DLT creates new opportunities for capital markets infrastructure and the new DLT Pilot Regulation can help the technology to take off

1. The FT Lab test with Deon Digital has been educational

Between September 2022 and February 2023, Deon Digital Denmark ApS (Deon Digital) was part of a test in the regulatory sandbox of the Danish Financial Supervisory Authority (DFSA), FT Lab[1]. Deon Digital has developed a system (the SFI system) that uses *distributed ledger technology* (DLT) with the aim of supporting the provision of capital market infrastructure by, among other things, enabling securities trades to be entered into and settled simultaneously and in real time. Furthermore, the idea is that the use of so-called *smart financial instruments* (SFI) will enable increased automation and transparency in the lifecycle of financial contracts.

In the FT Lab test, the focus was on determining whether the SFI system can be classified as a DLT trading and settlement system, and whether the company can obtain permission under the new DLT Pilot Regulation (DLTR)[2]. The test has exclusively looked into the company's possibilities under the DLTR, including the use of the exemption options, and how the company's use of DLT enables the regulatory handling of the business model to deviate from existing requirements in some areas.

The test has made it clear that the use of DLT in capital market infrastructure largely requires a change in settlement practices. Thus, the technology raises

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[1] In this connection, the DFSA notes that a test in FT Lab is not, and cannot be, equated with a complete application process. In FT Lab, the focus is usually on identifying the regulatory ambiguities that may arise from the use of new technologies to provide financial services, such as an MTF or CSD. The guidance provided in the FT Lab is therefore not focused on regulatory uncertainty that is not driven by the use of new technology.

[2] Regulation (EU) 2022/858 of the European Parliament and of the Council on a pilot scheme for market infrastructures based on distributed ledger technology and amending Regulations (EU) 600/2014 and (EU) 909/2014 and Directive 2014/65/EU.

a number of questions, not only about the way in which settlement is currently carried out, but also about the benefits, challenges and risks the technology introduces. Both because the technology comes in many different versions, but also because the existing design of the capital market infrastructure also has its advantages for financial market participants. The DFSA has not considered, and does not intend to consider, whether DLT should become an integrated part of the capital market infrastructure. In general, the DFSA is of the opinion that regulation should be technology-neutral. The regulatory focus should be on ensuring a framework that accommodates technologies that can support a sufficiently safe and robust provision of the covered financial activities. Thus, the DLTR is, hopefully, also an effective regulatory tool that can support the effective design of future regulation. Among other things, by enabling supervisory authorities to monitor providers of capital market infrastructures use of DLT in practice under certain regulatory constraints, and thereby gaining the necessary understanding of the pros and cons of the technology, and the associated risks. That said, the test has shown that the SFI system's use of DLT enables a streamlining of the so-called "back-office" processes that arise out of the step-by-step design of the securities settlement systems currently in use. The test has also illustrated that the full potential of the technology in terms of real-time securities settlement cannot currently be reconciled with direct participation of all types of investors in the capital market infrastructure. This requires a redesign of the way in which the cash leg of a securities trade is settled, or a redesign of the integration options to existing payment systems.

In this note, the DFSA highlights the main points of attention that the test involving Deon Digital has raised. Both in respect of the DLTR but also the more general considerations that accompany a broader use of DLT in capital market infrastructure.

It should be noted that Deon Digital's implementation of DLT differs from more conventional variations of the technology such as *permissionless* blockchain systems. This in itself is a key learning point from the test. DLT is not a clearly defined concept. The technology can be varied according to the specific need, the number of variations is continuously growing, and each variation has its own unique characteristics. Although several of the issues and potentials identified in the test can be generalized, the DFSA has not yet identified clear answers as to what is needed, in terms of technology or regulations, to support an effective implementation of all variations of the technology. The test has also shown that the DLTR seems to be written with a specific variation of DLT in mind, but that it can also accommodate other variations.

2. What is the DLT Pilot Regulation?

Regulation (EU) 2022/858 of the European Parliament and of the Council of 30 May 2022 on a pilot scheme for market infrastructures based on distributed ledger technology (DLTR) allows companies to apply for permission to

operate a DLT market infrastructure provisionally for a period of up to six years. These infrastructure companies must use DLT, and can be either:

- an investment firm or market operator operating a multilateral trading facility (MTF); or
- a central securities depository (CSD).

And they may apply for a permit to operate either:

- a DLT-based multilateral trading facility (DLT-MTF)[3],
- a DLT settlement system (DLT-SS)[4], or
- a DLT trading and settlement system (DLT-TSS)[5].

A company that does not have current permission as an investment firm, market operator or CSD and intends to operate a DLT-MTF, DLT-SS or DLT-TSS may also apply. Such an application requires the company to apply for a permit under existing rules simultaneously, to run the type of business in question.

A key objective of the DLTR is to allow for the testing of DLT in the capital markets area without impacting the level of investor protection, market integrity, financial stability, and transparency. The experience gained from the pilot scheme should also support the development of an appropriate regulatory framework going forward. The DLT pilot scheme therefore allows DLT market infrastructures to be exempted, under certain conditions, from some of the regulatory requirements that could otherwise prevent DLT market infrastructure operators from developing solutions for the trading and settlement of trades in securities stored on DLT.

In the FT Lab test with Deon Digital, the focus has been on exploring the possibilities of operating a DLT trading and settlement system (DLT-TSS) on the basis of a permit as an investment firm operating an MTF.

The DLTR allows systems for the provision of capital market infrastructure that are based on DLT to combine trading and settlement activities in one legal entity. Current regulation[6] does not allow an investment firm offering an MTF to carry out securities settlement activities. Nor is it possible under the applicable rules for CSDs in the CSDR[7] to carry out trading activities.

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[3] cf. Article 8 of the DLTR

[4] cf. Article 9 of the DLTR

[5] cf. Article 10 of the DLTR

[6] Lov om fondsmæglerselskaber og investeringsservice og -aktiviteter fra 6. juni 2021 (the Danish Investment Firm Act not available in English).

[7] Regulation 909/2014 of the European Parliament and of the Council on improving securities settlement in the European Union and on central securities depositories.

The exemptions for a DLT-TSS are set out in Article 6 of the Regulation. There are both mandatory exceptions and exceptions that must be specifically applied for. The exemptions include the specific exemptions for both a DLT-MTF and a DLT-SS, as specified in Articles 4 and 5 of the Regulation. If a company wants to apply for an exemption under the DLTR, their application for a license must specify how it will ensure compliance with the considerations of existing regulation and the DLTR. This applies to all exemption options that may be applied for.

3. The DLTR should allow for different versions of DLT

DLT is a generalised term for a distributed database. The technology really got known outside of IT circles with the introduction of the Bitcoin in 2009 and the underlying blockchain system, which represents one variation of DLT. Since then, this variation of DLT has become widespread as the crypto-asset market has evolved. For this reason, it has also driven the regulatory movement in this area. The development of crypto-assets is largely driven by the vision of empowering the public to directly access financial services through a decentralised provision of infrastructure[8], and DLT systems such as blockchain have proven capable of supporting this agenda. The DFSA has previously assessed that decentralised DLT systems can also support the provision of regulated payment services[9].

As mentioned, blockchain is just a variation of DLT. By allowing different variations of DLT to be covered by the Regulation, the DLTR therefore provides a broader framework[10] than the decentralised variation. This reflects the purpose of the Regulation, namely to develop the right regulatory framework for the use of the technology in capital market infrastructure:

> *The experience gained from the pilot scheme should help identify possible concrete proposals for an appropriate legislative framework to make targeted adaptations to Union law regarding the issuance, safekeeping and asset servicing, trading and settlement of DLT-based financial instruments.[11]*

Deon Digital's implementation of DLT is an example of a variation of the technology that requires centralised operation and identification of all participants in the operation *(permissioned)*. The ledger is also broken down and operated in fragments. These choices motivated by benefits such as increased

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[8] The FSA's working group for decentralised finance is currently working on the issue of decentralisation, which is not clear-cut at either service or infrastructure level. Read more here.

[9] Read more here.

[10] The broad definition of DLT in the Regulation allows for different versions of the technology to be used as part of the provision of capital market infrastructure. The definition can be read from Article 2, Para. 1 (1-4) of the Regulation.

[11] See Preamble 6 of the DLTR.

scalability and latency (the speed at which entries can be made in the ledger), in part because a consensus mechanism is used that does not require consensus on entries to be reached across all participants in the operation. The structure of the individual fragments of the ledger is transaction-based, in the same way as a conventional blockchain, and connected by means of cryptographic techniques. Entries can also be neither changed nor deleted once they are added, without other participants in the network can detect such changes.

The requirement to identify participants in the operation is a key difference from more conventional blockchain systems such as Bitcoin, Ethereum and Algorand. These systems are based on the decentralised idea that anyone with a computer has free access to participate in the operation without being identified *(permissionless)*. Not identifying participants necessitates consensus mechanisms such as *Proof-of-Work (PoW)* or *Proof-of-Stake (PoS),* where decision-making authority is based on available computer power or resources rather than assignment on an 'individual basis'. The ledger must therefore also be distributed in its entirety (replicated) so that it does not become inaccessible, for example, because one or more actors interrupt their participation in the operation.

Table 1 - Elements of a distributed ledger

Updating the ledger	Permissionless	Anyone can validate transactions on the ledger.
	Permissioned	Only trusted parties can validate transactions on the ledger.
Access to use the ledger	Public	Anyone can read and initiate transactions on the ledger.
	Private	Only trusted parties can read and initiate transactions on the ledger.
Access to view the ledger	Non-hierarchical	Everyone can hold a full copy of the ledger and can read all the information on the ledger.
	Hierarchical	Only some parties can hold a full copy of the ledger or read all information on the ledger.

Source: Bank of International Settlement.

The Bank of International Settlement (BIS) is also looking into the use of DLT in capital market infrastructure in their *innovation hub*. In the article *On the Future of Securities Settlement[12]*, BIS sets out three parameters that can be used to classify a distributed ledger[13] as being centrally or decentrally provided, see Table 1. They also highlight that the majority of existing examples of DLT capital market infrastructures can be characterised as *permissioned,* private and hierarchical. If only one entity has access to update the ledger, the role of this actor will mirror the role of existing CSDs. In this way, BIS's work shows that while conventional blockchain systems target

[12]Read more here.

[13] According to BIS, a distributed ledger is: *A record of transactions held across a network of computers (nodes) where each node has a synchronized copy. It usually relies on cryptography to allow nodes to securely propose, validate and record state change (or updates) to the synchronized ledger without necessarily the need for a central authority.*

decentralisation, DLT's scope is broader, and can also be implemented in such a way that the centralisation of traditional capital market infrastructure is recreated.

In BIS terminology, Deon Digital's solution also mirrors existing capital market infrastructure. The central party operating the DLT is known to all participants in the system. The distributed ledger is also both private and inherently hierarchical. However, a key difference is that Deon Digital's implementation of the technology does not require the different fragments of the ledger to be replicated across all nodes (servers). The system's overall ledger is thus split up, and responsibility for each part is handled by separate clusters of servers. For example, the responsibility for registering transfers of securities and funds is separated. However, the system does allow other identified actors in the system to subscribe to entries in the different fragments of the ledger, and thus monitor whether manipulation or incorrect entries are made, but the system does not require this[14]. In addition, the system's participants receive all entries made in the SFI system's ledger that involve them. Nevertheless, the implementation of DLT in the SFI system can be said to be trust-based, as is the case for the operation of other existing and centralised providers of capital market infrastructure's underlying databases. This differs from more decentralised variations of the technology, where trust in a central counterparty is replaced by trust in the consensus mechanism used. In practice, the components of the solution can also be separated across separate legal entities, but the DLTR limits this possibility. The only technical prerequisite for the solution to function as a capital market infrastructure is that all the necessary components for the establishment of the capital market infrastructure are established and interact in accordance with the rules of the system, which implies that they operate their own distributed fragment of the ledger.

Conditions such as these make it clear why the approach to different versions of DLT under the DLTR should be agnostic[15]. All else being equal, if future regulation is to be technology-neutral, the goal must be to enable the creation of new, safe and efficient capital market infrastructures, rather than place special value on specific variations of DLT.

4. Simultaneous trading and settlement of securities trades

The settlement of trading in Danish-issued securities is currently carried out in cooperation between Danmarks Nationalbank and the Danish CSD *Euronext Securities Copenhagen* (ES-CPH). The securities leg is legally settled via ES-CPH. The payment takes place through accounts in Kronos2 (Danmarks

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[14] The implementation of this possibility may affect whether the SFI system can be considered non-hierarchical due to the importance of the access to keep and read the ledger.

[15] Preamble 9 of the Regulation states that EU financial services legislation is intended to be neutral with regard to the use of one technology as opposed to another. References to a specific type of distributed ledger technology should therefore be avoided.

Nationalbank's RTGS system). The ES-CPH securities settlement system is an example of a multilateral net settlement system, which at fixed times of the day calculates participants' net positions in securities and money (clearing), and subsequently settles net positions in accounts in ES-CPH and Kronos2.

The clearing of net positions between participants in the securities settlement system has a significant impact on the liquidity needs in the settlement of the cash leg. In 2022, for example, securities trades worth DKK 255 billion were carried out daily in Denmark, resulting in a total net settlement of the cash leg of DKK 19.2 billion. In this way, the net settlement reduced the participants' liquidity needs to a significantly greater extent than if each trade was settled individually.

Figure 1 - Net settlement of securities trading
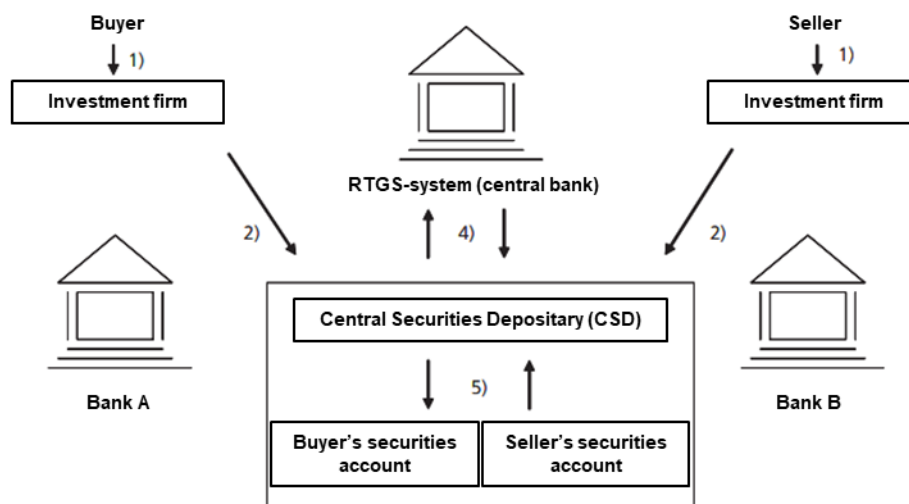
1) Buyer and seller concludes a securities trade, e.g. through investment firms.
2) Buyer and seller, e.g. investment firms, report the trade to the CSD.
3) The CSD clears the trade (matches, identifies net positions, and ensures coverage).
4) The cash leg is settled (debit/credit of the banks central bank accounts through the RTGS-system.
5) The securities leg is settled (debit/credit of the respective securities accounts).

Note: It is assumed that the securities trade is cleared in a CSD without the use of a central counterparty. The figure does not illustrate the payment settlement between the buyer and seller and their respective banks.
Source: Betalingsformidling i Danmark, Danmarks Nationalbank (translated by the DFSA).

Figure 1 illustrates the step-by-step design of the settlement mechanism. Trades involving securities admitted to trading at a trading venue are con-cluded at the trading venue or bilaterally between buyer and seller as over-the-counter (OTC) trades. The trades are then reported for settlement in the securities settlement system operated by the CSD where the security is is-sued and held. The concluded trades are settled in net blocks for a simulta-neous exchange of securities and cash. Prior to the actual settlement, an overall calculation is made of obligations and rights - clearing.

For a large part of the securities traded at trading venues today, a central counterparty (CCP) will be involved in the clearing. A CCP is commonly known from derivative contracts where it is used to manage counterparty risk, but capital market participants do in some instances also see an advantage in using a CCP for equity trading. It is easier to have a single counterparty that intervenes in participants' trades until they are settled. A CSD also clears the trades prior to settlement but, unlike a CCP, does not act as a counterparty to the trade in connection with the clearing.

The current practice in the capital markets is that securities trades are settled two days after the trading day - T+2. Since 2015, it has also been an obligation within the EU that trades concluded on a trading venue are settled T+2. Until then, there was no requirement for the settlement period in Danish law, but the custom was T+3 settlement. The post-trade processes (or 'post-trade activities' in the form of clearing and settlement) will therefore generally be completed two days after the trading day, when the simultaneous exchange of securities and cash will be made[16].

Today, it is therefore a requirement for a CSD that the securities settlement system operated by the CSD is recognised as a so-called 'finality system'. The purpose of the Finality Directive[17] is to ensure fundamental confidence in the settlement of securities settlement and payment systems, by eliminating the risks to participants if settlement does not proceed smoothly. For example, if the settlement of a trade is stopped or rolled back due to the insolvency of a participant. Systems must have a common set of rules (a contractual basis) that regulates when a trade entered into the system can no longer be reversed, and when it is finally settled. Recognition as a 'finality system' is therefore necessary to protect the netting against insolvency, etc. until the settlement becomes final. In practice, a securities trade is not finally settled until the net settlement of the securities leg and the cash leg have both been completed at the CSD and the central bank respectively, i.e. no later than T+2 if settled on time.

One of the key benefits of using DLT in the capital markets area is the simultaneous execution of trading and post-trading activities. The DLTR therefore also enables a departure from the step-by-step approach of existing regulations:

The use of distributed ledger technology, where all transactions are recorded in a decentralised ledger, can accelerate and condense trading

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[16] The USA will make the transition to T+1 securities settlement by mid-2024. It is also to be expected that the EU will examine the possibilities for this.

[17] The CSDR takes into account EU Directive 28/26/EC (the Settlement Finality Directive), which is implemented in the Capital Markets Act, by requiring that the securities settlement system operated by a CSD meets the requirements of the Settlement Finality Directive.

and settlement in near real-time and enable a combination of trading and post-trade services and activities. However, the current rules do not allow for the combination of trading and post-trading activities in one entity, regardless of the technology used [...].[18]

In Deon Digital's DLT-based solution, *the trade is the settlement*. Trades can only be entered into if there is certainty that they can be settled on both the securities and the cash leg. The system also makes the execution of a trade conditional on both legs being settled at the same time. The timing of the actual settlement of securities trade depends on the method used for the settlement of the cash leg, but the system technically supports real-time settlement, cf. Section 6. I.e. the settlement period is T. A prerequisite for real-time settlement is that it is executed simultaneously and on a gross basis for both the securities and cash leg. In principle, this also requires that the parties to the trade participate directly in the capital market infrastructure, cf. Section 5.

When DLT systems support simultaneous trading and settlement and the direct participation of all investor types, they can also eliminate many of the "back-office" tasks that are currently a result of the regulatory separation of trading, clearing and settlement of securities trades. For example, it is not as necessary to ensure the ongoing integrity of securities issues[19] if the ledger serves as the final and only record of both ownership and specification of the securities in question. Thus, the technology can help avoid situations where the CSD is forced to suspend the settlement of a specific issue if the reconciliation against the CSD's ledger shows irregularities. At the same time, it supports increased transparency for the investor[20]. It may also have implications for the design and scope of systems to monitor settlement fails due to non-delivery of securities or funds. Settlement agreements cannot be breached if the settlement is made simultaneously with the trade, and therefore a failure to deliver cannot spread to the next trade.

Conversely, it raises a number of questions about the way investment firms currently organize their trading activities. A transition from net settlement to gross settlement will, all else being equal, lead to a change in the liquidity needs of capital market participants. Real-time gross settlement also requires a certain scalability and speed of settlement systems, although it eliminates the necessity of clearing net positions and also changes the role of key counterparties (CCPs) in the settlement of securities trades. In addition, there are other operational and regulatory considerations in the design of the capital markets infrastructure today, and considerations regarding integration between trading and securities settlement systems across borders.

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[18] Preamble 14 of the DLTR.

[19] Cf. Article 37 of the DLTR

[20] For example, the SFI system can be structured with the operational advantages of single investor custody accounts, while allowing the investor to access the custody account directly.

Furthermore, the implications are not necessarily the same across all types of players and investment products. The scale and complexity of the activities of credit institutions and other professional players in the capital markets differ from those of retail investors, and the settlement of a securities trade cannot be compared to the settlement of, for example, a derivatives trade. Shorter settlement cycles may also have an impact on the ability of *market makers* to provide liquidity and the costs associated with the activities of financial market participants, such as borrowing costs associated with providing liquidity and costs associated with restructuring the operational structure of financial institutions.

Nevertheless, a key learning point from the test is that the use of DLT in the capital markets infrastructure has the potential to create significant efficiency gains in the back-office processes that investment firms carry out in connection with settlement. As mentioned, the FT Lab test with Deon Digital has shown how the task and costs associated with handling settlement fails can be eliminated. Many of the other operational tasks can also be made redundant, or at least automated to a large extent.

The DLTR will therefore, hopefully, prove to be the right tool to understand the full potential of DLT in the capital market infrastructure. For now, at least, the Regulation is the available regulatory tool to ensure the necessary understanding of the benefits, drawbacks and risks, and thus enable authorities to design future regulation in a technological neutral way, with financial stability and investor protection in mind.

5. Direct participation in the capital market infrastructure

The SFI system's use of DLT enables direct investor participation in a similar way to conventional blockchain systems. This is a challenge for existing capital market infrastructure, where there are significant regulatory requirements for both MTF and the CSD participants. In practice, this means that participation is limited to certain types of financial institutions. Natural and legal persons, such as retail investors or institutional investors in the form of pension funds, investment funds, insurance companies, etc., therefore participate indirectly through, for example, their credit institution. The requirement for settlement in central bank money and the methods for settling the cash leg also limit the possibility of broader direct participation, cf. section 6.

DLT can take on the role some financial firms play in the capital market infrastructure. The key difference is that the existing capital market infrastructure is designed and regulated according to a step-by-step settlement of securities trades. It necessitates the indirect participation of the investor in the post-trade activities through a financial institution.

When securities issued on a DLT are traded, it is usually a prerequisite that the participant in the trade is also registered as a participant and owner of the resources in the relevant DLT system[21]. In this way it can be ensured that securities trades can only be executed if they can be settled simultaneously. The simultaneous settlement of securities trades is the reason why the procedures for settlement under the DLTR can be deemed to be sufficient without the settlement system fulfilling the applicable conditions for recognition as a finality system, including the requirements for participants[22].

The exemption options in the DLTR allow the participation of natural and legal persons acting on their own account (execution only) under a number of conditions, cf. Articles 4, Para. 2 and 5, Para. 7 of the Regulation. However, the Regulation does not change the fact that a license is required under financial regulation to receive and transmit or execute securities orders on behalf of clients. If the provider of a DLT-TSS intends to execute customer orders on behalf of the investor, this will therefore also require permission. The same applies to third parties facilitating investor access to the MTF. In this way, the current investor protection requirements for providers of investment services and activities[23] are maintained, and the scope of the requirements continues to be differentiated by both the client type and the activity offered.

The DLTR does as something new enable all investors to access a more direct participation in the capital market infrastructure. However, *execution-only* trading through financial companies such as credit institutions and investment firms is already possible today. An opportunity a large part of the retail segment in Denmark is taking advantage of, with many investments in, for example, equities and ETFs being made outside of advisory and portfolio management schemes[24].

6. Limited integration options for payment systems

The CSDR[25] sets out the requirements for settlement of the cash leg of a securities trade. Settlement shall generally be made through accounts opened with the central bank issuing the currency in which the payment for

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[21] Although the crypto-asset market currently offers retail investors a wide range of crypto-asset services based on permissionless blockchains, this variation of the technology requires that control of the crypto-assets is transferred to the service provider in order for them to carry out actions on behalf of the investor.

[22] While the participants in existing systems meet the need for the settlement to be protected against disruption by the insolvency etc. of the other participants in the period from when transfer orders are entered into the system to the final T+2 settlement via the system requirements of the Settlement Finality Directive, participants in a DLT-TSS who settle simultaneously with the conclusion of the trade do not have the same need for protection.

[23] Executive Order on Investor Protection in Securities Trading No. 191 of 13 January 2022.

[24] Based on the Danish FSA's own analysis of trade data.

[25] Cf. Article 40.

the securities is made. In cases where it is not practicable to settle the payment through central bank accounts, settlement may exceptionally be made in commercial bank money (i.e., settlement is not made via the central bank), in accordance with Section IV of the CSDR. The settlement of the cash leg can therefore already be structured differently, even though the intention of the regulation is that the settlement is made via the central bank.

As described in the previous section, the use of DLT in the SFI system enables simultaneous trading and settlement of trades in real-time. The main thing is that the technology can, in practice, support delivery versus payment, with final execution of both the securities and cash leg in real-time. Thus, both cash and securities are transferred, and can be accessed as soon as a securities trade is concluded. This is not the practice today, where the final settlement of the cash leg is made in existing payment systems, where access is limited to mainly credit institutions, and the latency of settlement is dependent on the speed of the settlement system. A prerequisite for realising the possibilities of the technology, therefore, is that the settlement method for the cash leg can be directly integrated with the relevant DLT-based settlement system. It is important to note in this respect that DLT comes in different versions, so a possible integration option may not necessarily support all variations of DLT-based settlement systems. For example, Deon Digital's implementation of DLT differs, as mentioned, from other variations of the technology.

In any case, it is not possible to settle the cash leg in central bank payment systems if all types of investors have to participate directly, regardless of whether securities trades are settled on a gross or net basis. The access to open an account with Danmarks Nationalbank (the Danish central bank) is for example subject to extensive requirements and restrictions[26], and in practice only certain financial institutions can gain access. Thus, an effective implementation of this variation of the technology requires the use of the exemption option in the DLTR for settlement of the cash leg via a credit institution rather than a central bank.

The DLTR extends the existing exemption in the CSDR for settlement in commercial bank money at a credit institution, and also allows for settlement using e-money in tokenised form. The exemption in the DLTR requires the provider of a DLT trading and settlement system to either obtain a permit as a credit institution and settle in accordance with Chapter IV of the CSDR or enter into an agreement with a credit institution that can settle the cash leg with either commercial bank money or e-money. If an agreement is made with an external credit institution, the credit institution is also exempt from the existing requirement to segregate the activity in a separate "CSD bank". The DLTR therefore allows for the cash leg to be settled externally from the central bank

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[26]Read more here.

to a greater extent, although this requires permission as or cooperation with one or more credit institutions.

In the FT Lab test with Deon Digital, the DFSA has examined various options for settlement of the cash leg that can be used under the DLTR. Regardless of the method, it is a prerequisite that the contractual basis ensures that settlement is made in accordance with the rules of the DLT system in question. For example, that settlement can be made in accordance with the consensus mechanism used. The discussions in the test have been of a more general nature, with a focus on identifying the various options for settlement of the cash leg under the DLTR, and can therefore also be transferred to other DLT systems such as the conventional blockchain.

One option is to establish a 'closed system', whereby the provider of the DLT trading and settlement system either obtains a permit as a credit institution, or appoints an external credit institution and makes it a prerequisite for participation that a customer relationship is established with this credit institution. This would enable the entire settlement to be completed in the system without integration to existing payment systems. This could be done, for example, by issuing e-money tokens directly in the DLT system, or by settling directly into participants' accounts with the relevant credit institution.

Other options include different versions of the services credit institutions can provide, including in the area of payments. For example, settlement of the cash leg can be made through an integration to all participants' credit institutions. This requires the contractual basis to be extended to all these credit institutions. Alternatively, a determination can be made as to whether the DLT used can be integrated with the APIs that credit institutions are required to provide under PSD2. With these types of solutions, final settlement of the cash leg is ultimately made in existing payment systems. It is therefore not necessarily possible to implement real-time settlement. For example, the latency of the final settlement will be limited by the latency with which credit institutions can settle the cash leg in the central bank's payment systems. In addition, there are considerations as to whether such solutions requires that the central bank is also included in the contractual basis for the DLT settlement system in question.

Realisation of the full potential of DLT requires the settlement method for the cash leg to be integrated with the DLT systems, regardless of how this is done. It raises a number of questions if the value potential eventually finds its way into the capital markets. The key question is whether the intention of the CSDR to settle the cash leg via central banks should be maintained, or whether an increased concentration risk with credit institution's is acceptable in respect of financial stability. Whether settlement of the cash leg via credit institutions, for example, can be made sufficiently robust and reliable is an obvious question.

As mentioned, DLT-based settlement through a direct integration to the central bank is not currently possible. However, several central banks are exploring the possibilities of the technology and the potential issuance of *Central Bank Digital Currencies* (CBDC) for transactions between credit institutions. Danmarks Nationalbank is following this development closely[27]. Work is also ongoing on a 'citizen-facing' digital euro (retail CBDC)[28]. The scope of application of the capital market infrastructure, where the number of participants is not limited, could also be included in future discussions on the need for a CBDC. Should the scope of retail CBDCs in securities settlement, for example, be considered a separate *use case*? For now, at least, a realistic scenario is that participants in a DLT trading and settlement system gets exposed to counterparty risk towards one or more credit institutions rather than the central bank.

7. The risks associated with a time-limited 'sandbox' regulation

A DLTR permit currently has a maximum time limit of six years, which poses a risk for companies that make use of such a permit. This is due to uncertainty around the regulatory framework if the current regulation is not extended or existing regulation is not adapted. The risk is particularly high for companies that, at the time of application, do not have the required permission, as a financial institution, to access the DLTR, and therefore also have to dedicate the necessary resources to this application. Among other things, considerations include whether the uncertainty associated with the prospects of obtaining a relatively comprehensive permit under existing regulation as either an investment firm (MTF) or a CSD is compatible with the uncertainty associated with a time-limited regulation. It is also necessary to weigh up the business implications of the restrictions on market capitalization of issuances provided for in the DLTR, but also the risk of premature termination of the activities.

The risk associated with the time limit is addressed in the DLTR by the requirement for a transition strategy, which must be continuously adapted as the company's activities develop. A key element of the transition strategy is that the company must be able to move financial instruments from its system to another MTF and CSD. This poses a particular challenge for companies that do not originate from the existing infrastructure, and thus do not have a connection to existing players in the market. It is not necessarily easy to get an agreement with existing players, to be part of their transition strategy.

The requirement for a transition strategy means, in the DFSA's view, that an operator of a DLT-TSS must use its best efforts to make arrangements with another CSD to take over operations, and must explain the arrangements in the transition strategy. An arrangement for the existing infrastructure must be

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[27] Read more about Danmarks Nationalbank's view on this here.

[28] Read more here.

in place no later than five years after a permit is granted. Thus, it is not a condition for obtaining a permit that an agreement with the existing infrastructure has been made in advance, but rather that a company must have done everything possible to secure such an agreement.

Furthermore, according to Article 10, Para. 8 of the DLTR, ESMA must be given the opportunity to provide a non-binding opinion to the competent authority (the FSA) on the exemptions applied for by the operator of a DLT market infrastructure, and whether the type of DLT used is sufficient to fall within the scope of the DLTR. The DFSA's assessment of an application under the DLTR must therefore be tested with ESMA, although the final decision remains with the DFSA. This entails a certain risk that ESMA's assessment is not in line with that of the DFSA, and hence some uncertainty about what consequences this may have for an application for a permit, and for the regulatory classification of different versions of DLT in the longer term.