CORA Cork Open Research Archive
Cartlann Taighde Oscailte Chorcaí

Title	Distributed ledger technology and financial market infrastructures: an EU pilot regulatory regime
Authors	McCarthy, Jonathan
Publication date	2022-05-26
Original Citation	McCarthy, J. (2022) 'Distributed ledger technology and financial market infrastructures: an EU pilot regulatory regime', Capital Markets Law Journal, 17(3), pp. 288-306. doi: 10.1093/cmlj/kmac009
Type of publication	Article (peer-reviewed)
Link to publisher's version	10.1093/cmlj/kmac009
Rights	© 2022, the Authors. Published by Oxford University Press. All rights reserved.
Download date	2026-11-04 04:15:19
Item downloaded from	https://hdl.handle.net/10468/13432

UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Distributed Ledger Technology and Financial Market Infrastructures: An EU Pilot Regulatory Regime

Jonathan McCarthy

Introduction

The release of the European Commission's Digital Finance Strategy in September 2020 [1] was a notable progression from previous initiatives for the regulation of FinTech within the European Union. Rather than persisting solely with a monitoring stance towards technological innovations in finance, the package published by the Commission evinces a more proactive approach through legislative intervention. As an indication of the scale of the Strategy, the package consists of three Regulation proposals. The proposed Regulation on a pilot regime for financial market infrastructures (FMIs), based on distributed ledger technology (DLT), [2] is of particular significance for its implications for securities trading and post-trading. At the time of publication, the final text of the Regulation has been adopted by the European Parliament at first reading.

Aside from its importance as a measure that will imminently affect European capital markets, the legislation warrants analysis as an especially suitable case example of a certain type of technology. Much is expected of DLT in its capacity to enhance market efficiencies, but it is a technology which remains laden with legal ambiguities. As relatively brief as the legislation is, the framework envisaged through the proposal serves as a lesson in the complexities involved when determining the extent of a pilot regime and the allocation of supervisory responsibilities.

[1] See European Commission's communication regarding the Digital Finance Strategy at: https://ec.europa.eu/info/publications/200924-digital-finance-proposals_en (date accessed: 21 April 2022)

[2] Proposal for a Regulation of the European Parliament and of the Council on a pilot regime for market infrastructures based on distributed ledger technology, COM(2020) 594/3 – 2020/0267 (COD) [hereinafter 'DLT Regulation Proposal'].

It raises questions as to the very purposes of the pilot regime in stimulating innovation, while ensuring sufficiently robust regulation. There is certainly more than meets the eye to the little sibling of the other Regulations within the Strategy.

As articulated in the Commission's proposal, there seems to be an awakening to the possibilities of DLT, but this may not be matched by an understanding of the technology and its uses. When outlining the legal basis for the measures, the proposal notes factors such as the benefits of assisting firms to be "able to exploit the full potential of the existing framework, allowing supervisors and legislators to identify obstacles in the regulation, while regulators and firms themselves gain valuable knowledge about the application of DLT." [3] Furthermore, it is expressed that a regime would "allow for real use cases and help build the necessary experience and evidence on which a permanent EU regulatory regime could be inspired." [4]

The article commences by establishing a context for the legislative proposal by appraising the broader impact of a pilot regime for the future course of FinTech-related regulation. The regime should be especially viewed in light of similar proposed EU initiatives for sandboxes in the regulation of artificial intelligence (AI). However, there are doubts as to whether the DLT pilot regime envisioned in this Regulation could completely fulfil the kinds of objectives usually attributed to sandboxes.

The article then delves into the detail of the proposal by reference to specific provisions. In explaining the eligibility for admission to the pilot regime, the article assesses the criteria provided for in relation to multilateral trading facilities (MTFs) and central securities depositories (CSDs). The article identifies the scope of the regime, including its shortcomings

[3] DLT Regulation proposal, Legal Basis, p.4.
[4] DLT Regulation proposal, Legal Basis, p.4.

relating to transferable securities. The procedures for the granting of specific permissions and exemptions reveal how the powers of national competent authorities overlap with the coordination role of the European Securities and Markets Authority (ESMA).

The potential of DLT to transform trading and settlement activities is startling. By its very technical format, there are legal dilemmas which are perennially associated with DLT. The dilemmas are not alleviated in circumstances where DLT has yet to be utilised to a meaningful extent in modern markets. There is ultimately very little that could be achieved by allowing a technology the opportunity to prove itself if the technology may not be believed in by market operators. By the same logic, it could be argued that it is the limited uptake for DLT which justifies the implementation of an EU-wide pilot regime.

Even within the confined scope of the legislation, a pilot regime should effectively enable evidence-based testing of technologies in practical settings. The pilot regime therefore carries profound repercussions for the potential integration of DLT and equivalent technologies within securities markets, but also within the wider financial services industry.

Embracing the sandbox approach?

In terms of FinTech regulation generally, the proposed pilot regime for DLT market infrastructures is closer to an EU-wide regulatory sandbox approach. For all of the similarities between regulatory sandboxes and pilot regimes, it should be acknowledged that there are nuanced differences between both. A sandbox and a pilot regime constitute examples of 'structured experimentalism', giving firms and financial institutions the opportunity to trial novel products, services and processes over set durations. Compared to the entry thresholds for

sandboxes, the distinctive characteristic of a pilot regime is its suitability for regulated entities which do not require prior, or restricted, authorisation. [5]

As pilots represent a strand within the same overall regulatory approach towards FinTech, it could be presumed that the usual features, advantages and limitations of sandboxes would be reflected by what is envisaged in the Regulation. However, it will be firstly argued that the proposed pilot regime does not exhibit the same onus on fresh innovation as typically associated with regulatory sandboxes (including analogous proposed measures related to AI). Secondly, the functions which are to be vested in ESMA mean that the pilot regime is planned as a standardised pan-EU model with ESMA coordinating oversight of national authorities. Yet, it is a model which is endowed with timelines that leave the regime open for significant review, or even termination, in due course.

Part of a pattern of fostering innovation and start-up growth?

By its eligibility conditions, the legislation is directed towards MTFs which comply with the requirements of the second Markets in Financial Instruments Directive (MiFID 2) [6] and the Markets in Financial Instruments Regulation (MiFIR) [7], and towards securities settlement systems operated by CSDs in accordance with the requirements of Central Securities Depository Regulation (CSDR). [8] The pilot regime is not explicitly intended to benefit start-up

[5] See especially D. Zetzsche, R. Buckley, J. Barberis and D. Arner, 'Regulating a Revolution: From Regulatory Sandboxes to Smart Regulation' (2017) 23 *Fordham Journal of Corporate and Financial Law* 31, 83–85. For a survey of the shared features of sandboxes and pilots, see World Bank Group, *Global Experiences from Regulatory Sandboxes* (Fintech Note No. 8) (Washington D.C., 2020).
[6] 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 (recast), OJ L 173.
[7] 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.
[8] 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.

firms. This marks a conspicuous difference between the regime and what is usually connoted by a regulatory sandbox for FinTech firms or products. Within the clinical trial or controlled sanctuary of a sandbox, firms are insulated from the consequences of possible breaches of, or non-compliance with, present regulatory requirements. [9] For instance, one of the world's most well-known sandboxes, that run by the Financial Conduct Authority in the UK, specifies eligibility criteria which include innovation that is "new or a significantly different offering in the marketplace", and where there is "a genuine need to test the innovation." [10]

Albeit an admittedly rather fluid concept, there are no such pre-requisites for 'innovation' contained in the wording of the Regulation proposal. It gives the overall impression of a pilot regime that is essentially for incumbent FMIs seeking to 'try out' or incrementally incorporate DLT within their ordinary activities, as opposed to introducing radically new or experimental processes in post-trading. The proposed pilot regime contrasts with the more recent Regulation proposal from the Commission in the related context of AI. [11] The AI Regulation proposal consists of a specific Title V with measures in support of innovation. Provision is made for designated AI regulatory sandboxes (supervised by national competent authorities and coordinated by a European AI Board) for "a controlled environment that facilitates the development, testing and validation of innovative AI systems for a limited time" before being placed on the market or into service, pursuant to a specific plan. [12]

[9] It should be borne in mind that sandboxes are but one aspect of a suite of possible regulatory options for promoting innovation, while ensuring the rigours of existing rules for non-regulated firms. Along with 'innovation hubs', the key objective of regulators is increasingly becoming to cultivate linkages of complementary supports for FinTech innovation. See further R. Buckley, D. Arner, R. Veidt and D. Zetzsche, 'Building Fintech Ecosystems: Regulatory Sandboxes, Innovation Hubs and Beyond' (2020) 61 *Washington University Journal of Law & Policy* 55.

[10] See https://www.fca.org.uk/firms/innovation/regulatory-sandbox-prepare-application (date accessed: 21 April 2022).

[11] Proposal for a Regulation of the European Parliament and of the Council laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) and amending certain Union legislative acts, COM(2021) 206 final – 2021/0106 (COD) [hereinafter 'AI Regulation proposal']

[12] AI Regulation proposal, Article 53.

By contrast to the pilot regime of the DLT Regulation proposal, eligible small-scale providers and start-ups are to be given priority access. [13] Awareness-raising activities tailored towards small-scale providers and start-ups are to be organised, [14] and a dedicated communication channel for small providers' queries to be established, where appropriate. [15] There are no similar measures favouring innovative small– and medium–sized enterprises (SMEs) within the DLT Regulation proposal. Nonetheless, the 'signalling' effect of the introduction of a pilot regime should not be underestimated. As expressed by Elisabeth Noble, the true import of the regime could be in its broadening of a 'dialogue' on the pursuit of innovation, through experimentation, but within defined regulatory parameters. [16]

Supervisory functions and the relevance of durations

Sandboxes – and, by extension, pilots – are now a feature of FinTech regulation in jurisdictions globally. [17] A preoccupation of regulators in designing such measures is the level of oversight which is expected of supervisors. If the relationship between regulators and entrant firms becomes unduly close, there is a heightened probability of regulatory 'capture', that is, of supervisors' impartiality becoming impaired. [18] As explained by Wolf-Georg Ringe and Christopher Ruof, similar problems complicate the design of a sandbox model on an EU-wide basis. [19] In order to guarantee consistency and proportionality of standards – if not uniformity

[13] AI Regulation proposal, Article 55(1)(a).
[14] AI Regulation proposal, Article 55(1)(b).
[15] AI Regulation proposal, Article 55(1)(c). Furthermore, under Article 55(2), fees are to be reduced in proportion to a provider's size when setting the fees for the conformity assessment of 'high-risk' AI systems.
[16] E. Noble, 'Towards a Common Framework for the Acceptance of DLT Applications in the EU Banking Sector' (Oxford Business Law Blog, 17 February 2021); available at: https://www.law.ox.ac.uk/business-law-blog/blog/2021/02/towards-common-framework-acceptance-dlt-applications-eu-banking (date accessed: 21 April 2022); and E. Noble, 'Crypto-Assets: Overcoming Challenges to Scaling – An EU Approach' (October 2020); available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3748343 (date accessed: 21 April 2022).
[17] For an example of an international overview, see UNSGSA–Cambridge Centre for Alternative Finance, *Early Lessons on Regulatory Innovations to Enable Inclusive FinTech: Innovation Offices, Regulatory Sandboxes, and RegTech* (2019).
[18] See especially H. Allen, 'Regulatory Sandboxes' (2019) 87(3) *George Washington Law Review* 579.
[19] W-G. Ringe and C. Ruof, ''Regulating FinTech in the EU: The Case for a Guided Sandbox' (2020) 11(3) *European Journal of Risk Regulation* 604.

– the exemplar is for a single EU institution to be entrusted with supervisory powers. However, since the *Meroni* doctrine militates against the entrusting of discretionary powers to a single EU authority or agency, national supervisors within Member States must retain their significance. An intermediate option of a 'guided' sandbox, coordinated by an EU institution, but directly overseen by national authorities, was astutely recommended by Ringe and Ruof. [20] Yet, there are obstacles to ensuring a more harmonised stance and to reducing fragmentation. [21]

If a paradigm of an EU-wide guided approach is to be achieved, then the Regulation proposal has come as close as could have been possible. As will be set out below, by issuing non-binding opinions to competent authorities at Member State level on specific permissions and exemptions, ESMA would hold the major influence in the admission of FMIs to the DLT pilot regime. This coordinating status is encapsulated by the kinds of requirements described below, including for ESMA to be notified of such occurrences as material changes to business plans, changes to information initially provided by participating FMIs, and cyber-threats or attacks. However, the timelines for a report and a review of the pilot regime do not instil confidence in the regime receiving the most resounding of endorsements in the medium-term.

Under Article 10 of the Regulation proposal, ESMA presents its report to the Commission five years from the entry into force of the Regulation. However, within the final text for adoption, it is to be a period three years from the date of the Regulation's entry into force. A specific permission for a DLT market infrastructure is to be valid for up to six years. [22] Relative to the

[20] W-G. Ringe and C. Ruof, ''Regulating FinTech in the EU: The Case for a Guided Sandbox' (2020) 11(3) *European Journal of Risk Regulation* 604, 622–628.
[21] It was easy to be circumspect, and perhaps pessimistic, prior to the release of the Digital Finance Strategy as to the idea of any form of EU sandbox-like regime being unveiled: see J. McCarthy, 'FinTech, Digital Finance and the EU's Regulatory Choices' (2020) 35(11) *Journal of International Banking Law and Regulation* 464, 473–4.
[22] DLT Regulation proposal, Articles 7(5) and 8(5).

durations by which a firm would generally engage in a sandbox, [23] it is tantamount to ESMA reviewing the efficacy of the regime shortly around the time an individual MTF or CSD-operated system is in and out after completing a trial use of DLT. The Commission's report would encompass a cost-benefit analysis to determine whether the pilot regime should be extended for another period, extended to other financial instruments, amended, made permanent, or terminated. [24]

By reserving the review and report to within three years, it is difficult to realistically expect a thorough approval of the pilot regime in circumstances where the uptake in the numbers of participating FMIs would be very limited. In view of certain constraints to the scope of the regime, there is the strong likelihood of subdued interest in the earliest stages, at any rate. The exception would be MTFs and CSDs which are almost already prepared to trial DLT systems anyway by the time of the legislation coming into effect.

The shape of the proposed pilot regime

The purpose of the Regulation proposal is to introduce a pilot regime for the anticipated 'tokenisation' of financial instruments. Tokenisation is described in the proposal as essentially being the "transformation into crypto-assets to enable them to be issued, stored and transferred on a distributed ledger", thereby leading to improved efficiency in trading and post-trading. [25] The use of DLT is seen to be capable of expediting trading and settlement "to nearly real-time" and could even result in merged trading and post-trading. [26]

[23] For example, the FCA sandbox permits an initial six months which can be renewed to an additional six months. By comparison, the Australian Securities & Investments Commission (ASIC) Enhanced Regulatory Sandbox allows for durations of up to 24 months.
[24] DLT Regulation proposal, Article 10(2).
[25] DLT Regulation proposal, Recital (2).
[26] DLT Regulation proposal, Recital (9).

Although the proposal concedes that EU financial services legislation "was not designed with DLT and crypto-assets in mind", [27] the expectations concerning DLT's putative efficacy for securities markets accordingly raise the expectations of any proposed legal framework. In order to understand the nature of the proposal, the eligibility criteria and the scope of the regime must be explained. Procedures regarding specific permissions and exemptions will clearly be intrinsic to the oversight of the regime. In clarifying the supervisory functions associated with this EU-wide regime, the role of ESMA is set to be a vital one.

Eligibility

As a regime intended to be devoted to a specific form of technology, the definition ascribed to DLT should be pivotal to the eligibility criteria. For the purposes of the original proposal, DLT means "a class of technologies which support the distributed recording of encrypted data." [28] There is a deceptive simplicity to the rather minimal wording. It is difficult to discern how the definition differs from an interpretation of blockchain technology generally. Aside from DLT, blockchain has gained renown as the decentralised technology underpinning crypto-assets such as the virtual currency Bitcoin. If the application of blockchain could be distilled to a single sentence, encrypted ('hashed') units are added to chains through a peer-to-peer process of validation, or consensus, which is dependent on proof-of-work (and, potentially for certain networks, on proof-of-stake). [29]

[27] DLT Regulation proposal, Recital (3).
[28] DLT Regulation proposal, Article 2(1).
[29] On the features of blockchain technology and the resulting legal and regulatory issues, see generally P. Hacker, I. Lianos, G. Dimitropoulos and S. Eich (eds.), *Regulating Blockchain: Techno-Social and Legal Challenges* (Oxford: Oxford University Press, 2019), P. De Filippi and A. Wright*., Blockchain and the Law. The Rule of Code* (Harvard: Harvard University Press, 2019), and C. Brummer (ed.), *Crypto-Assets: Legal, Regulatory and Monetary Perspectives* (Oxford: Oxford University Press, 2019). On how this technology applies to the workings of Bitcoin, see R. Bohme, N. Christin, B. Edelman and T. Moore, 'Bitcoin: Economics, Technology and Governance' (2015) 29(2) *The Journal of Economic Perspectives* 213.

Considering the sparingly worded definition of DLT in the proposal and the possibility for overlap with what blockchain typically denotes, it can be legitimately questioned as to whether the pilot regime would be exclusively focused on DLT. The proposal does not shed light on the likelihood of future variations of DLT systems being acceptable within the regime. All in all, the dearth of clear differentiation in terminology is an innate problem in FinTech regulation. For instance, research from the Cambridge Centre for Alternative Finance describes DLT as a consensus mechanism through a multi-party system in which participants agree on a set of shared data and its validity. [30] Without a single, central point of control, electronic records are cryptographically validated by nodes as the participants of the system. The shared data consequently forms an authoritative 'ledger'. However, the same report recognises that "[c]oncomitant with the expansion and evolution in types and uses of DLT has been the widespread use of language and terminology which is frequently fuzzy, imprecise and inconsistent across different projects." [31]

The confused terminology even causes ambivalence as to whether blockchain and DLT should be interchangeable terms and signifying the same thing, or whether DLT is, in effect, a sub-set of blockchain. [32] For any practical consideration of DLT usage in securities markets, the most telling determinant may be that DLT should involve a *permissioned* network of participants as nodes. Even after trying to clarify the technical ambiguities, what then should constitute a network, or DLT market infrastructure, within the proposal?

[30] M. Rauchs, A. Glidden, B. Gordon, G. Pieters, M. Recanatini, F. Rostand, K. Vagneur, and B. Zhang, *Distributed Ledger Technology Systems. A Conceptual Framework* (Cambridge Centre for Alternative Finance, August 2018).
[31] M. Rauchs, A. Glidden, B. Gordon, G. Pieters, M. Recanatini, F. Rostand, K. Vagneur, and B. Zhang, *Distributed Ledger Technology Systems. A Conceptual Framework* (Cambridge Centre for Alternative Finance, August 2018), p. 16.
[32] See A. Walch, 'The Path of the Blockchain Lexicon (and the Law)' (2016-17) 36 *Review of Banking & Financial Law* 713.

A ‘DLT market infrastructure’ is stated as referring to either an MTF or a securities settlement system. [33] An MTF is defined in accordance with Article 4(1)(22) of MiFID 2. A securities settlement system is one which is operated by a CSD as provided for by Article 2(1) of CSDR. A DLT MTF should only admit the trading of DLT transferable securities and may be permitted to, firstly, ensure the securities’ initial recording; secondly, settle DLT transferable securities transactions against payment; and, thirdly, provide safekeeping services for securities and, where applicable, for related payments and collateral. [34] A DLT securities settlement system, operated by a CSD, is to settle transactions in DLT transferable securities against payment. [35]

When assessing the eligibility conditions, the two-fold categorisation of market infrastructures immediately draws curiosity. As expressed by the European Central Bank Opinion on the Regulation proposal, [36] does the categorisation mean that a CSD operating an MTF, as well as a DLT settlement system, could be recognised as eligible for the pilot regime? The original provisions’ omission in noting possible interactions between MTFs, settlement systems and CSDs diminishes the consistently reiterated goal of the EU Digital Finance Strategy to maintain a ‘same activity, same risks, same rules’ principle. [37] To facilitate a sought-after level playing field of market participants, a proposed pilot regime would need to be cognisant of the pitfalls in designating operators using a one-or-other approach.

Scope

Article 3 of the Regulation proposal limits DLT transferable securities to two types which are admissible to an MTF or to a settlement system operated by a CSD. Firstly, the transferable

[33] DLT Regulation proposal, Article 2(2).
[34] DLT Regulation proposal, Article 2(3).
[35] DLT Regulation proposal, Article 2(4).
[36] ECB Opinion, 28 April 2021 (CON/2021/15).
[37] European Commission, A Digital Finance Strategy for the EU, COM(2020) 591 final.

securities are to include shares, for which the issuer has a market capitalisation, or tentative capitalisation value, of less than €200 million. [38] Secondly, transferable securities can be bonds (convertible, covered, corporate, public or otherwise) with an issuance size of less than €500 million. [39] Sovereign bonds are not to be admitted for trading or recorded by a DLT market infrastructure within the pilot regime. [40] The scope of the pilot regime is thus curtailed by the conditions it imposes on admissible securities. Moreover, it constrains the capacity of the pilot regime to boost innovation in the application of DLT to securities markets. [41]

The limitations on forms of admissible securities are made especially restrictive from a strictly literal reading of the provisions. Transferable securities (in line with the requirements of Article 4(1)(44) of MiFID 2) are to be issued, traded, recorded and stored, all using DLT. [42] When interpreting this obligation in combination with the requirement for shares and bonds only, the possible range of securities that could be permitted under the pilot regime would be narrowed.

The total market value of DLT transferable securities recorded by the operator of DLT MTF, or by a CSD operating a securities settlement system, should not exceed €2.5 billion. [43] The value should be determined daily and should be equal to the sum of the daily closing price of each admitted security, multiplied by the number of securities with the same ISIN (International Securities Identification Number) settled by the market infrastructure on the

[38] DLT Regulation proposal, Article 3(1)(a). On the first reading of the proposal before the European Parliament, the limitation on the shares value is raised to €500 million.
[39] DLT Regulation proposal, Article 3(1)(b). On the first reading of the proposal before the European Parliament, the limitation on the bonds value is increased to €1 billion.
[40] DLT Regulation proposal, Article 3(2).
[41] A shortcoming which is also particularly pinpointed in D. Zetzsche and J. Woxholth, 'The DLT Sandbox under the Pilot Regulation' (University of Luxembourg Law Working Paper Series, 2021-001); available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3833766 (date accessed: 21 April 2022).
[42] DLT Regulation proposal, Article 2(5).
[43] DLT Regulation proposal, Article 3(3). This is being extended to €6 billion within the final text for adoption.

same day, whether in full or in part. [44] Where the total value is to reach a certain amount, [45] a market infrastructure should activate a transition strategy or winding-down.

The requirement for a transition strategy is included amongst additional requirements for DLT market infrastructures. Although the strategy is stipulated to be 'clear', 'detailed' and 'publicly available', there is no extensive detail provided for within the proposal. A strategy should be "deployed in a timely manner", while setting out how members, participants, issuers and clients are to be treated in the event of withdrawal, discontinuation and cessation. [46] Even if the strategy can be updated with the prior consent of the competent authority concerned, there is sparse guidance as to the ideal content of a strategy. [47]

As well as the transition strategy, operators should establish clear and detailed business plans. Electronically available written documentation should be prepared, including agreed legal terms (affecting operators, members, participants, issuers and/or clients) along with specification of the governing law, the pre-litigation dispute settlement mechanism and the jurisdiction for instituting legal proceedings. [48] Clear and unambiguous information must be provided on the websites of operators of DLT market infrastructures, including on how performance deviates from that of an ordinary MTF or settlement system. [49] CSDs operating DLT systems are to be expressly obliged to establish rules on the functioning of the DLT being utilised. [50]

[44] DLT Regulation proposal, Article 3(4).
[45] It is specified as €2.75 billion in the provisions of the Regulation proposal but is increased to €9 billion for the final adopted text.
[46] DLT Regulation proposal, Article 6(6).
[47] See also ECB Opinion, 28 April 2021 (CON/2021/15), para. 3.6.
[48] DLT Regulation proposal, Article 6(1). It is stated that business plans should describe how operators intend to carry out their services and activities, including a description of critical staff, technical aspects and the use of the DLT.
[49] DLT Regulation proposal, Article 6(3).
[50] DLT Regulation proposal, Article 6(2). The rules should include those for accessing the DLT, for the participation of validating nodes, for addressing potential conflicts of interest, and for risk management (as well as mitigation measures).

Requirements in respect of transparency, arrangements for data and mitigation of operational risk are included within the legislation. The requirements are reinforced by provision for an audit (as appointed by the competent authority) to assess the reliability of the overall IT and cyber arrangements of the market infrastructure. [51] The breadth of obligations extends to the safekeeping of funds and of records of the transferable securities held by the DLT market infrastructure. An FMI's own funds are to be segregated from the assets of members, participants, issuers and clients. The overall IT and cyber arrangements should ensure protection from risks of unauthorised access, hacking, degradation, loss, attack or theft. [52]

Specific permissions and exemptions

Respective categories of specific permissions and exceptions are provided for in relation to DLT MTFs and to CSDs operating securities settlement systems. As emphasised in the next section, permissions carry a central importance to the proposal in enabling the passporting of market infrastructures across EU Member States for the duration of a permission.

For MTFs in the pilot regime, the requirements under MiFID 2 and MiFIR will apply, subject to a number of exceptions. [53] An operator may expressly request an exemption which can be approved by a competent authority (by virtue of Article 7 of the Regulation proposal), where an operator complies with the additional requirements on infrastructures under Article 6, and where the operator complies with the conditions specified within Article 4. These include compensatory measures which the competent authority may deem appropriate, or "to ensure

[51] DLT Regulation proposal, Article 6(4). The DLT market infrastructure is to bear the costs of an audit. It is also specified that arrangements should ensure the reliability of smart contracts used on the DLT.
[52] DLT Regulation proposal, Article 6(5).
[53] DLT Regulation proposal, Article 4(1).

investor protection, market integrity and/or financial stability." [54] The grounds by which a competent authority may deem compensatory measures to be appropriate include: for the recording of DLT transferable securities; for the total number of recorded DLT transferable securities to equate to the total number of securities in circulation on the DLT infrastructure at any given time; and for records to be kept which enable the segregation of DLT transferable securities, without undue delay at any given time. [55]

When a DLT MTF operator requests an exemption, it is required, through "robust procedures and arrangements", to satisfy criteria ranging from ensuring the recording of the total number of admissible securities in circulation, the safekeeping of securities, and the clear, accurate and timely confirmation of payment and settlement. Settlement should be close to real-time or within the day, and, in any case, no later than on the second business day after the conclusion of a trade. [56]

For CSDs that operate DLT securities settlement systems in the pilot regime, the requirements of CSDR will apply, subject to the equivalent exceptions as for DLT MTFs (that is, an exemption granted by a competent authority; where there is compliance with Article 6 additional requirements; and where there is compliance with conditions, including compensatory measures and if deemed appropriate by a competent authority). [57] Compared to DLT MTFs, the proposal goes further in allowing for dedicated exemptions available to CSDs. CSDR requirements on dematerialised form, transfer of orders, securities accounts, recording of securities, integrity of issue, and segregation of assets can all be exempted by request to a competent authority. [58] In order to attain an exemption, a requesting CSD must demonstrate

[54] DLT Regulation proposal, Article 4(1)(c).
[55] DLT Regulation proposal, Article 4(2).
[56] DLT Regulation proposal, Article 4(3)(a)–(g).
[57] DLT Regulation proposal, Article 5(1).
[58] DLT Regulation proposal, Article 5(2).

that the use of a securities account, or of book-entry form, is incompatible with its use of a DLT system. [59] The CSD may also propose compensatory measures to ensure the recording of the DLT transferable securities, the equal recording of the number of admitted securities with those issued within the system, and the keeping of records to enable the segregation of DLT transferable securities, without undue delay at any given time. [60]

Particular exemptions are also available from CSDR provisions (Articles 19 and 30) on the outsourcing of CSD activities and services to third parties. [61] CSDs operating DLT settlement systems must satisfy a competent authority that the CSDR provisions are not compatible with the envisaged use of the DLT. [62] A CSD must still act in compliance with requirements of Article 30(1)(c) to (i) of CSDR, whereby CDRs retain certain responsibilities under the outsourcing arrangement, and with Article 30(2), whereby a written agreement (which can be terminated by the CSD) defines the rights and obligations of the CSD and service provider. [63] CSDs may also request exemptions from CSDR provisions (Articles 50 and 53) on standard link access rights and on access between a CSD and another CSDR market infrastructure. Within the pilot regime, a CSD making this request must demonstrate that the use of DLT is incompatible with other legacy systems, or that the granting of access would trigger "disproportionate costs." [64] The provisions do not extend to proffering either an indication of how 'incompatibility' could be construed, or a way of gauging how costs could be adjudged to be 'disproportionate'.

[59] DLT Regulation proposal, Article 5(2)(a).
[60] DLT Regulation proposal, Article 5(2)(b)–(e).
[61] DLT Regulation proposal, Article 5(3).
[62] DLT Regulation proposal, Article 5(3)(a).
[63] DLT Regulation proposal, Article 5(3)(b).
[64] DLT Regulation proposal, Article 5(6).

For ‘participants’ in a settlement system, as defined in Article 2(19) of CSDR, the Regulation proposal permits CSDs operating DLT systems to admit other examples of natural and legal persons. [65] Firstly, such persons must be of “sufficient good repute and are fit and proper.” [66] Secondly, these persons must have “sufficient level of ability, competence, experience and knowledge of the post-trading and functioning of the DLT.” [67] There are no supplementary details given in the provisions as to how these qualities and attributes of additional participants are to be objectively ascertained. It is yet another aspect of the proposal which underscores the vital role of competent authorities (and ESMA) in deciding on permissions and in making determinations on when exemptions should, or should not, apply.

CSDs are exempted from the CSDR provisions (Article 40) obliging settlement of cash payments through central bank accounts for transactions which are denominated in the currency of the jurisdiction in which settlement takes place. [68] In terms of DLT MTFs and CSDs alike, it should be noted that the provisions specify that settlement of payments should be carried out through ‘central bank money’ where practicable and available. Where it is not practicable and available, ‘commercial bank money’, including in token-based and e-money forms, may be used, while the operator is to take necessary precautions to mitigate counterparty risk. [69]

In one sense, the insertion of the provisions on commercial bank money is designed to juxtapose with the Markets in Crypto-Assets (MiCA) Regulation proposal [70] in the Digital Finance Strategy. However, it could be argued that the inclusion of the possibility for

[65] DLT Regulation proposal, Article 5(4).
[66] DLT Regulation proposal, Article 5(4)(a).
[67] DLT Regulation proposal, Article 5(4)(b).
[68] DLT Regulation proposal, Article 5(5).
[69] DLT Regulation proposal, Article 4(3)(f) and Article 5(5).
[70] Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-Assets, and amending Directive (EU) 2019/1937, COM(2020) 593/3 – 2020/0265 (COD).

commercial bank money creates needless confusion when trying to define instances of non-*fiat* currency that could be acceptable for settlement through a DLT market infrastructure. The quandary is identified by the ECB Opinion on the proposal. The ECB Opinion describes it as "difficult to understand why the Union legislative bodies would want to require, on the one hand, that e-money tokens can only be issued either by credit institutions or e-money institutions", as obliged under the MiCA proposal, but, while also, "on the other hand, to implicitly open the door to settling the cash leg of securities transactions in traditional cash or settlement coins through accounts opened with persons which are not licensed as credit institutions." [71]

The ambiguities could, at least, be reduced by the limiting of a requested exemption to a particular DLT MTF or the securities settlement system. An exemption would not extend to any other MTF or settlement system of the same operator. [72] Yet, the somewhat cursory manner by which exemptions are listed in the provisions infers that much will depend on the procedures by which competent authorities can grant permissions. Moreover, there is a vagueness which permeates several of the criteria, especially when adjudging the incompatibility of DLT with existing rules for MTFs and CSDs. [73] The onus would not merely be on competent authorities to instil clarity and the role of ESMA in the regime is decisive.

[71] ECB Opinion, 28 April 2021 (CON/2021/15), para. 3.3.7.
[72] DLT Regulation proposal, Article 4(4)(b) and Article 5(7)(b).
[73] See also the discussion of the incompatibility requirements in D. Zetzsche and J. Woxholth, 'The DLT Sandbox under the Pilot Regulation' (University of Luxembourg Law Working Paper Series, 2021-001).

Competent authorities and the role of ESMA

In order for specific permission to be granted to operate either a DLT MTF or securities settlement system, an application must be presented to a national competent authority. [74] The proposal defines a competent authority as one which is recognised in accordance with Article 67 of MiFID 2, Article 11 of CSDR, or "otherwise designated by the Member States for the purposes of overseeing" the proposed Regulation. [75] Before a decision is made on an application, the competent authority of the applicant's home Member State must notify ESMA. ESMA is to be furnished by the competent authority with all relevant information regarding the application, an explanation of the exemptions being requested, the justifications for these requests and any proposed compensatory measures. [76]

After receipt of the notification, ESMA should issue a "non-binding opinion" to the competent authority. Recommendations are to be made by ESMA on the requested exemptions which are "necessary to ensure investor protection, market integrity and financial stability." [77] The objective should therefore be to "promote consistency and proportionality" in the granting of exemptions. In accomplishing this, ESMA should consult with, and take account of the views of, the competent authorities of other Member States. [78]

Specific permissions can be refused by competent authorities if there are objective grounds for believing, firstly, that there are significant risks to investor protection, market integrity or financial stability which the applicant has not properly addressed or mitigated; and, secondly,

[74] The informational requirements on applicants are set out in Article 7(2) in respect of DLT MTFs and in Article 8(2) in respect of DLT settlement systems.
[75] DLT Regulation proposal, Article 2(21).
[76] DLT Regulation proposal, Article 7(3) and Article 8(3).
[77] DLT Regulation proposal, Article 7(3) and Article 8(3).
[78] DLT Regulation proposal, Article 7(3) and Article 8(3).

that the requested permissions and exemptions would circumvent existing legal and/or regulatory requirements. [79]

Once a specific permission is granted, the DLT market infrastructure is to be passported across Member States as the approval remains valid throughout the EU for up to six years from the date of the permission. A list of DLT market infrastructures under the pilot regime, the permission start and end dates, and the relevant exemptions for each infrastructure should be published on ESMA's website. [80] However, the involvement of ESMA does not cease simply at the stage of the granting of a permission. Following consultation with ESMA, a permission can be withdrawn by a competent authority.

In relation to DLT MTFs and settlement systems, withdrawal of permission can be based on, *inter alia*: a flaw in the functioning of the DLT, a risk to investor protection, market integrity and financial stability which outweighs the benefits of experimentation, a breach of conditions attached to an exemption, the trading or recording of financial instruments that are not within the scope of the proposal, an exceeding of the value thresholds for an eligible market infrastructure, or where it transpires that a permission or related exemptions were granted on the basis of misleading information (including material omissions). [81]

ESMA is to maintain its pivotal position in the continuance of a DLT market infrastructure's participation in the regime. Any proposed material change to an infrastructure's business plan must be notified to not only the competent authority, but also to ESMA, before the change is planned. [82] In addition to competent authorities, ESMA should be notified of any evidence of unauthorised access, material malfunctioning, loss, cyber-attacks or other cyber-threats, fraud,

[79] DLT Regulation proposal, Article 7(4) and Article 8(4).
[80] DLT Regulation proposal, Article 7(5) and Article 8(5).
[81] DLT Regulation proposal, Article 7(6) and Article 8(6).
[82] DLT Regulation proposal, Article 9(1)(a).

theft or other serious malpractice suffered by the DLT market infrastructure. [83] ESMA should equally be notified of material changes to the information originally provided by an infrastructure when applying for specific permission. [84] Any technical or operational difficulties, [85] and risks to investor protection, market integrity or financial stability [86] must be brought to the notice of the competent authority and ESMA. Furthermore, if a competent authority is to require a DLT market infrastructure to take corrective measures to a business plan, ESMA should be consulted with beforehand. [87]

Every six months, a DLT market infrastructure should submit a report (including details of the number and value of transferable securities traded and settled) to both the competent authority concerned and ESMA. [88] In the express wording of the provisions, ESMA is envisioned to assume a "coordination role between competent authorities" and to facilitate "building a common understanding" of DLT and the market infrastructures using this technology. As an added consequence, a "common supervisory culture and convergent supervisory practices" are to be ensured. [89] As well as annual reports to be submitted to the Commission, [90] ESMA is to be responsible for the presentation of a report to the Commission on the application of the Regulation after its entry into force. [91]

As highlighted above with regard to supervisory functions and durations, the range of powers accorded to ESMA – and the input towards the eventual review of the pilot regime – give a semblance of more centralised oversight than may be expected. Rather than being a fragmented

[83] DLT Regulation proposal, Article 9(1)(b).
[84] DLT Regulation proposal, Article 9(1)(c).
[85] DLT Regulation proposal, Article 9(1)(d).
[86] DLT Regulation proposal, Article 9(1)(e).
[87] DLT Regulation proposal, Article 9(3).
[88] DLT Regulation proposal, Article 9(4)
[89] DLT Regulation proposal, Article 9(5).
[90] DLT Regulation proposal, Article 9(6).
[91] DLT Regulation proposal, Article 10(1).

set of procedures, founded on specific permissions awarded through the varying standards of national authorities, the regime's consistency could be enhanced by ESMA's overarching role.

Suitability of DLT for a pilot regime

Although the regime's introduction appears a pioneering initiative, the purported advantages of DLT for securities trading and post-trading have been voiced since the very emergence of the technology. However, there are salient risks which could threaten to undercut its impact. In leading towards the article conclusion, it is necessary to weigh the potential of DLT against the resulting legal dilemmas so as to fully grasp the technology's probable impact at a market level and its suitability for a pilot regime.

The potential of DLT in securities trading and post-trading

As a signal of the EU-level research and policy discussions which have motivated legislative intervention, the most notable report of recent times on the uses of DLT in securities markets is that of the ECB's Advisory Groups on Market Infrastructures for Securities and Collateral and for Payments from 2021. [92] It followed previous reports from 2017 and 2019, [93] which, in turn, elaborated on the issues identified in a 2016 ECB paper by Andrea Pinna and Wiebe Ruttenberg. [94] The speed of transaction settlement and finality (enabling execution of payments on an almost real-time basis, if not within a business day) is a predominant factor reiterated by

[92] ECB Advisory Groups on Market Infrastructures for Securities and Collateral and for Payments, *The Use of DLT in Post-Trade Processes* (April 2021).
[93] ECB Advisory Groups on Market Infrastructures for Securities and Collateral and for Payments, *The Potential Impact of DLTS on Securities Post-Trading Harmonisation and on the Wider EU Financial Market Integration* (September 2017); ECB Advisory Groups on Market Infrastructures for Securities and Collateral and for Payments, *Potential Use Cases for Innovative Technologies in Securities Post-Trading* (January 2019).
[94] A. Pinna and W. Ruttenberg, 'Distributed Ledger Technologies in Securities Post-Trading. Revolution or Evolution?' (ECB Occasional Paper No. 172) (April 2016).

all of the reports. [95] Cost-efficiency can also be yielded by a DLT network equipped with appropriate governance structures and technical interoperability with existing clearing and settlement systems. [96] As conveyed by Pinna and Ruttenberg (including by means of succinct diagrams), layers of the post-trade market would potentially be made redundant by the use of DLT networks. [97] Aside from the pace and the decreased expense of settlement finality through DLT, the benefits should extend across securities markets by the alleviation of systemic risk, depending on the degree of prior reliance on particular counterparties and CSDs. [98]

If it can be reduced to a simplistic explanation, the planned application of DLT to securities trading and post-trading is characterised by tokenisation. The ideal (perhaps even idealistic) format is for financial instruments to be completely represented as on-chain tokens when issued. Securities could subsequently be traded through a permissioned network of nodes. Settlement, and the recording of a transaction, would then be visible through the validated addition of a unit on the chain, or, in effect, an entry on the ledger. Consensus, in allowing for a new entry, is brought about by an automated 'smart contract'. [99] For MTFs in trading and for CSDs in settlement and recording, there would be transformative implications of integrating DLT into current activities, even when those activities involve an array of interlinked phases.

The original appeal of DLT recording of transactions was that an authoritative, unchangeable and 'tamper evident' ledger could be accessed and viewed by all participants. However, the

[95] See also D. Zetzsche and J. Woxholth, 'The DLT Sandbox under the Pilot Regulation' (University of Luxembourg Law Working Paper Series, 2021-001),

[96] These are the prominent factors which are especially noted in ECB Advisory Groups on Market Infrastructures for Securities and Collateral and for Payments, *The Use of DLT in Post-Trade Processes* (April 2021).

[97] As merely one evocative example, see Diagram 3 in A. Pinna and W. Ruttenberg, 'Distributed Ledger Technologies in Securities Post-Trading. Revolution or Evolution?' (ECB Occasional Paper No. 172) (April 2016).

[98] For an analysis of the possible effects of DLT in diminishing the risk arising from interconnectedness in derivatives markets, see E. Avgouleas and A. Kiayias, 'The Promise of Blockchain Technology for Global Securities and Derivatives Markets: The New Financial Ecosystem and the 'Holy Grail' of Systemic Risk Containment' (2019) 20(1) *European Business Organization Law Review* 81.

[99] The smart contract idea was first postulated by the cryptographer, Nick Szabo, in papers and articles from the mid-1990s.

supposed 'immutability', or irreversibility, of data entered on blockchain-style systems has already been questioned. [100] As regards securities post-trading, the prospects of rectification of errors and alteration of the golden copy of a ledger have unsurprisingly been considered in the ECB Advisory Groups' report. As accepted in the report, "…it remains to be clarified how unpredictable events can be flagged and monitored in a decentralised environment", in addition to a need for clarity on "what protocols and standards to adopt in order to ensure the integrity and consistency of the information and the efficiency of data flows among network participants and external parties." [101]

In principle, the possibility for DLT systems to operate in combination with off-chain transactions is an alluring means of rejuvenating traditional methods of settlement and recording, but without sacrificing elements which have gradually become ingrained in market activities. In practice, the interaction between on-chain representations and transactions external to the DLT system may not be as seamless as aspired to. A form of application programming interface (API) is vital as a bridge towards ensuring that transactions are ultimately represented on the ledger. Concerns over interoperability and standardised messaging quickly surface. [102] An API should be implemented only on the grounds of extensive technical testing and of delivery-versus-payment reliability. Nonetheless, as the proof of the pudding in demonstrating how adoption of this technology is far from fanciful, there is evidence of successful test uses of DLT and tokenised systems.

---

[100] See particularly C. Millard, 'Blockchain and Law: Incompatible Codes?' (2018) 34 *Computer Law and Security Review* 843. In M. Rauchs, A. Glidden, B. Gordon, G. Pieters, M. Recanatini, F. Rostand, K. Vagneur, and B. Zhang, *Distributed Ledger Technology Systems. A Conceptual Framework* (Cambridge Centre for Alternative Finance, August 2018), p. 35, it is asserted that the 'popular belief' of immutability for transaction finality will actually vary by how a given system is designed.

[101] ECB Advisory Groups on Market Infrastructures for Securities and Collateral and for Payments, *The Use of DLT in Post-Trade Processes* (April 2021), at 3.2.3.3 (p.25).

[102] On interoperability, see especially ECB Advisory Groups on Market Infrastructures for Securities and Collateral and for Payments, *The Use of DLT in Post-Trade Processes* (April 2021) at 1.3 (pp. 9-11), and, on recommendations for the standardisation of messaging, the same report at 3.2.3.2 (pp. 23-24).

Examples set out in Annex 1 of the Advisory Groups' report include the Australian CHESS system of digitally recording (as tokens) securities which are issued and registered outside of the Australian Stock Exchange. [103] Other examples are Banco Santander's launch of a digital token to represent issued bonds, the ID2S CSD's establishment of a blockchain recording system, and the SIX Digital Exchange's use of a DLT-based system for safekeeping of native digital assets. At the risk of relying only on examples presented in recent reports, the existence of a pilot regime would, at least, offer opportunities for further instances of DLT experimentation involving FMIs.

Legal dilemmas of DLT

The rewards of DLT in securities markets are countered by the types of technical hurdles indicated above. There are also more conventionally legal dilemmas. Legal ambiguities are manifested in the sheer murkiness regarding allocation of liability within DLT networks. It is a problem which is particularly elucidated by Dirk Zetzsche, Ross Buckley and Douglas Arner. [104] Of the issues discussed in the analysis of Zetzsche, Buckley and Arner, it could be argued that complexities relating to conflicts of laws and to dispute resolution are slightly mitigated by the wording of provisions implementing the pilot regime. Even if it is confined to EU Member States, operators' documentation must state the governing law, the available pre-litigation dispute resolution mechanism and the jurisdiction for commencing legal actions. [105] However, the reasons for legal uncertainty surrounding DLT are more multi-faceted than this.

[103] On the proposals to integrate a blockchain-DLT settlement system within the Australian Stock Exchange, see: https://www.ledgerinsights.com/asx-delays-blockchain-settlement-system-chess/ (date accessed: 21 April 2022), and https://www.afr.com/companies/financial-services/asx-finishes-new-chess-build-sends-to-market-for-testing-20210628-p584t8 (date accessed: 21 April 2022).
[104] D. Zetzsche, R. Buckley and D. Arner, 'The Distributed Liability of Distributed Ledgers: Legal Risks of Blockchain' (2018) 4 *University of Illinois Law Review* 1361.
[105] DLT Regulation proposal, Article 6(1).

The challenges can be attributed to aspects as varied as the decentralised nature of DLT, the hasty eagerness to readily apply a nascent technology to all sorts of economic activities, and to the use of smart contracts in the DLT-based recording and execution of transactions. Firstly, with connected network participants and with no controlling authority, the notion of 'decentralisation' is at the foundation of how DLT works. As cautioned by the Cambridge Centre for Alternative Finance, decentralisation could be imprudently considered an end in itself, rather than a means to an end. [106] In securities trading and post-trading, there are several market participants involved and myriad processes occurring which may not be satisfactorily captured by neat representations on a digital ledger. In respect of tort law, it signifies that ascertaining proximity of relationships, leading to a duty of care when liability should be allocated in cases of pure economic loss, could be frustrated by the use of decentralised technology. [107] In a peer-to-peer system of nodes, a tamper-proof format is difficult to maintain when there are more participants involved. Cyber-threats (such as denial of service (DDOS) attacks, or Sybil and 51% attacks that aim to seize control of network nodes) generate familiar questions of liability in the event of loss or theft. [108]

Secondly, there are risks in scampering to harness DLT and blockchain for a variety of activities, without fully contemplating the necessity of the technologies for the functions to be performed. This perspective is epitomised in the vociferously scathing critique by Kelvin Low and Eliza Mik of the hype around blockchain and DLT, not only for the potential uses for

[106] M. Rauchs, A. Glidden, B. Gordon, G. Pieters, M. Recanatini, F. Rostand, K. Vagneur, and B. Zhang, *Distributed Ledger Technology Systems. A Conceptual Framework* (Cambridge Centre for Alternative Finance, August 2018), p. 44.
[107] See D. Zetzsche, R. Buckley and D. Arner, 'The Distributed Liability of Distributed Ledgers: Legal Risks of Blockchain' (2018) 4 *University of Illinois Law Review* 1361, 1396–1398.
[108] These are questions pertinent to DLT market infrastructures which are not entirely resolved either by another Regulation proposal within the Digital Finance Strategy on digital operational resilience for the financial sector (the 'Digital Operational Resilience Act' (DORA)): Proposal for a Regulation of the European Parliament and of the Council on Digital Operational Resilience for the Financial Sector and Amending Regulations (EC) No 1060/2009, (EU) No 648/2012, (EU) No 600/2014 and (EU) No 909/2014, COM(2020) 595 final – 2020/0266 (COD).

securities. [109] As the "damp, and regrettably widely distributed, squib" of supposedly revolutionary innovations of the modern era, blockchain is seen by Low and Mik as the subject of multiple misconceptions articulated by lawyers and technologists alike. For Low and Mik, a practical illustration is how easy a case can be made for blockchain asset registries for single issuances of securities. By contrast, for trading of derivatives or for inter-bank transfers, one apparently authoritative ledger is unlikely to adequately subsume the input of numerous intermediaries. The remedy would be to create "not one ledger, but hundreds of thousands of inter-linked sub-ledgers, which, if they utilise different blockchains, create problems of interoperability." [110] Moreover, Low and Mik opine that the reliance on coding, through smart contracts, only exacerbates blockchain's inherent deficiencies. The outcome is that "a tremendous amount of effort has been exerted by lawmakers throughout the world towards accommodating blockchain in the law" even when reforms "demonstrate zero acknowledgement of the technology's limitations and provide no answers to obvious challenges to its use." [111]

Thirdly, if a smart contract in a DLT is an example of code or software, will it ever be genuinely possible to apply the orthodox rules of contract law to something which is not really a contract at all in the commonly understood sense? Having moved well beyond the comparably carefree and halcyon days of Carbolic smokeballs of the late 19th century, the task of distinguishing an offer, an acceptance, the ingredient of consideration, and an intention among parties to create legal relations, appears a forlorn one in a contemporary setting of DLT network participants and consensus validation. By and large, assessments provided by legal academics and

[109] K. Low and E. Mik, 'Pause the Blockchain Legal Revolution' (2020) 69(1) *International & Comparative Law Quarterly* 135.
[110] K. Low and E. Mik, 'Pause the Blockchain Legal Revolution' (2020) 69(1) *International & Comparative Law Quarterly* 135, 162.
[111] K. Low and E. Mik, 'Pause the Blockchain Legal Revolution' (2020) 69(1) *International & Comparative Law Quarterly* 135, 174.

commentators range from being dubious as to whether code or programming could constitute a legally binding contract, [112] to asking whether smart contracts compel a re-appraisal of how legally enforceable contracts should be defined (even as relational arrangements), [113] to pragmatically accepting that smart contracts are symptomatic of continuous waves of automated innovations which will always prove incongruous, to some degree, with established premises of contract law. [114]

For securities markets, an especially crucial issue revolves around the transferability of proprietary rights for instruments which are digitally represented as tokens or as entries on a ledger. The ECB Advisory Groups report pointedly makes a distinction between the issuance of tokens and the issuance of securities. Ownership entitlements exist over a security since "the process of issuing tokens merely representing securities is a technical matter which may not be relevant to parties who are not directly involved in operating the system." [115] However, the report does add a caveat by noting that this distinction subsists when transfers are taking place on regulated markets. The trading of tokens on non-regulated markets prompts questions as to the links between tokens and underlying securities, even though the Advisory Groups report emphatically insists that "the act of "tokenising" cannot in itself create a security." [116] It is this necessity for regulated markets which can be seen as a spur for the formulation of a DLT pilot regime. Notwithstanding the legal dilemmas and ambiguities, the pilot regime should aid experimentation, testing and, indeed, the increased awareness of technical and legal problems.

[112] See E. Mik, 'Smart Contract: Terminology, Technical Limitations and Real World Complexity' (2017) 9(2) *Law, Innovation and Technology* 269, and A. Guadamuz, 'All Watched Over by Machines of Loving Grace: A Critical Look at Smart Contracts' (2019) 35 *Computer Law and Security Review* 105338.
[113] See S. Wheeler, 'Visions of Contract' (2017) 44(S1) *Journal of Law and Society* S74, and R. Brownsword, 'Regulatory Fitness: Fintech, Funny Money, and Smart Contracts' (2019) 20(1) *European Business Organization Law Review* 5.
[114] K. Werbach and N. Cornell, 'Contracts *Ex Machina*' (2017) 67(2) *Duke Law Journal* 313.
[115] ECB Advisory Groups on Market Infrastructures for Securities and Collateral and for Payments, *The Use of DLT in Post-Trade Processes* (April 2021), at 3.1.2 (p. 17).
[116] ECB Advisory Groups on Market Infrastructures for Securities and Collateral and for Payments, *The Use of DLT in Post-Trade Processes* (April 2021), at 3.1.2 (p. 18).

Conclusion

When seeking to design an EU sandbox-like approach, the legislation takes a shrewd approach in crafting a specialised regime for a specific technology which is to be used for certain activities in securities markets. Furthermore, it can be passported across EU Member States for this purpose. In adhering to its focus on a particular technology, the pilot regime would be as much of a trial run for what works effectively as regulation, as it would be a trial run of DLT itself in securities trading and post-trading.

By the very introduction of a pilot regime, the provisions could help in eroding a pervasive confusion, distrust and lack of knowledge of DLT. Where there could be a pre-conceived refusal to even consider the potential uses of DLT, misunderstandings inexorably follow as to what is, or is not, compliant with existing laws. However, a seemingly flawed, or patchy, regulatory regime can just as equally invigorate cynicism. An underwhelming uptake could wrongly encourage perceptions of DLT (and similar technologies) as being an over-hyped oddity, extracted from the wildest imaginations of science fiction enthusiasts who must happen to have a fascination with securities markets. The unfortunate paradox is that it would not take much for an excuse to be found to dismiss an innovative technology which has the ability to enhance market processes.

Significant shortcomings of the pilot regime include the limited eligibility for admission to the pilot regime and the timeline for review of the regime when the duration of a specific permission is for up to six years. A thriving of DLT usage in securities markets may not be brought about by this pilot regime alone. Nonetheless, there is an inevitability to the increased application of DLT (or, at the very least, tokenised variations of DLT) to securities which will outlast the discussions surrounding, and the implementation of, the EU's pilot regime. There

is sufficient evidence from test cases that DLT can be utilised functionally, but there are technical and legal quandaries which must be allayed. For now, the EU's pilot regime is an instructive microcosm of the challenges and the advantages in taking measures to try to regulate a certain technology. Very many of the same considerations could have to be addressed, sooner rather than later, for other examples of emerging technologies in capital markets and finance.