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Legal and Technological Conditions for Legal Circulation of Tokenized Assets in Modern Private and State-Owned Public Information Platforms

***Abstract.** The paper offers the author's view on modern approaches to legal circulation of tokenized assets in modern private and state-owned public information platforms being the only technologically possible environment for this circulation. The aim of the paper is to define and substantiate legal and technological conditions for legal circulation of tokenized assets in modern private and state-owned public information platforms, which may be the only technologically possible environment for legal circulation of tokenized assets. The paper is a continuation of the ongoing wide-ranging expert and political debate about what government officials and presidents should be guided by in circulation of virtual and, in particular, backed tokenized assets.*

The author makes an important conclusion that the main conditions ensuring the successful circulation of tokenized assets include: a) unambiguously identified objects of legal relations based on the use of a tokenized asset, which allows determining the owner and characteristics of the asset accurately; b) identification and verification of entities of legal relations in accordance with international KYC standards; c) use of a decentralized information platform as an environment for deals using tokenized assets, which allows reducing risks and ensures secure transactions.

The author summarizes that the information and applied component of a tokenized asset allows distinguishing three main types of a tokenized asset at this level: a) tokenized documents; b) tokenized resources; c) tokenized legal relations. This division into types of tokenized assets makes it possible to legally and ontologically facilitate the perception of tokenized assets as a new and useful phenomenon in practice, for example, in banks, trading companies, auditing firms, etc. As a result, the use of tokenized assets in the market infrastructure can result in increased competitiveness and stable European market, providing new opportunities for investors and enterprises.

***Keywords:** digital assets; virtual assets; state regulation; digitalization; distributed ledger; digital economy; digital transformation; token.*

Relevance of research. Against the background of the discussion of various regulators and selfish attitudes of individual states to be the first to “skim the cream off” for their national economy due to the surge in public interest in virtual assets and even “crypto-enthusiasm”, reaching a fast consensus on one or two flagship regulatory approaches [15] that would be acceptable to both supranational and state levels in the world can be considered a challenge. The author believes that it will happen in the short term, from two to three years, and it will contribute to the development of the virtual asset circulation area and technological innovations. However, two important theses can be stated:

1. Global and national regulators control blockchain-based products (virtual assets) because they are convinced that such products have a new or increased financial value. This financial value (for example, greater capitalization of an asset, greater liquidity, parallel circulation or conversion of an asset, etc.) is probably the main purpose of the initiation and public emission of a virtual asset in a private way. It radically distinguished the first cryptocurrency from all fiat money issued by central banks. Today, the unregulated circulation of virtual assets issued privately (by private individuals) and not backed by currency values of the state poses a significant threat to financial systems [21] and even the state sovereignty [11].

2. Today, regulators are no longer trying to directly control the blockchain technology, although earlier there were gross methodological errors in attempts to limit the hardware part in a globally decentralized data storage architecture [7; 14]. Such former errors can be explained by the technological ignorance of politicians and their advisers.

Problem statement and identification of unresolved issues. However, there are many questions about how should society — citizens, businesses and the state — react to backed virtual assets (which do not include cryptocurrency and other similar “bubbles”), which experts and politicians almost unanimously recognize as the future? What are the guiding principles? What can you confidently rely on? There is still no consensus on these questions, even though there are hundreds of dollar crypto-billionaires in the world, and the world press feeds society with new stories of digital

salvation every day.

Probably, today only a blind person cannot see that new digital technologies offer unexpectedly new solutions to traditional problems [1; 12; 13]. A clear example is the prospect of addressing global wealth inequality through legal tokenization of assets [16; 19]. Due to the extreme difficulty of addressing it in traditional or known ways related to a significant redistribution of property among elites and major conflicts, it is actively declared in the world, and globally “green” and energy agenda have taken its place. Tokenization of backed assets solves this problem by radically lowering the threshold to enter asset markets and allowing almost anyone to sell and buy any fractional part of even a single share/house/ounce of gold, etc., i.e. the underlying asset. The technological solution is quite simple: use of digital (based on distributed ledger technologies, DLTs) asset accounting systems for accounting of backed tokens tied (attributed) to a real asset, thanks to the unique property of a distributed ledger token — divisibility. Obviously, this transition will require a vast restructuring of institutions and rules of operation of the market infrastructure, but if done, tokenization can be a key tool for creating a more level playing field in asset markets around the world.

Over the past 2–3 years, the number of both expert publications (within the World Economic Forum, OECD, World Bank, G20) and scientific publications on all continents, which are devoted to legal circulation of virtual assets and especially tokenization of assets, has greatly increased. Despite the widespread interest and various expert evaluations, in fact, there is a lack of scientifically based industry insights of asset tokenization methodology practitioners. There is a problem, but it is complex and simple at the same time. The complexity lies in the political and administrative attitude as well as very significant inertia of political and social processes. The simplicity lies in actual decisions based on legal rules familiar to the civilized world: norms of civil law, which are the basis of deals, documents and described actual resources. That is, one of important points for “unblocking” the public and expert discussion is a critical look at essential technological and legal conditions for circulation of tokenized assets to make this circulation legal, understandable to everyone, simple and reliable.

The aim of the paper is to define and substantiate legal and technological

conditions for legal circulation of tokenized assets in modern private and state-owned public information platforms, which may be the only technologically possible environment for legal circulation of tokenized assets.

Research methodology. In this paper, the author proposes to follow this approach: to look at the essential object of supranational and state regulation from the other side. It is not about a new way of creating a key value in the form of greater financial value, which can be created through open sales on a competitive market (exchanges), but about a way of regulating social relations using a distributed ledger. The “key” of this regulation is a radically higher level of trust between the parties involved in relations, which is technologically enabled by the distributed ledger technology. In this case, the researcher and regulator do not need to be limited to the purely financial value of the asset. In such a case, a key value is more technologically enabled trust between parties. Therefore, in the context of this paper, the following chain of theses is methodologically significant:

- the main object of regulation will be a more technologically advanced way of regulating social, economic, socio-economic and legal relations;
- a more technologically advanced way of regulating relations is implemented through a distributed ledger. It is a “foundation” for the distributed ledger technology as well as an example of an orderly decentralized space where distributed transactions are recorded and conducted automatically;
- a distributed ledger should be perceived as a digital system for accounting legal relations in the form of classic deals that are automatically entered, registered in a distributed ledger and information about which cannot be deleted completely or without authorization. Accordingly, a distributed ledger should not be perceived as “new money” [22], a new financial value, or a new payment system. In general, it does not disprove the fact that cryptoassets, cryptovalues, private money, etc. can be created using a distributed ledger;
- in order to implement a more technologically advanced way of regulating relations through a distributed ledger in the form of a system for accounting digital data on legal relations (for example, agreements, deals, business information), technological

and legal conditions for circulation of tokenized assets in information platforms should be defined (Figure 1).

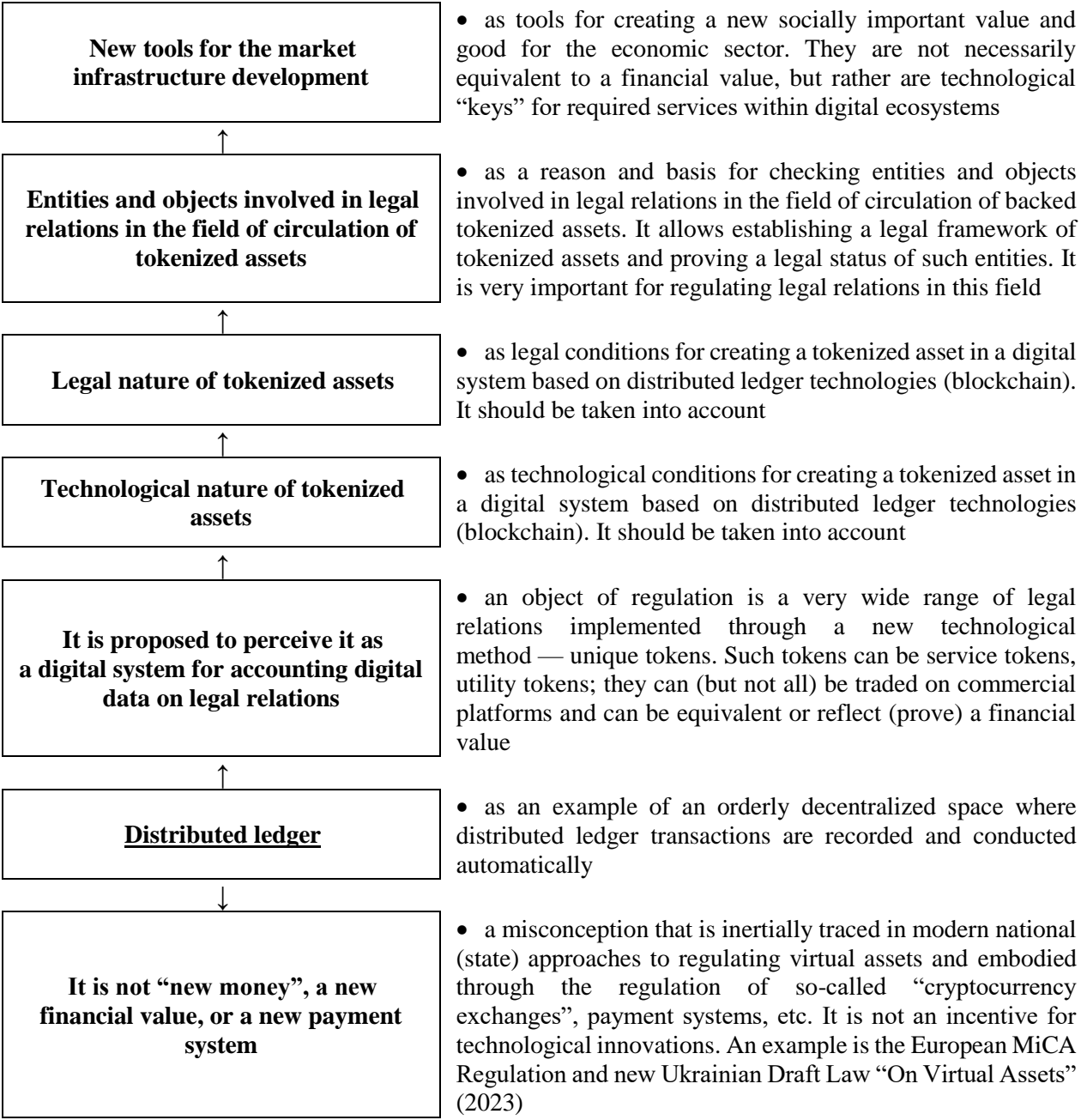


Fig. 1. The author’s morphology of a socially important value of tokenized assets through the explanation of their technological and legal nature

* Source: author’s development.

Presentation of basic material. Therefore, one of the problems of the modern lawmakers in different countries is that they try to regulate an object before they study the nature of its origin, which, logically, entails many errors regarding its definition

in the legal framework. The lack of unified definitions and clear classification of tokenized assets as tools for financial and management accounting of property according to their fundamental and unique features makes it nearly impossible to determine the features of tokenized assets important for legal regulation and conditions for circulation of tokenized assets in modern private and state-owned information platforms.

To objectively determine conditions for circulation of tokenized assets as tools for financial and management accounting of property in information platforms, we have to start with the complexity of the nature of tokenized assets. In turn, it has the following components: technological, economic and legal, information and applied nature. Moreover, research of the complexity of the nature of tokenized assets can also become the basis for determining types of tokenized assets. Further, in this paper we will successively consider: a) technological and b) legal conditions for circulation of tokenized assets.

As for technological conditions, one of the important properties of tokenized assets is the technological aspect of their implementation, which indicates the creation of a tokenized asset in the system based on a specific technology — the distributed ledger technology (blockchain). It is known that a distributed ledger acts as an advanced technological solution in digital space that provides a more modern and perfect approach to accounting of distributed ledger tokens [9]. In general, the distributed ledger technology is perhaps the only mastered (widespread) technological foundation for creating systems [10] allowing storage of records of distributed ledger tokens that expand the application possibilities for tokenized assets and their integration into various activity areas [20]. By their technological nature, tokenized assets are created in systems using a distributed ledger of tokens, circulate and function as tokens in these distributed ledgers. There are several features that allow considering a distributed ledger token (its accounting units) as an object (Figure 2):

- accounting system (distributed ledger) users can create distributed ledger tokens by themselves;
- distributed ledger token is in the form of identifier and has its own

accounting units in an accounting system;

- depending on their goal, when creating a distributed ledger token, an accounting system user may specify the number of accounting units of this token to be issued at their own discretion;

- accounting system users transfer among one another not a distributed ledger token itself, but its accounting units;

- users of a distributed ledger as a distributed ledger token circulation environment keep records together, so none of them can alter or delete entirely any data of a distributed ledger token [6].

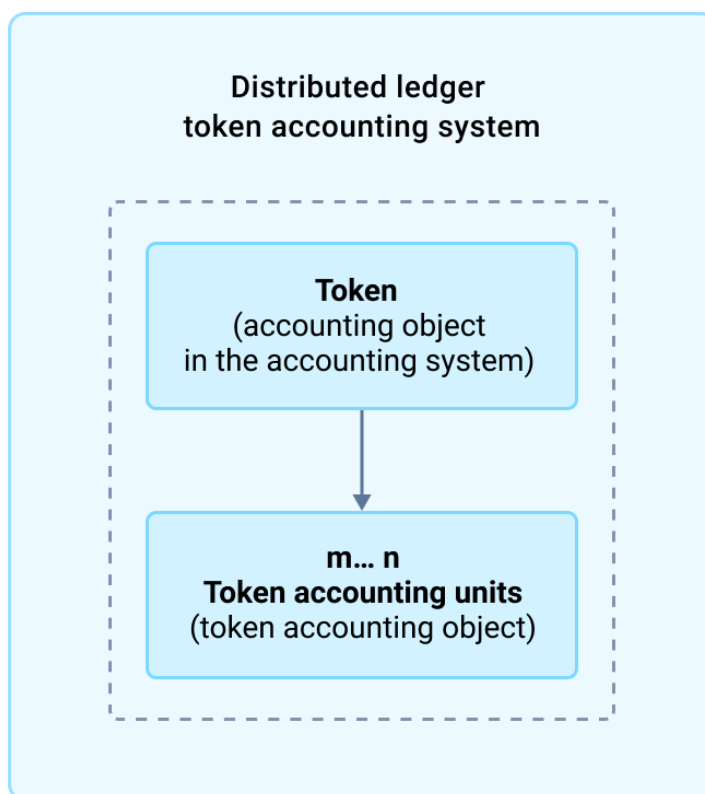


Fig. 2. Distributed ledger token accounting system

* Note: m is the minimal indivisible and/or divisible numeric value of distributed ledger token accounting units [5].

Thus, a distributed ledger token has accounting units in a distributed ledger token accounting system. When creating a distributed ledger token, users of this accounting system, based on their goals, can specify the number of accounting units

of this distributed ledger token to be issued at their own discretion. In turn, a distributed ledger token as an accounting object can be an independent object of property relations that has its own accounting units in a distributed ledger token accounting system.

Since one of the properties of a distributed ledger token is its duality, accordingly, any property can be an accounting object in a distributed ledger token accounting system. Not the distributed ledger token itself is transferred between users of this distributed ledger token accounting system, but its accounting units. In other words, distributed ledger token accounting units circulating in distributed ledger token accounting systems are property rights that in distributed ledger token accounting systems are represented in the form of distributed ledger tokens with unique identifiers. The unique identifier is used in information systems and is intended to identify a specific object in the network as well as allows excluding any probability of duplication of this object and confirms its authenticity. Thus, an identifier is an attribute of an accounting object intended to identify it, which is represented in the form of a unique set of alphabetical and/or numerical characters of a certain length and is assigned to an accounting object in its circulation environment. That is, technically, tokenized distributed ledger assets are distributed ledger tokens.

The main functional purpose of the distributed ledger technology comes down to the ability to create modern information accounting systems of the new generation based on it [5]. As part of analysis of the economic component of the economic and legal nature, a tokenized asset should be considered from the point of its correspondence to a tool, using which a distributed ledger token accounting system records information on property.

As stated above, technically, tokenized assets are distributed ledger tokens. Accounting units of a distributed ledger token may be units of measuring the scope of rights to this distributed ledger token, while the distributed ledger token may be an object for accounting of any property existing outside the accounting system (outside the distributed ledger), such as:

- objects of civil rights (money, securities, results of works, services, results

of intellectual activities, information and other tangible and intangible goods);

- assets as a type of property representing a resource controlled by an entity as a result of past events and from which the entity expects future economic benefits;
 - property rights (rights to use, dispose of and own an object of civil rights)
- [5].

The described dual nature of a distributed ledger token is due to the fact that the distributed ledger token exists in a distributed ledger token accounting system in the form of an identifier and has its own accounting units. Therefore, tokenized assets can be used for accounting of property, which may be an independent object of legal relations.

When talking about the purpose of accounting by means of tokenized assets in a distributed ledger token accounting system, it has to be noted that accounting may be defined as one of the following:

Financial accounting. Financial accounting by means of a distributed ledger token accounting system using tokenized assets is possible because:

- tokenized asset may be presented as an inventory number assigned to property for the purpose of accounting by means of the distributed ledger token accounting system;
- records of tokenized asset accounting units are defined as a product in civil circulation and can correlate with units of property financial accounting.

Civil (property) circulation is a set of deals of all its participants and their obligations arising based on it, which legally establish economic relations of the exchange of goods. Civil circulation has a property and product nature. Therefore, for clear understanding of the discussed matter, tokenized assets should be considered as products.

A product means a specific economic good produced for exchange. Furthermore, economic goods are “rare goods that are not ready-made in nature” [2] and become products regardless of their ability to move, persons offering them for sale, their tangibility, their nature as a product of labor, but are definitely intended for exchange. The ability of products to satisfy a certain need of a person makes up their

consumer value (all products have it). Meanwhile, the ability of a product to be exchanged in certain proportions makes up its exchange value.

Thus, in order to perceive a tokenized asset as a legal product, the following conditions should be met:

1. This tokenized asset should be based on a property deal. A tokenized asset, which is in civil circulation, as a tool for financial accounting of property can be created only during preparation and conclusion of an agreement describing the right to use or dispose of the property.

2. Parties to the deal, the object of which is the tokenized asset, should be identified. This requirement establishes the functional aspects of operation of a distributed ledger token accounting system and consists in the need to ensure identification of a user who transferred accounting units of the tokenized asset and a user who received these accounting units of the tokenized asset as part of a certain deal.

3. It is possible to confirm data about the property, the deal involving which may be the basis of the tokenized asset, as well as about the tokenized asset creation. In order to ensure that a number of legal guarantees regarding the tokenized asset are followed, there should be documented information about the owner of the property, the deal involving which is the basis of this tokenized asset, as well as confirmed information on the scope of rights to this property that the tokenized asset creator has.

Therefore, the above conditions are mandatory and sufficient for defining tokenized assets as products, which ensures that they are kept in civil circulation. In turn, in case the tokenized asset does not meet all the mentioned conditions, it will not be considered as an object of civil circulation (product) and will be intended for use for purposes other than exchange.

Going back to financial accounting in a distributed ledger token accounting system, it has to be mentioned that currently, the standardization of financial reporting on the international scale is based on the requirements of the International Financial Reporting Standards [17]. They are developed and published by an independent body of the International Financial Reporting Standards Foundation, namely the

International Financial Reporting Standards Advisory Council. It should be noted that financial accounting in the distributed ledger token accounting system using a tool such as a tokenized asset can be organized in accordance with the requirements laid down in the International Financial Reporting Standards.

Management accounting. If a tool that will be used for property accounting is represented by a tokenized asset that is not an object of civil circulation and is intended for use for purposes other than exchange, management accounting of property will have to be considered. A tokenized asset, which is not in civil circulation, as a tool for management accounting of property can be created only during preparation and conclusion of an agreement describing this property intended for use for purposes other than exchange.

When talking about the purpose of management accounting, it has to be mentioned that unlike financial accounting, this type can be characterized as accounting for providing the relevant information, first and foremost, to internal users in order to manage production and business activity of an organization, solve internal tasks of managing the organization as well as find and substantiate management decisions. The data of management accounting is a trade secret of the organization. In addition, the methodology and organization of management accounting are not regulated. Management accounting is performed in accordance with the rules established by the organization itself considering the specifics of its activity [8].

It is important to note that financial and management accounting of property by means of the distributed ledger token accounting system using the tokenized asset will have a high level of authenticity because the distributed ledger technology, due to its properties, provides an entirely new way of storing and managing information in terms of reliability.

Based on everything stated above, the fundamental feature for considering a tokenized asset as a tool used for accounting of property in a distributed ledger token accounting system is its legal connection with property, which, in turn, determines further consideration of the legal component of the economic and legal nature of the tokenized asset.

We will continue to present tokenized assets through legal nature. As is known, “legal nature is a legal feature of a certain phenomenon that represents its specifics, place and functions among other legal phenomena in accordance with its social nature. The legal nature of tokenized assets should be considered based on objects and entities involved. It allows determining the legal aspect of tokenized assets, which, in turn, will become the foundation for creating a proper legal framework of tokenized assets.

As noted when considering the technological nature of tokenized assets, a distributed ledger is an accounting system based on accounting objects in the form of distributed ledger tokens — objects of the distributed ledger token accounting system that are identifiers of information structured in a certain way, which can be, but not exclusively, derivative of a property deal. At the same time, a tokenized asset should be considered as a property right in digital form derivative of property” [5].

Property rights usually mean subjective rights of entities involved in civil legal relations that have to do with their legal rights to property objects (owning, using and disposing of property) as well as with material (property) claims that arise during civil circulation and have monetary representation. In this case, a tokenized asset will be a property right in digital form derivative of property. This property for the tokenized asset is the property, the right to dispose of which is used by its owner to create the tokenized asset. For ease of use, we will use the phrase “original asset” in the text to designate this property for the tokenized asset. It is worth noting that both property itself and the scope of rights to the property, among other things, can be an original asset.

The legal connection with a specific deal determines the derivativeness of the tokenized asset from the original asset, which is evident from mutual rights and obligations between the owner of the original asset and the owner of the tokenized asset. There is a condition that is mandatory for creation of a tokenized asset: it can be created and used only as a result of a deal involving the original asset. In other words, the tokenized asset cannot exist without a deal involving the original asset. The tokenized asset can be created only within the deal involving a specific property

and only as a digital representation of the already existing property right, which is the object of that deal. In particular, when accounting units of the tokenized asset are transferred, the deal will involve property that is outside the distributed ledger token accounting system, namely the original asset of this tokenized asset. Precisely because the tokenized asset is based on the deal involving the original asset, the tokenized asset is a tool for financial or management accounting of this original asset in the distributed ledger token accounting system.

It is wrong to talk about relations arising in the field of application of tokenized assets without considering and distinguishing the legal status of entities involved in such relations. This issue requires a comprehensive approach [18] with establishing not only their objects, but their entities as well. Thus, several key rules should be synthesized:

1. The parties to relations in the field of application of tokenized assets can be determined as users of a distributed ledger token accounting system.

2. The distributed ledger token accounting system itself does not allow identifying its users due to the absence of software architecture for creating accounts as a set of valid data about stored users, that is, data required for identification, authentication and authorization of users. This makes it impossible to use the distributed ledger token accounting system as an environment for concluding deals because the actions of users of the distributed ledger token accounting system are not subject to state guarantees, in particular protection of legal rights and interests of users that were not identified [6].

3. The consideration of the economic and legal nature of the tokenized asset allowed understanding that the tokenized asset exists in the distributed ledger token accounting system in the form of a record with an identifier of information derivative of the original asset.

4. If the tokenized asset is defined as an object of civil circulation, it allows conducting financial accounting of the original asset. Whereas the tokenized asset of non-civil circulation can be used for management accounting of the original asset.

Thus, having determined the method of formation and verification of entities

and objects involved in relations in the field of application of tokenized assets, the establishment of a legal framework of tokenized assets and legal status of these entities can be considered. It is very important for regulating relations that arise in the field of application of tokenized assets [6].

However, as already mentioned above, it is not possible to use the distributed ledger token accounting system in its “pure form” as an environment for concluding deals. Therefore, in order to ensure possible deals using tokenized assets, an appropriate environment is required, the infrastructure of which determines possible identification of both objects and entities involved — a decentralized information platform.

A decentralized information platform consists of “a service infrastructure and a community of independent users having equal rights or pre-identified rights granted according to the levels of the decentralized governance model to make such a system stable” [3]. The decentralized information platform includes a distributed ledger token accounting system and can be used as an environment for concluding deals, where counterparties identified by the decentralized information platform [4] have accounts, and all actions are automatically recorded in this platform.

Since decentralized information platforms are a result of human activity, obviously, there are users that ensure the operation of such platforms, and there are some users whose actions are aimed at benefitting from these platforms. Therefore, decentralized information platform users can be classified as “service providers” and “service users” (Figure 3).

Activities of service providers may be aimed at providing services to other users, which essentially entails implementing social relations in decentralized information platforms with tokenized assets as tools for financial and management accounting of property. Tokenized assets and decentralized information platforms can be used to implement any relations, in particular commercial ones, meanwhile tokenized assets can also be objects of such relations. It should be noted that activities of service providers are entrepreneurial and are defined as activities in the field of information technologies and computer systems or as intermediary services. In turn,

other users of decentralized information platforms (service users) use services both for personal and entrepreneurial purposes.

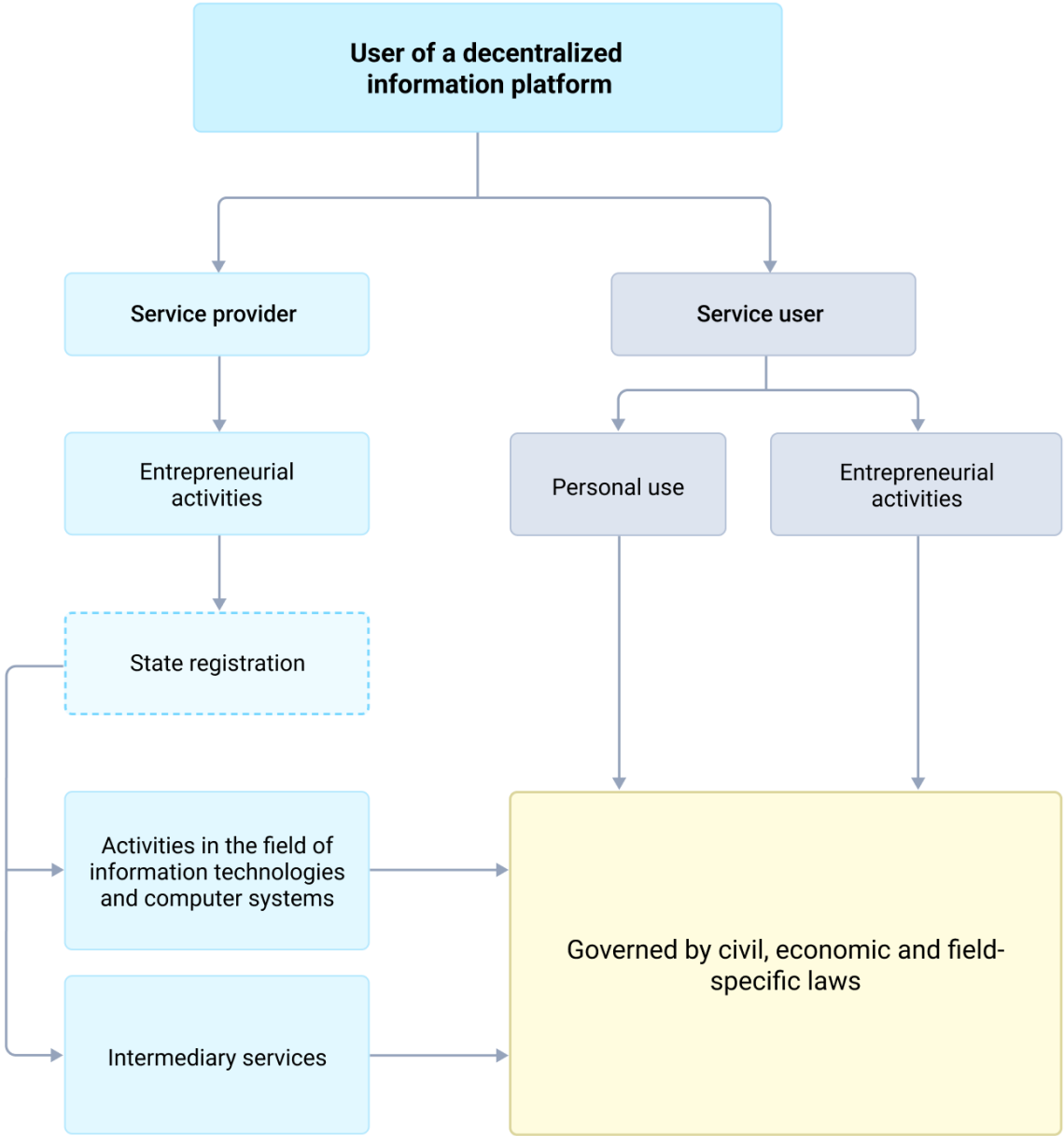


Fig. 3. Entities involved in social relations based on a decentralized information platform [5]

Social relations based on a decentralized information platform should be considered contractual and governed by civil and/or economic laws. Identification of users of the decentralized information platform allows stating that such deals can be covered by state guarantees, which include protection of legal rights and interests of

identified users of the decentralized information platform [5]. As an infrastructure solution, the decentralized information platform consists of software complexes that can be implemented as services and components.

Therefore, the above analysis allows defining the following four essential provisions about the role of decentralized information platforms in the circulation of tokenized assets, which are fundamental for the further scientific novelty of this paper regarding the market infrastructure development:

1. A decentralized information platform can be perceived as a hardware and software complex. Its infrastructure consists of components and services, includes a distributed ledger token accounting system and allows its users to implement property and personal non-property relations by performing financial and management accounting of their property and personal non-property rights by means of tokenized assets.

2. The ability to create user accounts in the decentralized information platform as a combination of data about users stored and necessary for their identification, authentication and authorization as well as existence of a set of components and services confirm that the decentralized information platform is a circulation environment for tokenized assets.

3. Only the decentralized information platform with its components and services (as infrastructure solutions) can ensure the creation of the information and applied component of a tokenized asset [5].

4. As for the organizational and technological support of the information component of a tokenized asset (for example, permanent and safe storage, instant confirmation and verification of data), the decentralized information platform infrastructure allows storing objects in digital form, managing access to them, registering the data of such objects in the distributed ledger token accounting system with the creation of a unique digital identifier (a distributed ledger token), and providing these objects with additional properties that include “authenticity”, “immutability”, “structuredness”.

Therefore, decentralized information platforms allow creating tokenized assets

with information component in the form of a tokenized asset information resource.

Depending on the goals of creating a tokenized asset and object of tokenization, the applied component of a tokenized asset can be distinguished: 1) tokenization of documents and document workflow; 2) tokenization of digital resources and management of access to them; 3) tokenization of legal relations.

Revealing the technological and legal nature of a tokenized asset allows generalizing conditions for circulation of tokenized assets as new tools and objects for financial and management accounting of property in information platforms. In particular, the following main conditions can be singled out:

- objects involved in legal relations unambiguously identified using a tokenized asset;
- entities involved in legal relations identified and verified in accordance with international Know Your Customer/Client (KYC) standards using a tokenized asset;
- a decentralized information platform as an environment for deals using a tokenized asset.

Conclusions. Based on the conducted research, the following general conclusions can be drawn:

1. The global development of digital technologies towards Web 3.0 and Web 4.0 literally rests on the guiding principles of open source code, decentralized governance, continuity, simplicity, reliability and technologically supported trust. Based on the blockchain technology, backed tokenized assets become an integral part of this technological development since they serve as tools for the exchange and preservation of social and economic value, supporting the interaction of billions of people on the internet and combining technological innovations with new economic and social models.

2. The main conditions ensuring the successful circulation of tokenized assets include:

- a) unambiguously identified objects involved in legal relations based on the use of a tokenized asset, which allows determining the owner and characteristics of the asset accurately;

- b) identification and verification of entities involved in legal relations in accordance with international Know Your Customer/Client standards, which allows ensuring safe and trusted transactions with tokenized assets;
- c) use of a decentralized information platform as an environment for deals using tokenized assets, which allows reducing risks and ensures secure transactions.

These three conditions will allow ensuring an efficient and transparent market infrastructure, promote innovation and development of various economic sectors in the European Union. Tokenized assets can become an important tool for providing access to new economic and social models, creating innovative solutions and developing the digital economy in the region.

3. The information and applied component of a tokenized asset allows distinguishing three main types of the tokenized asset at this level: a) tokenized documents; b) tokenized resources and c) tokenized legal relations. This division of tokenized assets into types makes it possible to legally and ontologically facilitate the perception of tokenized assets as a new and useful phenomenon in practice, for example, in banks, trading companies, auditing firms, etc. As a result, the use of tokenized assets in the market infrastructure can result in increased competitiveness and stable European market, providing new opportunities for investors and enterprises.

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