USDDex
0x protocol v 2.0

The USDDex Stablecoin System

based on Ethereum ERC-20 standart

by the USDDex Team

September 2018

Contents:

USDDex Stablecoin System. General information

For the time being there is no a digital asset which would be relatively stable or suitable for everyday usage.
All existing cryptocurrencies including Bitcoin and Ether are highly volatile with almost unpredictable falls and rises during a pretty short period of time.

We are dedicated to creating a stable, not fluctuated in value, cryptocurrency pegged to US dollar and which would help to exploit the blockchain technology to the full.
Here we introduce you USDDex Stablecoin, a cryptocurrency with collaterals for guarantees.

Our solution involves USDDEX as a unique smart contract platform on Ethereum which secures and stabilizes USDDex value, also USDDex Generating Collateralized Smart Contracts (UGCSCs) system to generate USDDex and have it as an asset, autonomous feedback mechanism and external actors to maintain and control stability of USDDex price and risk management.

Every Ethereum keeper or holder can generate USDDex through the Platform.
USDDex is of no difference from other cryptocurrencies, so it can be sent, act as a payment method or kept in the user's wallet.
Along with that, USDDex generation process supports decentralized margin trading platform.

USDDex Generating Collateralized Smart Contracts

All holders of collateral assets can use them as leverage to generate USDDex on our platform using smart contracts.

By depositing, the user generates USDDex and along with that a debt arises.
To withdraw the collateral the user shall pay the amount in USDDex, until then all collateral asset(s) are locked inside the USDDEX Generating Collateralized Smart Contract (UGCSC).
The value of the collateral shall always be higher than those of the debt.
Otherwise the debt or collateral auction are to be launched.

The UGCSC interaction process

The whole UGCSC process acts in four stages.

The first stage supposes the user to create the smart contract by sending transaction. The next transaction shall be sent to secure it with the collateral (i.e amount and type of it). Upon completing the first stage UGCSC becomes collateralized.

At **the second stage** USDDex gets generated. The smart contract user shall send a transaction in order to retrieve the needed USDDex amount from UGCSC. In this moment UGCSC locks the collateral until the user pay back the whole amount of the debt.

The third stage includes covering the debt and Stability Fee. Stability Fee is an amount to be paid by every UGCSC user in no other currency than USDDex. When withdrawing his/her collateral back to their wallet the user shall cover both the debt and Stability Fee in USDDex.
The UGCSC is considered debt free as soon as the user pays down the required amount of the debt plus Stability Fee by converting it into USDDex and sends transaction to the UGCSC.

At **the fourth stage** the UGCSC smart contract is closed and the collateral is withdrawn. The user can send the transaction and withdraw either the whole or a part of the collateral.

Single- and Multi-Collateral USDDex

Currently only Single-collateral USDDex (ZRX) is available.
During the next 2-4 months we will deploy the USDDEX Platform
with multi-collateral support capable to deal with any number of UGCSC types.

ZRX (Temporary mechanism for Single-Collateral USDDex)

ZRX is the only type of collateral supported by USDDex for the time being.
It means that ZRX shall be received before generating USDDex through UGCSC.
There is a special smart contract that pools ETH from all users and to get the amount
of ZRX the user needs to deposit Ether in it so to receive an equivalent amount of ZRX.
In case of emergency or market crash when the value of debts would exceed
the collateral, USDDEX Platform will react by issuing new ZRX with decreased
value and recapitalize the system.

Price Stability Mechanisms

Target Price

The USDDex Stablecoin includes Target Price function which developed to determine
the ratio of UGCSC collateral relatively the debt and, secondly, the value of assets
every USDDex owner would receive upon a comprehensive clearing which description
and conception will be given below.
At the current phase of the Platform the Target Price is denominated
in US Dollar and softly pegged to it as 1:1 starting at 1 USD.

Target Rate Supervision Function

The USDDex Stablecoin includes Target Price function which developed to determine
the ratio of UGCSC collateral relatively the debt and, secondly, the value of assets
every USDDex owner would receive upon a comprehensive clearing which description
and conception will be given below.
At the current phase of the Platform the Target Price is denominated
in US Dollar and softly pegged to it as 1:1 starting at 1 USD.

Target Rate Change Regulator

In order to determine the exact alteration of Target Rate change upon USDDex target/market price change the TRSF needs a regulator which would adjust the operating speed of feedback depending on the scale of the system and would be used to activate or disactivate the supervision function.
This regulator is called Target Rate Change Regulator (TRCR).

USDDEX voters (see below) have the right to set the TRCR but cannot control it in case of TRSF is activated, so it is when the Target Price and the Target Rate are subject to control by market behavior.
In normal market situation USDDex is fixedly pegged to the Target Price and TRCR as well as the Target Rate are kept at 0 point.

Comprehensive Clearing

We secure the users' collaterals and value of their assets.
Therefore, we have developed the mechanism called Comprehensive Clearing which ensures the Target Prices towards USDDex holders and keepers.
It is designed to freeze the work of the Platform and carefully shut it down avoiding all possible system errors enabling USDDex holders and UGCSC users to receive all their lawful assets and values.
The access to this process is regulated by USDDEX voters and is controlled to be engaged only in force-major or other serious situations like hacking attack, security system violations, continuous market instability or system upgrades.

Below we indicate three main stages of the Comprehensive Clearing (CC) function process. At the first stage CC gets activated.

How?

First, USDDex Token Management selects and appoints to the position of clearers any actors at its own discretion. It is a major part of clearers, having deemed an event as a sever attack or a preplanned technical upgrade, who is eligible to launch the CC process. At this point UGCSC creation and deployment gets stopped, the Price Feed is blocked at a given fixed value and this value serves as a basis for proportional calculation of the users' claims and requests.

On **the second stage** the users' claims are to be processed. It supposes to take some time for keepers to complete and clear the proportional claims in accordance with the fixed value. As soon as it is done all USDDex or UGCSC holders can request a fixed amount of Ether due to their stablecoins or smart contracts.

The third stage involves the collateral call. If any (or all) holder of USDDex or UGCSC intends to withdraw his/her assets they can claim their collateral and exchange their Platform assets for an amount of Ether equally to the value of their USDDex and/or UGCSCs assets calculated on the USDDex target price.

For example, USDDex Target Price is 1 USD, The ETH/USD exchange rate is 200 at a day of Comprehensive Clearing engagement. Suppose, a user holds 1000 USDDex as of CC day. Then the first two stages shall be performed. At stage three the user can claim 5 ETH and get them back. We do not put any time restriction on the period of the final claim application.

Risk Management Resources

Our Risk Management policy includes a wide range of tools to determine and mitigate risks associated with UGCSCs, key parameters and external participants. Most of them flexibly support modification and adjustments of main variable components of the System and election of trusted out-of-Platform actors.

Each holder of USDDex has the right to vote to implement seven Risk Management options as below:

Adding of new UGCSC type.
It means the holder can compose own set of Threat Agents for every newly-created type of UGCSC. It involves either a new collateral or a new kit of Threat Agents for an existing collateral.

Changing of the existing UGCSC types by changing the Threat Agents of one or several added UGCSC types or modify the sensitivity of TRSF.

A team of trusted oracles are elected by USDDEX voters.
Every oracle is a node approved and individually known by the voters and included in oracle infrastructure. Oracles provide the Platform with information on the market price and internal collateral price. The system is secured to continuously operate even if a half of oracle nodes are compromised or malfunction.

A team of clearers are also elected by USDDEX voters.
Plus, they decide how many clearers shall be engaged to launch comprehensive clearing procedure and protect the whole system from attacks.

Three of seven options allow to modify the following criteria:

A) Target Rate Change Regulator.
It basically means the change of the sensitivity indicator of TRSF.

B) Target Rate.
This option can be applied in the only specific situation, namely, when the USDDex holders want USDDex price to be pegged to the current value of Target Price. In this case there is no way to avoid Target Rate Change Regulator changing. Simultaneously, the Target Rate Supervision Function gets turned off.

C) Price Feed Sensitivity.
This is used to change the maximum and minimum deviations and the period of time set for inflation force of the price feed to internal USDDex price.

For example, USDDex Target Price is 1 USD, The ETH/USD exchange rate is 200 at a day of Comprehensive Clearing engagement. Suppose, a user holds 1000 USDDex as of CC day. Then the first two stages shall be performed. At stage three the user can claim 5 ETH and get them back. We do not put any time restriction on the period of the final claim application.

Threat Agents

For every UGCSC there can be set a unique range of Threat Agents (TAs).
Risk profile data of the collateral security of every UGCSC type specifies its TAs.
With one vote for one USDDex the holders have the right to control
the TA through voting mechanism.
Below there are four main TAs for USDDex Generating Collagenized Smart Contracts:

The key Threat Agents for UGCSCs are:

Debt Ceiling
Is the limit on the amount of the debt a single-type UGCSC can reach and serves for diversification of the pool of the users' collaterals. UGCSC with the debt ceiling shall be closed.

Liquidation Ratio
Is a relation of the amounts of collateral and debt which supposes UGCSC to be liquidated upon reaching it. LR of the positive correlation to the volatility of the collateral.
A low LR shows low volatility of the collateral and vice versa.

Stability Fee
To be paid as APY (annually percentage yield) in USDDex tokens by every UGCSC user. The amount of Stability Fee is based on Price Feed and used to balance the supply and demand of the stablecoin. In case of payment USDDex is a subject to remove from the supply.

Penalty Ratio
Is developed and implemented to compensate the unproductivity of liquidation process. While the Single-Collateral USDDex is in effect, the Liquidation Penalty is used to purchase and remove ZRX from the system resulting in positive ZRX-to-ETH balance. So, the Penalty Ratio is needed to define how many USDDex can be generated during Liquidation Auction. This sum serves for USDDex purchasing and removing them from the supply; and excess collateral shall be brought back to the UGCSC owner.

USDDex Token Management

Besides its primary function, USDDex token also grants its holder the right to deploy Active Proposal smart contracts. Active Proposal include Single Action Proposal Contracts and Delegating Proposal Contracts and are important for USDDex Platform governing. An Ether holder can deploy any proposal smart contract which shall be voted by USDDex token to elect it as the Active Proposal upon having received the highest number of votes.

Initially only Single Action Proposal Contracts will be performed due to its simplicity, but with the development of the Platform the Delegating Proposal Contracts will be activated.

SAPCs grant the root access, can be executed only once and getting deleted right after that without reusing possibility. DPCs' code is developed to provide the constant root access using the second layer management logic which can be rather flexible and multi-functioning. For example, through this logic there can be defined protocols of weekly voting on risks parameters as well as any management actions restriction when needed or delegating of authority(-ies) to the third layer DPC(s).

USDDex and Multi-Collateral USDDex

MCD, Multi-collateral USDDex will be support a variety of assets and will replace ZRX. Single-Collateral USDDex users will have time to gradually upgrade it to MCD. In case of emergency or market crash when the value of debts would exceed the collateral, USDDex Platform will react by issuing new USDDex decreased value and recapitalize the system.

Automatic Liquidations of risky UGCSCs

The system can determine and delete too risky UGCSCs which do not correspond the principles of exceed- collateral-to-the-debt and do not have enough collateral. It is reached by comparing the Liquidation Ratio (LR) and the collateral-to debt ratio based on the Target Price. USDDEX voters control the Liquidation Ratio of every UGCSC type and the risk profile of a UGCSC is a base parameter for calculation of LR. Once UGCSC hits its UGCSC the liquidation process is launched and complete through the following procedure: Platform first buys and then sell the UGCSC's collateral.

On the current stage of the USDDex Stablecoin System we allow only SC USDDex (Single-Collateral) as a Liquidity Providing Contracts but for Multi-collateral assets there will be used a specially developed auction.

Liquidity Providing Contract (Temporary mechanism for Single-Collateral USDDex)

The Liquidity Providing smart contract is available to all ETH accounts at the feed price set by the system for USDDex cryptocurrency. In this case all USDDex paid for the ZRX collateral to be removed from the supply. In case USDDex paid for the collateral would exceed the outstanding debt, this exceeding amount to be used to buy and then remove ZRX at the market. This operation leads to maintaining positive ETH/ZRX ratio and increasing ZRX net value.
But in case ZRX collateral do not gain the necessary volume of USDDex, new ZRXs shall be created and sold off. This will result in negative ETH/ZRX ratio and decreasing ZRX net value.

Liquidity Providing Contract is developed for the current stage of Platform with Single Collateral USDDex. UGCSC to be liquidated is bought by the system and the owner received the amount of his/her collateral upon the debt, stability fee and liquidation penalty are dedicated.

Debt and Collateral Auctions (Multi-Collateral USDDex)

For liquidation the Multi-Collateral contracts debts at the next stage of Platform there will be established Debt Auction to generate USDDex amount necessary for the outstanding debt covering. Debt Auction supposes gaining and selling the USDDex supply to participants of auction.

Collateral Auctions operate in USDDex currency and besides UGCSC debt amount also include a Liquidation Penalty (see below). This will help to balance/even the additional amount of USDDex issued for Debt Auction. Upon reaching USDDex amount enough for cover UGCSC debt and LP, the Collateral Auction will start selling the collateral but in the minimum amount, and all not-sold collaterals are to be returned to the UGCSC owner.

Oracles, Keepers and Clearers

To receive information on market price of USDDex and determine its deviation from the Target Price the Platform need external participants.
Those who acts as mentioned above and provide real-time information are called Oracles.

On the other hand, the system also needs another type of participants to control and maintain USDDex around the Target Price and those who shall be interested in economic benefits and profits opened by the Platform, such as Debt and Collateral Auctions, stock market game and manipulations on increasing/decreasing the Target Price and market price if USDDex and expected long-term profit. Such actors are called Keepers. All external participants we consider as main (key) external actors. All Oracles shall have special permissions to operate in the Platform which are granted them by USDDEX voters who decide if a particular Oracle is trusted enough to provide the system with information on marker prices.

In order to avoid attacks on oracles functions and their control we so-called Price Feed Sensitivity which restricts the maximum change of the value of the price feed. This parameter is watched by the system and is also applied to prevent any types of collusions or back door conspiracies.

For example, the Price Feed Sensitivity is 10% in 30 minutes. It means that price feeds can change only for 10%, not higher, for 30 minutes, and not shorter. So, for 1 hour it can be changed for 20% and no other than that. This mechanism secures the system from sever attacks and give the clearers the time to launch Comprehensive Clearing process.
USDDEX voters are lawful to select participants, Clearers, who are external actors and are granted the right to launch Comprehensive Clearing process. That is the only function of them, and they are forbidden to access to any other controlling functions of the Platform. Clearers are reviewed as the system's last protection wall from attacks.

Target Market

In this chapter we approximate the size and some fields of the addressable markets where USDDex Stablecoin System can unveil its full potential and gain great profit results. Since all USDDex assets are collateral-backed it significantly expand its application in wide range of industries, including but not limited to blockchain one, and our system can also serve as a decentralized margin increasing/trading platform.

Prediction Markets & Gambling Applications: It is rather risky to use unstable, volatility-able currency to make bets. Long-term bets are of no profit is the user cannot be sure in the future prices of the asset for betting. So, the stable cryptocurrency, the backed one, is the best solution for this market field.

Financial Markets; Hedging, Derivatives, Leverage: Collateral Debt Positions smart contracts are perfect for margin trading. USDDex is also supposed to be used in options contracts and contracts for difference (of prices).

Merchant receipts, Cross-border transactions and remittances: Having considered that USDDex is almost not influenced on by volatility of other currencies and no intermediates are involved in the process, it contributes to reduction of transaction fees and costs within the scope of international trade.

Transparent accounting systems: USDDex is effective to use by Charity funds, non-governmental and public organizations due to its transparency and misuses (for example, corruption) impossibility which would be interesting to Governments

Risks and their Mitigation

We give a great attention to safety of the system, its proper and seamless operation, so we consider greatly significant to follow the risk mitigation policy.
That is why we make public some of our strategies on preventing and avoiding negative impacts through our risk management technology.

Risk: Hacking attacks aimed at smart contracts infrastructure

At its initial phases the infrastructure of smart contracts is under high risk of being broken/stolen by hackers. It might result in non-recoverably stolen collaterals. The only assets are not subject to steal in this case are those which can be controlled and blocked through centralized financial methods not associated with the decentralized ones.
A model of those assets can be Digix Gold IOU's.

Solution: To carry out securities audits and attract the best researches and independent coders/specialists to continuously monitor the security system and practice of USDDex Stablecoin System development. Currently we have already successfully carried out as many as three security audits.

Our goal is to reach fully secured system through complete code verification provided by mathematically proved code as per its targeted function as it was intended.
This method will allow to fully eliminate the risk of smart contracts breaches.
Even though complete formal verification is a distant prospect point we have already performed Haskell programmed reference implementation of the System.
So, our next goal is to perform the full formalizations as soon as they are developed and approved.

Black swan event

Risk: Black swan is an event which cannot be predictable or foreseen, but which greatly influence on the collateral asset(s) and entails high consequences.
In terms of Platform Black swan event might happen in its early stages.

Solution: In order to protect enough the System we restrict the diversity of UGCSC collaterals to ETH cryptocurrency and also limit the debt ceiling first and allow it grow smoothly and gradually.

Competition and the importance of ease-of-use

Risk: The USDDex Stablecoin System is developed by highly qualified professionals and possesses large investments to be true decentralized and effective platform.
Due this, the level of the system complexity is the highest which can be used by marketing specialists of competitors who represent usual centralized financial institution and regulators to win the customer opinion to use the simple and easy understandable centralized digital assets.

Solution: The USDDex Stablecoin system is designed to be easy-of-use to ordinary users. Most of the users are not required to realize in detail the operating process performed by the Platform. User-friendly interface and the high level of usability open huge of possibilities for USDDex supporting ERC-20 standard to be used throughout the ecosystem. At the same time key actors like Keepers and/or investors must understand complex structure of USDDex system in order to perform margin trade. But all of them are accustomed and trained to be expert in financial world of cryptocurrency industry due to their professional occupation, business field experience or education.
USDDex team is developing the proper technical documentation and specification to present it to these types of participants.

Pricing errors, irrationality and unforeseen events

Risk: The mainstay of cryptocurrency industry is users trust and confidence. Once it lost no changes and improvement can help to straighten situation and maintain/return the USDDex stability. There is a wide range of sudden unpredictable event which could influence the price feed information received from Oracles or USDDex value or trigger any other unwished events.

Solution: USDDex team intends to attract investments enough to boost and secure market efficiency and motivate them to play as Keepers. It will facilitate USDDex supply safely growing and secures from various market risks.

Failure of centralized infrastructure

Risk: At initial phases of development the USDDex team function as management team and perform administrative responsibilities like the following: costs planning, seeking programmers, partners, interacting with authorities and regulators, etc. These activities imply risks of failures for whatever reasons, legal, managerial, human or technical factors. And therefore, the proper function of the USDDex Stablecoin System becomes under the threat too.

Solution: As an additional line of defense the USDDex holders shall be motivated to finance developers or perform their functions in order to keep their investments secured.
The fact of holding USDDex itself act as a uniting reason for maintaining operating and market health of the System making all participants interested and responsible users.
We ensured in advance all key developers to have a considerable proportion of USDDex exactly with the aim of heightening their interest, dedication and involvement.

Conclusion

The USDDex Stablecion system is collaterally-backed mechanism of stable exchange and manipulations in Ethereum ecosystem. Besides Ethereum it can be easily expanded to all blockchain industry and solve the key problem of insufficient trust to cryptocurrencies as unpegged to anything and unsecured financial tool. All functional instruments and possibilities of USDDex will make Keepers interested and involved in regulating price stability. To reach our goals and further development of Platform we developed a roadmap and a plan of actions allowing the rapid agile development and still meet the mission and values of decentralized operations and conceptions. We understand that the best way to integrate our action plan is to realize it in aggressive but responsible manner. So, the roadmap is exactly this way.

Terms and Definitions

USDDex Generating Collateralized Smart Contract (UGCSC): is a collateral-backed smart contract to generate USDDex as an asset performing functions of debt instrument with interest accrual. The UGCSC owner shall provide the collateral excessing the amount of the debt to secure the smart contract.

USDDex: The stable-price cryptocurrency. It is performed at ERC20 standard and is equal to Ethereum token.

Debt Auction: The auction reverse mechanism designed to maintain UGCSCs in case their collaterals value become lower than determined minimum.
Collateral Auction is launched upon liquidation process. Its first task is to cover the debts associated with UGCSCs and the second is to provide the best price for UGCSC owners' excessive collateral.

The USDDex Foundation: Smart Contract developers (or team) who jointly work on USDDex Platform improvement and implementation.

Keepers: External participants trading USDDex, UGCSCs. They are lawful to create or close it respectively and apply for arbitrage on the System. Keepers's goal is to secure USDDex market position and keep the price stable.

USDDEX: The ERC20 token allowing its holders to vote in proportion of 1 USDDEX is equal 1 vote and is used to cover undercollateralized UGCSCs, it is also includes technical infrastructure of the Platform and USDDEX holders with the right to vote.

USDDEX Voters: All holders of USDDEX. Their votes determine Threat Agents applied in the System.

Oracles: Trusted Ethereum contracts or users determined by USDDEX voters to supply price feed information to USDDEX Platform.

Threat Agents: The unique set of parameters designed to automatically determine the level of UGCSC risks and enable Keepers to launch the liquidation process
Target Rate Change Regulator: Stablecoin System automatically changes the Target Rate in response to USDDex market price deviations. It measures the Target Rate/market price ratio and control end deviations.

Target Rate Supervision Function (TRSF): This mechanism is developed to keep the USDDex market price close to the Target Price by using market instruments.