

## **PERSPECTIVES FOR THE DEVELOPMENT OF DISTRIBUTED REGISTER TECHNOLOGY AND ITS IMPACT ON FINANCIAL MARKETS**

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Recently, the European Commission presented its new strategy on digital finance, and, in this strategy, a special emphasis was placed on "crypto-assets" and the implementation under a pilot regime of market infrastructures based on "distributed register technology" (DLT). Probably the most publicized technology is the blockchain, which refers to the organization of data into blocks of data, which are linked to each other only by addition. While blockchain is a first form of DLT and best known to the general public, it is important to focus on the broader concept of DLT.

DLT is a syntagma that is used to describe different technologies that are based on a decentralized data set architecture, which allows records to be stored and shared in a synchronized manner, while ensuring their integrity through the use of validation protocols based on consensus and cryptographic signatures.

That said, DLT refers to the technology used to record data simultaneously in multiple locations using distributed registers. Distributed registry technology can be seen as a shared database that is accessible to multiple users or participants. DLT uses independent participants (called nodes) to record, share and synchronize transactions in those electronic registers (instead of storing the data in a centralized system as in a traditional database).

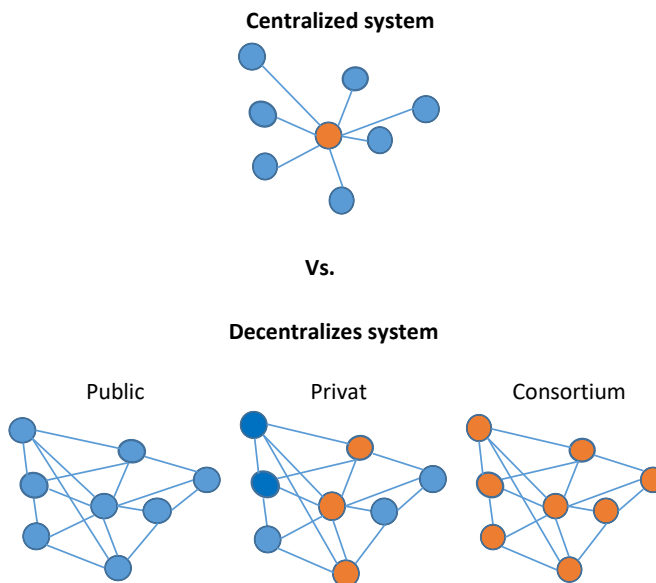
One of the key features of DLT is that the data is maintained by the participants and not by an administrator or a central authority, which means that the participants can have an identical copy of the register. Based on a consensus mechanism and encrypted technologies, everything that is added to the database, such as new transactions, is grouped and validated by a network of "nodes", thus being built independently and kept by participants.

DLT architecture can be of several types, depending on the type of permissions users need to view and write the nodes in the network. Thus, we distinguish the following categories of DLTs: public, private or consortium type.

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**Figure no. 1. Distributed register technology architecture**

*Source: own conception*

The public DLT is based on a decentralized reliable system. Transactions take place between any two parties, from any computer, in any location. The nature of the technology allows it to be considered secure and no entity has full control over the network.

The fact that the public DLT depends on the consensus and participation of all those involved gives value to this type of technology. Usually, state-of-the-art public DLT protocols, based on Proof of Work (PoW) consensus algorithms, are open-source and do not require "permission" to be accessed and anyone can participate. Thus, anyone can download the code and start running a public node on their device, validating network transactions, thus participating in the consensus process. This makes it possible for anyone to make transactions over the network, see them included in the distributed register and see if they are valid. The transactions are transparent, being accessible for reading on the explorer of the public block, but at the same time they are anonymous / pseudonymous. Examples of such public DLTs are Bitcoin, Ethereum, Monero, Dash, Litecoin, Dogecoin etc. Such a network has no infrastructure costs: it is not necessary to maintain servers or system administrators and thus radically reduces the costs of creating and running decentralized applications (dApps).

Private-type DLT has become more widely used in recent years. Private DLT is used more similarly to a database than for trading (and openly agreeing transactions). The structure of this type of DLT serves as an administrator for who can see what transactions are performed. An important feature of private DLT is that it is not fully decentralized and therefore can be controlled by network owners. Writing permissions

are managed centrally, and read permissions can be both public and restricted. Private DLTs are a way to take advantage of DLT technology without significantly disrupting the configuration of existing systems. However, the use of a private DLT exposes the network to security risks similar to the use of a centralized system, as opposed to the public DLT. However, private DLTs have benefits, being used to reduce transaction costs and data redundancies, simplifying document management and eliminating some non-automated compliance processes.

The consortium-type DLT can be seen as a hybrid of public and private DLT structures. The consortium DLT is based on a consensus similar to the public DLT, but assigns permissions based on which the nodes have the authority to approve transactions, such as the private DLT. In consortium-type DLTs, the consensus process is controlled by a preselected set of nodes; for example, one could imagine a consortium of 15 participants, each operating a node, of which 10 nodes must sign each block in order to be considered valid. The right to read the distributed register may be public or limited to participants. This type of DLT offers high transaction speeds, which gives them greater scalability. At the same time, these DLTs provide more confidentiality of transactions and are therefore often used in the financial sector.

A major advantage of DLT over centralized databases is its history. Thus, centralized databases are used only to record current information, in their case the information history is not taken into account. Databases that use DLT are different, they not only record real-time information, but can also store information about transactions that have taken place previously. In other words, DLTs can create databases that write their own history at the same time.

Although blockchain was the first form of DLT and was first used for Bitcoin, a number of inefficiencies and scaling issues prompted developers to look for solutions outside the blockchain. As such, new and ingenious solutions have been developed, such as Holochain, Directed Acyclic Graph (DAG) or Hashgraph. The emergence of new solutions, which differ from the blockchain, raises questions about which solution is the best, given the various strengths and limitations of them, in other words, which will be the one that will be accepted internationally.

The importance given to DLT and its future uses also stems from the fact that the European Parliament adopted a resolution on DLT, entitled "European Parliament resolution on distributed registry technologies and blockchain technologies: building confidence by eliminating intermediation". The content of this resolution presents the multiple ways in which DLT can be applied in all sectors of the economy, such as financial, medical, educational, industrial, public sector, etc. and the importance of research and investment in DLT is emphasized. The Commission is also called upon to pay greater attention to DLT and to take initiatives to educate citizens about technology.

Following this resolution, the European Commission recently presented its new strategy for digital financial markets. According to the Commission's vision, the future of finance is digital: consumers are increasingly accessing digital financial services, more and more participants are innovating and implementing new technologies, and all this is changing existing business models. Ensuring the secure and reliable operation of digital infrastructures has become more important, as the number

of people accessing online financial services is constantly growing, as is the number of employees in the financial sector working remotely.

The aim of the strategy for digital financial markets is to ensure that there is an EU-wide regulatory framework for financial services adapted to the new digital context. Thus, the Commission aims to implement by 2024 a comprehensive regulatory framework that will allow the use of DLT and cryptocurrencies in the financial sector and that will also take into account the risks associated with these technologies.

In this context, the Commission presented in September 2020 a set of legislative proposals to accompany this strategy, the most important of which in the light of the DLT are the draft regulation on markets for cryptocurrencies and the draft regulation for a pilot regime for DLT-based market infrastructures.

By proposing a pilot scheme for market infrastructures, wishing to experiment with trading and settlement of transactions in financial instruments in the form of cryptocurrencies, the Commission aims to provide an opportunity for market participants and regulators to gain experience in using the infrastructures of emerging markets, trading / recording operations of shares or bonds using a digital register (based on DLT). The purpose of this proposal is to promote innovation and the adoption of DLT technology and to provide the Commission with concrete evidence on which to make substantial changes to the legislative framework.

When discussing about DLT, we must also take into consideration possible negative aspects, such as hacker attacks, technological errors or some performance challenges. We must also take into account the possible lack of an effective legislative framework to ensure investor protection, financial stability and market integrity.

The DLT has some "gray" areas that can be difficult to regulate, taking into account their characteristics. An example in this case can be the determination of jurisdiction. DLT can be a decentralized system, which consists of several nodes that can be found in different jurisdictions. Given that there is no central authority in this network, it is not clear what the legal framework will be.

DLT also makes it possible to use "smart contracts", which are automatically executed when certain specified criteria are met, embedded in their content. The use of DLT technology eliminates the need for intermediaries to confirm the transaction, with contractual clauses involving self-execution. If we look at the use of "smart contracts" from a systemic point of view, their use could lead to an increase in market volatility when markets are under stress. This type of contract is executed automatically when a certain defined event occurs. Therefore, a small event will activate all the contracts that include it, without any human intervention. Thus, a spiral of events can be triggered which can eventually lead to a systemic event in the markets.

We must also consider the appeal mechanisms. A basic feature of DLT is that once a transaction is validated on a network, it cannot be canceled. In this case, in the absence of an appeal mechanism, the only way to resolve a disputed or erroneous transaction is to perform a reverse transaction.

Another important aspect to mention is the lack of standardization in the case of DLT. The current standards are underdeveloped, DLT not yet reaching the stage of mature technology, currently being in a stage of continuous and rapid development. Currently, there are various competitive DLT-based platforms and solutions that are

publicly managed by a community. The lack of generally accepted standards brings some risks such as lack of interoperability, confidentiality and security, or even keeping customers captive.

Last but not least, the use of DLT shifts the focus to the user. Responsibility is transferred to the user, especially in the case of public DLTs, which do not have a central authority. If private keys are lost or suffered as a result of the disclosure of a private key, there is no authority to contact to assist in this case.

As a result, DLT is a new technology that is evolving rapidly and has high potential. It is clear that DLT has not yet reached the level of a mature technology and it still takes time to mature and be used globally. Although there are currently some challenges that need to be addressed, this technology has the potential to change the way different types of financial market entities operate, but also the financial markets themselves. DLT can be applied in all processes using third parties or intermediaries, and thus can contribute to the efficiency of existing processes.

It is clear that the use of DLT involves a process of digital financial literacy on the part of consumers / investors, and the lack of this minimum knowledge can have negative effects on investor protection and financial inclusion. Consumers / investors may not fully understand the complexity and risks involved in using such technologies. It is also possible that certain categories of consumers / investors, for example the elderly, may not have the skills or resources to make full use of new technologies.

At the same time, financial market entities and regulators may face challenges in accumulating the knowledge and expertise needed to take full advantage of these technologies.

In this context, regulators need to take an active approach to ensure that the rules remain appropriate to their purposes and that they understand emerging business ideas. The regulatory framework should not unduly restrict potentially beneficial innovations, but at the same time not leave risks unaddressed

In conclusion, the European Central Bank's view seems most appropriate in this context: "new technologies will have a profound effect on financial markets. It is essential that we examine, analyze and test them to ensure that future market infrastructures are not only efficient and innovative, but also secure and reliable."

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