

An effective approach to asset tokenization

Predictable process of a digital transformation using blockchain platform

Dr. Pavel Kravchenko, Co-founder of Distributed Lab, cryptographer and PhD in Information Security

Dmytro Haidashenko, CTO Distributed Lab

The purpose of this paper

The white paper intends to describe how enterprises can use tokenization process to create new business and improve operations' model.

This document provides a detailed description of benefits of asset tokenization from business and IT perspective.

Business advantages:

- Increase of liquidity of assets as a result of reduced trading frictions
- Improvement of investment attractiveness
- Ability for instant audit for regulators and compliance procedure
- Reduction of total cost of ownership of the accounting system

Key IT benefits covered in the document:

- Protection of the digital ledgers by applying modern robust cryptography
- Secure synchronization of ledgers between counterparties
- Reliable management of the history of transactions and administrative events
- Utilization of the power of third-party developers with a high level of security

Introduction	4
Tokenization is NOT related to cryptocurrency	5
The big ideas behind tokenization	5
Situation overview	6
Limitations of legacy accounting and transaction processing systems	7
It is time for a change	8
Reasons to tokenize assets long-term	8
Five key areas of transformation expected by the business	9
Challenges in tokenization	11
The right technology helps	12
7 most frequently asked questions about tokenization	13
Difference between traditional approach and tokenization	14
Legal aspects of tokenization	15
Is your business ready for tokenization?	16
TokenD: Roadmap to successful tokenization	17
Integration with ERP, EAM, CRM	17
Examples of tokenization applications	18
Conclusion	19
Learn more	19
Sources	19
About authors	20
About Distributed Lab	20
About TokenD	20

Introduction

When one says “blockchain” or “tokenization”, many people tend to think about cryptocurrency and token sales, which made headlines in 2017. But this is only the hype version of the story. Analytical enterprises—those that maximize the strategic value of their assets—have already understood the role of blockchain in achieving security and interoperability of their IT systems.

Once or twice every decade, the IT marketplace experiences a major innovation that shakes the entire data management infrastructure. In recent years, the appearance of cryptocurrencies provided an example of how a financial system can be made robust in a completely hostile environment—fully anonymous, permissionless, distributed, and without any security administrators, firewalls or physical security. Many ideas can be borrowed from that scenario and applied to the much more friendly environment of enterprise asset management.

As it always happens with all technology innovations, hype is rampant and non-experts are overwhelmed with a variety of opinions. Even experienced technologists sometimes miss the point, claiming that blockchain is either a magic pill that will save the entire humanity or that it is no better than a traditional database with its old tricks. Of course, both views are far from reality. This paper will shed light on the key point—what is the approach of blockchain and tokenization and how to use it for the benefit of your business.

In addition, tokenization was mostly viewed as simply a process of issuance and sale of utility tokens, which bluntly copied the generic Bitcoin idea of a decentralized currency, applying it to payments between users of a particular business application. This is how the world has witnessed tokens for cannabis sale, car washes, exchanges, IoT, browsers, social networks, data storage, phones, investment funds, and many other things, both weird and not. The message these startups were trying to convey was the democratization of investment, transparency of operations and smart contracts between people and machines.

BLOCKCHAIN

Who hasn't heard about blockchain lately? With thousands of press articles and hundreds of conferences exploring it, it is clear that the data deluge is upon us.

Nearly every discussion about blockchain begins with a debate over definitions. Crypto people mean particular Bitcoin/Ethereum shared database, financial folks define it as a technology for transacting, startup founders often talk about their own version of the implementation of this magical sauce. Even Wikipedia doesn't provide a clear understanding of why this thing is so popular: “Blockchain is a growing list of records, called blocks, which are linked using cryptography”.

We came up with an explanation that summarizes key properties of the technology: **“Blockchain is a method of storage and synchronization of data between parties who don't trust each other”**. It clearly points out to the most appropriate applications of blockchain—those that require guaranteed decision making and ledger management.

In fact, many of these ideas made sense perfectly, but unfortunately, the real implementations mostly failed due to the incompetence, greed, and even fraud. Nevertheless, the idea of digitization of all assets and application of programmable logic to the operations with them is very prominent and is getting more and more traction. Tokenization brings guaranteed trust to the processes in accounting system and increases value of assets.

The two expressions “a tokenized title to an asset” and “a tokenized asset” will be used interchangeably.

Tokenization is NOT related to cryptocurrency

Tokenization is the process of digital transformation of asset accounting and management systems. It has nothing to do with creation of virtual currencies. Tokenized assets are always issued by a certain business which role is to perform registration of users, processing of transactions and custodial services. These activities are performed according to the local regulations.

The big ideas behind tokenization

Tokenization implies that accounts are managed using cryptographic keys, which results in direct account management instead of mere execution of orders.

Tokenization makes accounting systems secure than traditional database records which makes them transparent, expandable and scalable.

Tokenization implies that a blockchain based ledger is the primary source of information.

For business the main benefit is increased liquidity as a result of reduced trading frictions.

From the IT operations perspective, the main benefit is the reduction of TCO of ecosystem and greater interoperability.

Tokenization is an evolutionary step in the transition of accounting from paper to an entirely digital form.

Situation overview

Research and surveys from institutions such as the World Economic Forum (WEF), McKinsey [1,2] predict that up to 10% of the global Gross Domestic Product (GDP) will be stored and transacted with the help of blockchain technology by 2025–27. Having this tipping point in mind, we ran a market simulation to determine the potential market size of a global tokenized market using a conservative approach.

The need for digitization of assets arose alongside the emergence of computing machinery and data transmission networks. Existing tools for asset management and trading are either not sufficiently automated, not reliable enough, or require complete trust from users. This greatly limits the potential of market turnover of goods and services, resulting in an overly low liquidity and interoperability.

Before jumping into details of tokenization, we have to clarify the terminology.

TOKEN

A token is an accounting unit used to represent user's balance in a digital accounting system which allows proving ownership of a corresponding asset.

TOKENIZATION

Tokenization is a process of transformation of asset accounting and management in which the ownership of an asset is represented by a digital token.

Tokens and tokenization can be viewed at four conceptually different levels:

- **User experience.** The token owner is provided with a legal title to a corresponding asset and is also able to quickly and reliably transfer this right to other users without having to transfer the asset directly. Owners of a token are assumed to recognize the legitimacy and uniqueness of the registry where the record of tokens is maintained; also they should trust the custodian of physical assets (in case a token is backed by any).
- **Business operations.** Primarily, tokenization implies blockchain-based ledger (registry) of the ownership rights. Transferring a token "hand-to-hand" means changing the owner of the asset in the registry, which is considered the primary source of information for everybody.
- **IT infrastructure.** A token can be viewed as a recording method in the registry, which reflects a user's balance in an accounting system. At the same time, this method implements data backups, role and infrastructure management, integrity of the transaction history, automated real-time audit.

- **Technology.** A token is an account structure where all the fields are protected with cryptographic mechanisms (such as digital signature, zero knowledge proofs etc). The account supports operations for updating its state, presumes certain allowed transactions, their lifecycle model, rules for processing etc.

In **legal** terms, a tokenization platform is a typical registry of property rights and is not fundamentally different from a traditional centralized accounting system or a paper record. If a user has an account on the tokenization platform—where they store a certain number of tokens on the balance—they are meant to have an opportunity to prove the legal title to the relevant assets.

A distinctive feature of a tokenization platform is that it implements mechanisms of ensuring the integrity of the entire transaction history; it also offers data processing properties such as availability, non-repudiation, robustness, and authenticity. A tokenization platform satisfies the needs of users who work on the *trust but verify* principle.

Tokenization implies that accounts are managed using cryptographic keys, which results in direct account management instead of the execution of orders by system operators.

Limitations of legacy accounting and transaction processing systems

Digitization of accounting system is quite recent trend, started around 1970s. Internet attacks were not obviously a concern that days, which is one of the reasons why security mechanisms were not designed in the original architecture. Since communication processes were not digitized until 1990s and regulation (reporting, AML, KYC etc) was lagging even more - in majority of cases is still using on paper format, accounting systems inherited many legacy mechanisms that are not ready for the digital age. Other common practice was closeness of software, which was viewed as a good practice for achieving security. From the architectural perspective trust to a designated party wasn't an issue, since mentality of the business behaviour was always based on trust which was preserved by a legal and enforcement branch of a state. Summarizing the issues:

- Lack of transparency in the accounting process, particularly in the history of changes
- Low level of interoperability with other platforms
- Need to trust the management of a system to a third party
- High complexity of the audit
- Vulnerability to unintended and noncompliance changes
- Cumbersome integration with other systems
- High operational costs
- Significant time for business process modification

From the technical perspective these problems were caused by following issues:

- Technical incompatibility of data formats and a lack of open API
- API does not support managing using cryptographic methods
- Lack of strict ordering of transactions as well as of transactions integrity verification
- Final state of the database is, by default, considered the main source of data, making it difficult to trace the causes of errors
- Vulnerability to malicious actions
- Impossibility of synchronous and atomic updating

All the above-mentioned factors lead to inefficient operation, the need for manual intervention, and additional expenses on audit and insurance.

It is time for a change

There is new urgency to resolving these inefficiencies in the financial industry. Competitive pressures for one. Old fashioned traditional ways of doing business are rapidly losing ground to internet start-ups that offer real time response 24/7. Customers, especially from generation Y experience fear every time they need to sign a paper with a fine print. One reason for that is that in a global world with no borders trust is fading away, because company they are dealing with could be located on the other side of the globe, leaving limited opportunities to establish long term relationships. Therefore there is a need in a guaranteed trust, something they can *verify*, and not just blindly believe. Management of assets has to be aligned with requirements of a digital age and global economy.

Reasons to tokenize assets long-term

Tokenization has plenty of promising possibilities:

- Primary benefits of tokenization is that operations with tokens are cheaper and more secure than with the traditional database records.
- Reliable real-time audit of an accounting system from the owner or customer perspective increases confidence in business and strengthens relationships.
- Increased user convenience by using uniform software allows to bring on board more customers.
- Liquidity of assets is increased as a result of reduced trading frictions.
- From the IT operations perspective, the main benefit is the reduction of TCO of ecosystem and greater interoperability.

Five key areas of transformation expected by the business

USE TOKENIZATION TO WIN THE BUSINESS

Work with a global market. Make your system ready for third-party applications, which will extend customer base. Support their development and even provide your own open-source clients as a reference tool for developers.

Automate your KYC processes. Fast onboarding is crucial in a customer acquisition process. Allow simple registration with email only with limited ability (or a test mode) to work with the system and then require more data when users are familiar with the system and want to perform financial operations that require compliance with the regulation.

Enable secondary market. Engagement of users into your system is hard to overvalue. Let them communicate, recommend, trade with each other with assets or services that you provide. Don't worry that some of them will buy from each other and not from you — look how Amazon turned this into an advantage.

Provide transparency to win customers. A client is able to issue assets on the platform run by a business, without having to trust the platform operator. The usage of blockchain makes processes transparent for everyone. It is not a black box anymore.

Business operations. Effective resource allocation is the motto for the business of 21st century. Nowadays resources are wasted heavily because different customers are offered same prices, quality and speed of service even though they would happily pay a premium for some urgent needs (the best example would be trading waiting time in line for money). Therefore businesses will adopt flexible pricing based on an auction model and secondary market transactions, which lead to effective price discovery. It doesn't imply that business will lose money if its customers can trade with each other—facilitating the economy and taking fees from their transactions can be a winning strategy (as Amazon and eBay proved working). Fractional ownership and crowdfunding are another trends that penetrate "traditional" markets. For a long time, investment was a privilege of very rich people which lead to a high amount of a single investment. With globalization, approaching demand for investment in a variety of assets is growing—from commercial real estate on the other side of the globe to fine art. This demand comes mainly from the ordinary people who are looking for replacement of deposits (which often offer negative interest rates!). Due to a digital nature, tokenization allows for an easy dividing of asset title into fractions. Also, creation of crowdfunding campaigns present enterprises with another source for their investments and cash reserves.

Dealing with regulators and investors. Given the low level of trust for black box accounting processes from regulator's or investors' side, everything from the decision-making to reporting should be transparent. Tokenization provides the ability for real time data analysis and audit.

It also helps to get real-time statistics about the usage of the system. It was impossible earlier since the access with guaranteed information would require administrative rights to the system which business would not obviously provide due to security concerns. The blockchain-based architecture for tokenization systems allows adding audit nodes which only have the right to see and validate transactions but cannot change any data.

Customer relationships. Earning customer trust was never an easy task, especially in the world with hundreds of business relationships without physical interaction. Companies need a way to provide customers with a guaranteed trust towards their accounting systems. And the answer is a blockchain-based accounting system, where customers can actually prove (even in the court!) that something indeed has happened in the past. How would one today prove that a particular version of the end-user agreement has been read and the AGREE button was clicked?

These cases also include verifying that:

1. Particular conditions were signed.
2. The balance on the account is the result of correct operations.
3. The history of transactions wasn't changed.
4. The total amount of assets traded on exchanges corresponds to that issued. Future is definitely for those who are transforming their security systems from detection to prevention and anticipation.

Relationships with partners and developers. The result of tokenization will be a comprehensive, integrated platform for ownership rights management. Looking at the spirit of PSD2 regulation, wise businesses can get the idea of interoperability trend that is spreading very fast. This introduces open (but secure!) API, the ability for third-party developers to come up with external modules, and interoperability between software components. Along with eliminating the headache of the IT staff, this leads to the ability to work more closely with partners (or within consortiums). Formerly, this was a very hard task because even friendly organizations wouldn't trust each other to maintain the accounting in a black box manner. Blockchain enables maintaining a shared ledger of accounts and events where each partner is able to verify and validate the data. This feature is most helpful for consortiums that work with some asset (for example, a loyalty program that involves chains of stores). As a result, you can create an ecosystem that does not rely on (and does not belong to) a single organization; the issue of trust is removed; the cooperation is strengthened.

Internal IT processes. The key transformation that has to happen is that instead of changes in the database records initiated by administrators, every action (transaction) has to be signed by a digital signature. This implies usage of cryptography to protect data at each step (even the changing of fees is an action that has to be signed with a signature). This implies the usage of digital identity and rolling out a public key infrastructure. As a result, you achieve non-repudiation and security of the logging process (logs that are easily manipulated when hackers hide their actions). Cryptographic mechanism needed for this step - hash functions and digital signatures are widely standardized, available and tested for decades.

TOKENIZATION TAKES ASSET MANAGEMENT TO THE NEXT LEVEL

Real time audit. An audit was always never a very pleasant procedure for companies, and sometimes their normal business processes had to stop during it. The real-time audit will help companies that have nothing to hide to reduce the overhead and keep regulators at bay.

Guaranteed provenance. In the era of paper-based accounting, provenance was nearly impossible. Very few experts were able to verify the authenticity of documents and signatures. The start of the digital era was no better since forging digital data is much simpler. Only the usage of cryptography and blockchain helps to provide trust to the history of transactions.

Fractional ownership. Fractional ownership allows to extend customer segments and create new business models while keeping integrity of the records of assets in the legacy systems. Dealing with fractions of a title becomes very easy and efficient.

Smart contracts. A smart contract is a programmable logic stored on blockchain platform which explicitly defines process of asset ledger state modifications. It can be used to move automation of business process to the next level by protecting pre-conditions, input and outcomes with cryptography and consensus.

Challenges in tokenization

As we have seen before, tokenization touches on the key business processes and obviously is not a magic pill that could transform business overnight. Main challenges for tokenization are as follows:

Tokenization requires a digital identity. A secure digital identity that allows reaching non-repudiation that is achieved by the usage of a public key infrastructure. It means that every person involved in the business process receives a pair of cryptographic keys and an app or device to handle them. The main challenge here is that people are bad in internet security. Therefore hardware devices should be used in many cases and sometimes rigorous security policies should be followed. The learning curve for the new system can be months.

Digitization of all processes. In order to automate transactions with ownership rights, auxiliary processes have to be digitized as well. For example, if decisions about transaction validation have to be approved manually, there is little sense in speeding up other parts of the system. Therefore many supportive processes, such as handling KYC, AML, fraud prevention, reporting, audit have to be performed in a digital way using APIs. The digital transformation of a business requires a lot of focused efforts and often bumps in inefficiencies that were beneficial for some people in the company.

The right technology helps

A tokenization platform is a set of components that allow keeping records and performing operations with a particular asset through the use of a digital token as well as provide for the reliable storage, processing, and managing of assets. These components are as follows:

1. Ledger
2. Internal payment system
3. Internal exchange
4. User identity management module
5. Gateways and integration modules
6. Wallets
7. Admin management module

A tokenization platform is a comprehensive solution to the task of asset tokenization.

In order to reduce the risk of fraud and collusion, different types of actions have to be performed by different (sometimes independent) entities. Therefore, there is a set of roles that tokenization platform need to support. The most important among them are as follows:

Validator. A validator maintains the normal functioning of a system in accordance with the protocol of token accounting. The role of a validator can either be performed by one person or by an entire organization. In general, transaction validators could be auditors, regulators, as well as partners of the creator (owner) of a tokenization platform (e.g., members of a consortium performing a particular business function).

Auditor. An auditor is a designated party that has the right to verify transactions and raise a red flag if notices something suspicious. An auditor maintains a full copy of a transaction ledger and is required to prove the legality of actions.

Custodian. Custodian stores physical assets tokenized on the platform (if there are any). Custodian is an important role since an IT platform cannot prevent theft by itself.

Issuer. Issuance is performed by an issuer based on the information from the custodian. Tokens can be issued either in a centralized (the amount to be issued is set by the responsible party) or decentralized (several validators reach consensus about how to issue tokens) way.

Administrator makes decisions on updating and configuring the platform and setting business rules.

Corporate user. A business company (entity) can become a client of an organization that controls the platform to issue its assets on the tokenization platform. This is how the second layer of hierarchy is created.

End User. A customer that stores tokenized ownership rights in their wallet.

To guarantee the maximum level of security, tokenized asset (digital ownership rights) have to be carefully managed. The lifecycle of a token is as follows:

- Creation - parameters setting
- Pre-issuance - giving access to automated module or administrator to issue certain amount of tokens (performed on a secure offline device)
- Issuance and distribution - tokens are sent to the balances of regular accounts on confirmation from primary accounting system
- Transactions and trading
- Monitoring and reporting
- Redemption - exchange of tokens for a product or service and notification to primary accounting system of asset

7 most frequently asked questions about tokenization

What is the difference between tokens and currencies (money)?

Despite the fact that people already use this word in their everyday life, token is a technical term that in practice denotes the right to any asset, including a currency.

Tokens are a digitized right of ownership of an asset and can also be used as a means of payment. Exchange of tokens or payment in tokens for other goods and services are equal to *barter*.

What is the difference between cryptocurrency and token

Cryptocurrency is an independent digital currency in which management of the following processes is **decentralized**: coin issuance, transaction confirmation, data storage, audit of accounting system, and governance (such as decision-making about updates). To own cryptocurrency coins and make payments, you do not need to obtain any permissions: all users have equal rights to use it.

Sometimes the term *token* is used to denote an entire group of digital assets: digital collectibles, complementary currencies, and cryptocurrencies. The opposite statement, however (i. e., any token is a cryptocurrency), is false because tokens can be issued either in a centralized (managed by a particular organization) or decentralized (managed by an upfront specified algorithm) way; respectively, they can either be fully controlled or completely independent. Thus, only a narrow subset of tokens can be considered cryptocurrencies.

What are asset-backed tokens?

An asset can be a financial instrument, a product or a service. Tokens backed by assets are controlled within accounting systems where they are managed, stored, and issued either by the service provider or by the organization that stores physical goods. One such token is always backed by a fixed amount of goods or services in the 1:1 ratio, which is guaranteed by a certain party (custodian). For example, one token can grant the right to 1 kg of grain, one haircut in a salon, one square meter of real estate, or even 1/1000 of a particular artwork. Depending whether the underlying asset is considered security, the token can be named as a security token.

What is the difference between direct ownership of an asset and ownership of a token backed by this asset?

The difference lies in where an asset is physically located: transferring ownership in the form of a token does not necessarily presume the physical transfer of an asset by which this token is backed.

What are examples of tokens in everyday life?

A voucher for a haircut in a barbershop can be considered a token. A subway token is another example. The US dollar before the cancellation of the gold standard was a token for a certain amount of gold.

How can you monetize a tokenization platform?

- Fees for payments conducted within the platform
- Fees on the capital raised
- Data collection and analysis
- Revenue sharing with third-party services (insurance, advertising, etc.)

How are transactions canceled in case of errors or attacks?

Deleting or modifying transactions in the blockchain based ledger are impossible. However, there are service transactions that lead to changes in the current balance (thereby logically adjusting the results of actions). As a result, both wrong and corrective transactions remain in the history. This is necessary for reliable audit and protection against attacks from a system admin.

Difference between traditional approach and tokenization

A straightforward digitization of ledgers leaves open the question of security. Tokenization transforms asset management: *an order execution model is replaced with a model of direct asset management using cryptographic mechanisms*. The main difference is the elimination of a role (e.g., administrator or a module that operates with the corresponding permissions) that changes balances on users' accounts directly—this what the order execution model is based on. Tokenization presumes that users control their balances using cryptographic keys that no one else, including admins of the system, knows.

There is also a crucial difference between the registry of authenticity and the title registry (ownership right registry). *A registry of authenticity associates a specific asset (e. g., a designer bag) with its manufacturer and allows verifying its authenticity*. This registry contains only objects without current owners. A title registry is an information resource that contains data about existing and past ownership rights to certain assets.

The key question is why blockchain is better than the traditional database approach. There are several reasons to use blockchain for tokenization or protection of a ledger.

1. Every token holder can prove that their balance represents the result of the correct execution of a set of transactions—**audibility**.
2. No one can change the balance of accounts without being noticed—**integrity**.
3. It is hard to delete the state of the ledger since there are multiple copies of it synchronized real-time with no central point of failure—**robustness and accessibility**.
4. It is easy to prove who initiated and which action—**non-repudiation**.
5. It is possible to guarantee that transaction was approved by all the necessary parties — **decentralized decision making**.
6. Some participants in the system may be able to perform an audit without having the ability to change the data—**trustless transparency**.

If you try to achieve all these properties using the possibilities of a traditional database, it would be wheel reinventing—you would eventually come up with the blockchain solution.

WHAT WAS IMPOSSIBLE BEFORE TOKENIZATION?

Guaranteed trust in the following processes of the accounting system:

- Transaction history & Provenance
- Real-time audit
- Governance
- Relationships & integrations
- Reconciliation
- Data integrity management
- Reporting

Legal aspects of tokenization

Once a tokenization platform is considered a primary source of information about ownership rights, the ownership of an asset-backed token becomes legally equivalent to the ownership of an asset itself—a change of ownership of a token is equal to a change of ownership of an asset. However, due to the fact that some tangible assets need to be stored, the binding of digital ownership to an asset must be performed by a trusted party (or many independent parties)—custodian. In this situation, the owner of a token trusts a custodian who is responsible for backing these tokens with an appropriate asset; the token owner must also trust the issuer who ensures that the number of tokens matches the physical asset of a custodian. For the real estate or intangible assets, the ownership record is actually equivalent to the ownership of an asset (e. g., land, shares, or intellectual property).

Is your business ready for tokenization ?

Key questions:

- Is digitalization a company's strategy?
- Do you manage a ledger of assets that belong to your customers?
- Are these assets fungible?

If answers to these questions is positive, you will definitely benefit from tokenization.

Auxiliary questions will help to evaluate how important tokenization could be for your business right now.

1. Are these assets divisible?
2. Would your customers benefit from exchanging assets that belong to them?
3. Does it make sense to facilitate trading between users and take fees?
4. Would your industry benefit from the global ledger of authenticity/ownership of the assets?
5. Would your customers benefit from guaranteed provenance of the assets they own?
6. Do you need to provide comprehensive reports to regulators about transactions in your system?
7. Will an error in your system (or failure to provide authentic data) lead to big fines and reputation risks?
8. Would the market size grow significantly if companies from your industry adopt the same standards of managing assets?
9. Do you bear the legal risk of maintaining the ledger of ownership?
10. Does it make sense to build an ecosystem where customers could "pay" with the assets they own?
11. Does it make sense for customers to put their assets in escrow or lend them?

A prompt - these assets will be tokenized first:

- Bonus and loyalty points
- Gift cards
- IOU and money
- Tradable securities
- Registries of owners of precious metals in vaults
- Warehouse receipts and their derivatives
- Intellectual property
- Real estate and other proprietary rights
- Ownership rights for fine art

TokenD: Roadmap to successful tokenization

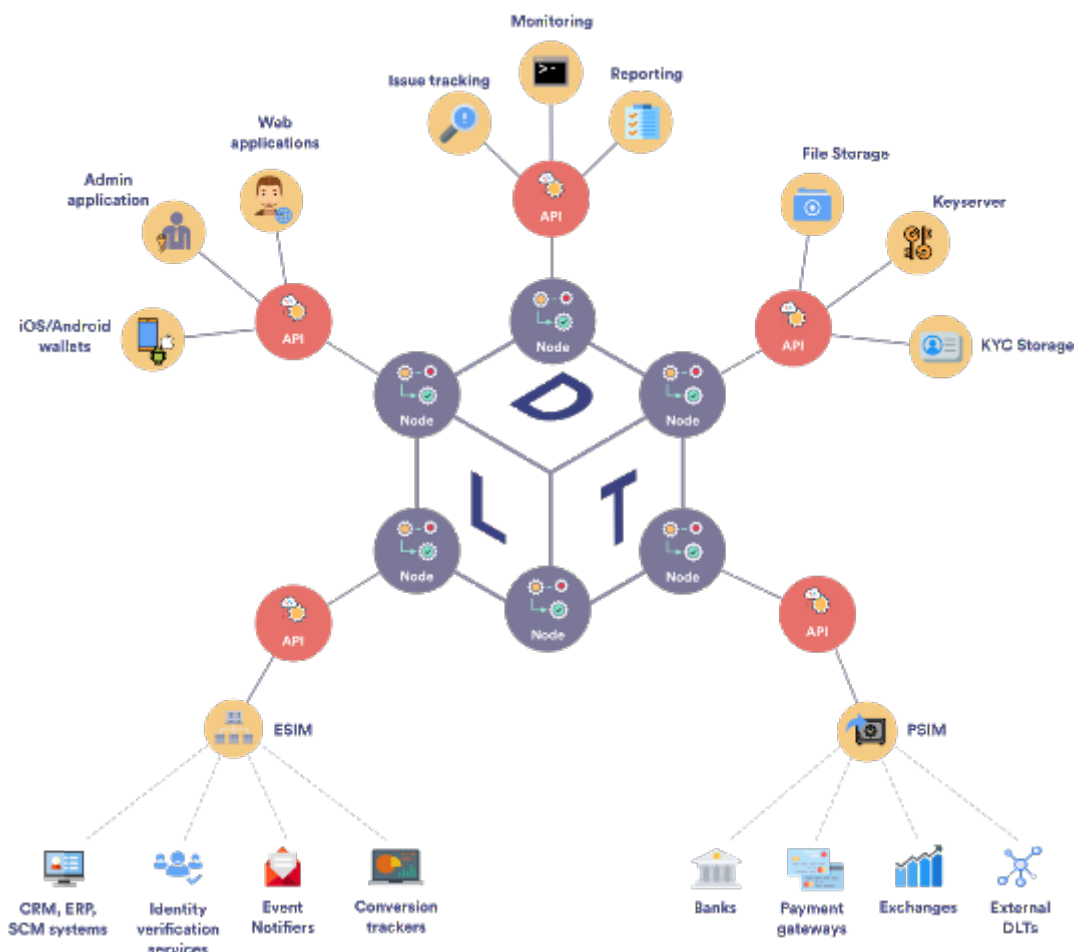
TokenD blockchain based solution has been tested and proven in different industries to be effective in optimizing the tokenization efforts.

TokenD key advantages:

- Allows to quickly create new business models and processes
- Enables support of modern security techniques
- Reduces the risk inherent in software development from scratch
- Has predictable TCO without any hidden “native currency” costs
- Was created based on experience in more than 15 projects over 4 years
- Allows you to launch an ecosystem within weeks or even days
- Has comprehensive documentation focused on developers and admins

Integration with ERP, EAM, CRM

In order for tokenization to fulfil its potential, the system has to be integrated with existing enterprise systems. TokenD has rich API that presumes work with external data sources such as CRM or EAM. All the transactions that clients initiate with tokenized assets are securely transmitted into EAM and vice versa. Principles and procedures of accounting and reporting stay the same.



Examples of application of tokenization

Real estate investment (REITs)

The problem. Today, real estate is generally traded in indivisible pieces, which are defined—trivially—by the construction plan. If an investor wants to buy real estate in a particular district, inside a particular building—due to particular investment reasons—he is obliged to buy the entire facility. This restricts the mass market while the diversification of risks is almost unattainable.

The solution. In terms of tokenization, there will be a digital property registry in which security tokens—micro-shares of a particular building—are issued. Therefore, an investor, when buying a token, gets ownership of a part of a building rather than of the entire office; he can buy/sell any number of tokens either on a secondary market or from/to the developer. At the same time, the managing company can rent offices and distribute profits proportionally between the owners of tokens. If all buildings in a district are tokenized, it is possible to create a token that will represent the commercial real estate index of a district (at that, it is not simply an index but a direct ownership of micro-shares). Similarly, one can make an index of a city or a state. Investors will choose an individually acceptable investment strategy.

Company owners voting

The problem. To make decisions on important issues, it is necessary to hold a shareholders' meeting: this often requires significant logistical and time expenses.

Solution. The registry of owners of a company is tokenized, and each shareholder will have their own digital wallet in which their share is accounted, so voting can be performed among the token holders. Any token holder will be able to initiate voting by posing a question with answer options. All other holders of tokens receive notification of a new vote and gain an opportunity to poll their vote for the proposed answer options. The weight of a voter is proportional to the number of owned tokens. As a result, the process of collecting and counting votes is completely transparent and safe for all shareholders, leading to a significant acceleration of decision making and reduction of expenses.

Warehouse receipts

As an example, imagine a grain storage (its business essentially is that it stores grain). Farmers bring grain for storage and in return receive a receipt. Later, they take back the grain (the grain returned should be of the same quality as what was brought). Tokenization of this process will allow the following goals to be achieved:

- Optimization of expenses related to system ownership
- Creation of a secondary market
- Increasing transparency of operations for the warehouse owner (all operations for the exchange of receipts are evident at any time as well as who holds them and how many)
- Ensuring the authenticity of receipts (users can be sure that their receipts are not fake)

Crowdfunding and crowd-investing

In order to increase the transparency of investments in a startup, shares can be tokenized. A tokenized accounting system of shares will allow all investors to be confident that *their share is accounted and that their share is a certain part of a total investment*.

Everything not accounted in the tokenized accounting system (which is, in fact, accessible to all investors) is considered non-valid.

Gift certificates

Currently, the process of issuing gift certificates is prone to several issues:

1. Gift certificates most often have a physical form, which leads to expenses on their creation and distribution.
2. The transfer of a gift certificate requires physical interaction, and its speed is limited.
3. Risk of counterfeit is possible (the buyer isn't able to verify the authenticity of a certificate).
4. In the case of using digital codes as certificates, there is a risk that the certificate can be reused since a code itself is a secret value.

Conclusion

Tokenization is the natural way of evolution of asset management system via using cryptographic methods to secure ledgers and guarantee their reliable synchronization. On a business level presence of these features result into increased liquidity of assets, instant audit, simplified operations and investment attractiveness of a business. Therefore, predictably, all assets will be tokenized in the future. Tokenization assumes better interoperability, secure and open APIs, expandable infrastructure and greater control over IT infrastructure. Tokenization platform can be seamlessly integrated with existing ERP, EAM, CRM and accounting systems.

Learn more

<https://tokend.io/>
enterprise@distributedlab.com

Sources

[1] Deep Shift Technology Tipping Points and Societal Impact. (September 2015) Global Agenda Council on the Future of Software & Society. Survey Report. World Economic Forum.

[2] Carson, B.; Romanelli, G.; Zhumaev, A.; Walsh, P. Blockchain beyond the hype: What is the strategic business value? McKinsey & Company.

About authors



Dr. Pavel Kravchenko

Co-founder Distributed Lab, cryptographer and PhD in Information Security

- Has over 15 years of practical experience in software development for banks and enterprises
- Due to proven sharing of knowledge was recognized as thought leader in the whole space many times

pavel@distributedlab.com

phone: +380677410874



Dmytro Haidashenko

CTO Distributed Lab

- Has over 5 years of practical experience in development of blockchain powered solutions

dh@distributedlab.com

phone: +380633059491

About Distributed Lab

Distributed Lab is a blockchain expertise center. The team consists of researchers, developers, analysts. The main activity is the development of TokenD—software platform for private blockchains and tokenization. The goal of Distributed Lab is to create Financial Internet—when all accounting systems use a uniform protocol that facilitates trade and value transfer.

About TokenD

TokenD is a state-of-the-art white label blockchain platform that consolidates the experience gained by Distributed Lab in building the production-ready tokenization solutions. It allows you to issue, transfer and exchange your assets with high level of privacy, security and auditability while following regulations of your jurisdiction. TokenD is designed for enterprises who are willing to take advantage of tokenization or experiment with the blockchain technology without the need of maintaining the expensive team of blockchain experts and within the shortest time to market.