MEMBRANA

TRUST MANAGEMENT OF DIGITAL ASSETS

WHITEPAPER

ABSTRACT

Membrana is a blockchain platform for concluding mutually beneficial and secure contracts, between investors and traders for trust management of crypto-currency assets.

Links: alpha.membrana.io, demo.membrana.io, membrana.io

Related documents: Membrana Business Overview

Cryptocurrency Market

Thanks to blockchain technology, a large number of new types of assets —crypto-currency—have appeared on the market: Bitcoin, Litecoin, Ether, Ethereum token, etc. These assets are decentralized digital currencies, each of which allows their owners to carry out transactions between wallets.

There are cryptocurrency exchanges based on market economy principles for the

exchange of various cryptocurrencies. Many exchanges, such as Bittrex, Kraken, Bitfinex, Hitbtc, offer their users the ability to trade a large number of cryptocurrency pairs, which enables traders to use different trading strategies and generate profit from rate changes. More and more traders have done it successfully, showing a stable and high yield that reaches hundreds or even thousands of percent per year. For example, the Alternative Money Fund, in 2017, has achieved a gain of more than 3,000%, and the Blue Magic Capital Fund went up more than 10,000%.

The modern market of crypto-currencies is highly volatile. On the one hand, it enables successful traders to achieve very high yields. On the other hand, it brings great risks to all market participants, and especially to beginners. Unlike traditional exchanges such as Forex, in crypto-currency trading, one can easily lose a significant portion of their assets in one day, even without leverage.

Trust Asset Management

Trust management of assets is an area that has always been in demand. Investors are ready to entrust their assets to successful traders in order to generate income. The crypto-currency market is no exception and is of increasing interest to investors and traders. By transferring their assets to experienced traders, investors retain the possibility of obtaining exceedingly-high income in the crypto-currency market, while at the same time; minimize the risks of significant loss common to inexperienced players.

However, at the moment, there is no convenient and safe tool on the market for the conclusion of contracts between investors and traders for the trust management of cryptocurrencies. Regardless, such contracts are active in words, forums, and chats, which leave the marketplace ripe for fraudulent acts, such as, when traders disappear with investors' fund.

Membrana Platform

The Membrana platform is intended to bring investors and traders together for concluding mutually beneficial blockchain-protected contracts for the trust management of crypto-currency assets. Membrana provides investors and traders with a transparent, decentralized and secure system, which controls the process of concluding and executing a contract up to the point of revenue gained by both parties.

CONCEPT

Users of Membrana
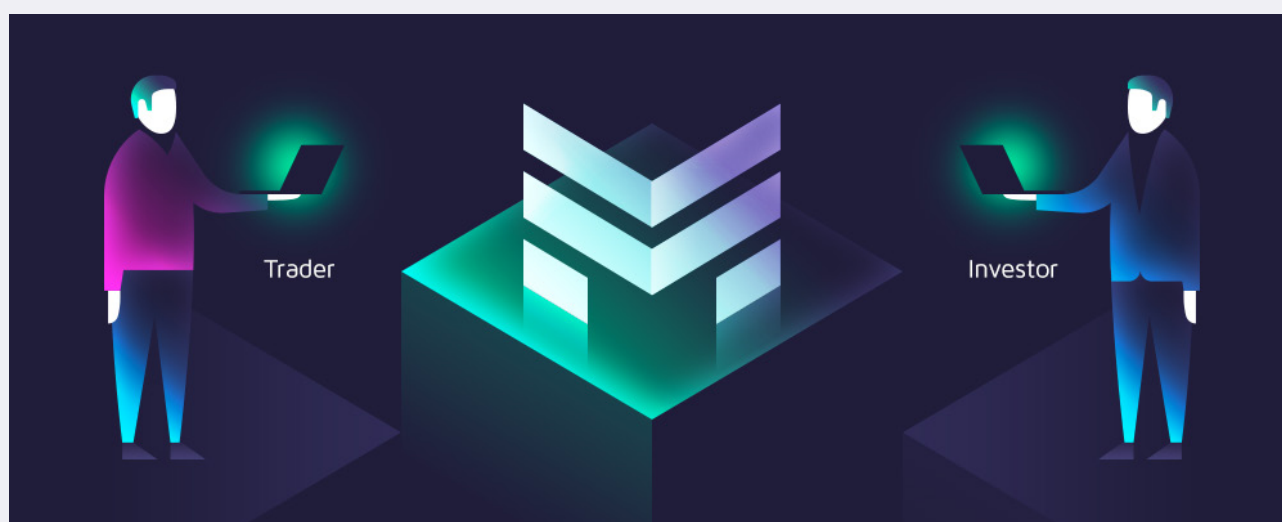
Traders

A trader is a participant in the market of crypto-currencies trading on the exchange, and who is potentially willing to receive digital assets in trust management for remuneration, paid in the event of profitable transactions involving an increase of an investor's assets. A trader is interested in being a notable investor and possessing all tools for trading on different crypto-currency exchanges—both at their own expense and with the funds transferred to them for management.

Investors

An investor is a participant in crypto-currency market with digital assets, who is potentially willing to transfer these assets to a successful trader, in trust management, for the purpose of making a positive return on their investment. Investors are interested in fund safety and obtaining complete and reliable information from traders.

Current Task

The main objective of the Membrana platform is to directly connect an investor and a trader to conclude a mutually beneficial, secure, and reliable contract.

To avoid risks for both the investor and trader, and to make trust management transactions more profitable and safe, Membrana has developed a unique algorithm to solve the following problems:

- The need for involvement of an intermediate party, guaranteeing the safety of funds and the fulfillment of contract terms
- Loss of control over invested fund (transfer of fund to a third party)
- Lack of trust between both parties
- Lack of opportunity to check the exact yield of a trader in the past
- Risk of violation of contractual terms
- Lack of a convenient tool for trading on different exchanges at the same time
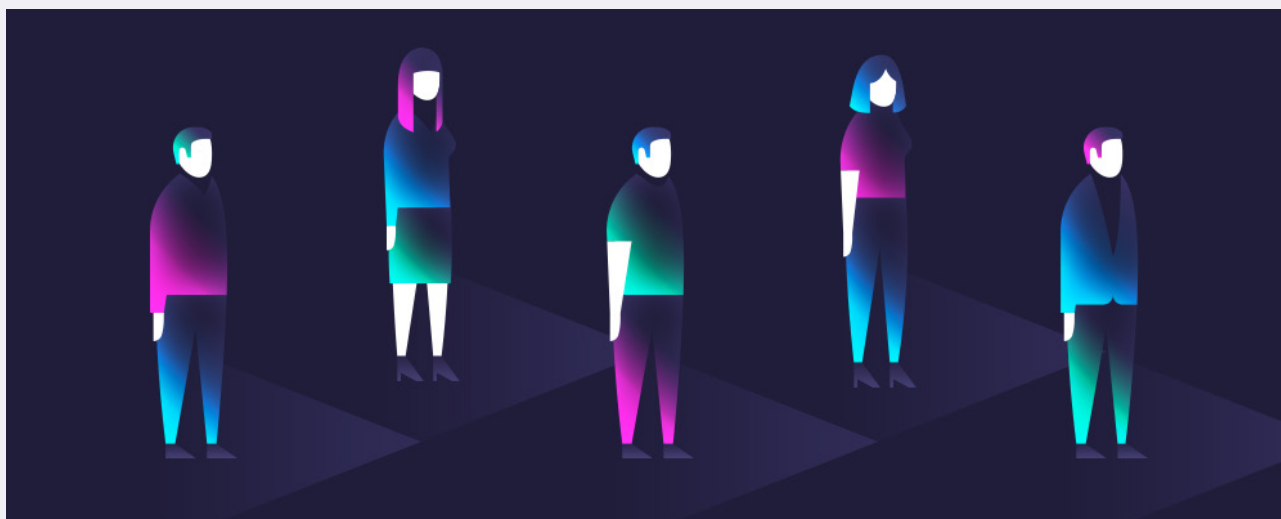
Opportunities for Traders

The Membrana platform offers traders the following opportunities:

- Trading on different cryptocurrency exchanges through a single interface
- Trading from both of their exchange accounts, and accounts transferred to traders in trust management by investors

- Offering their services on trust management to potential investors. Setting parameters for future contracts, such as contract duration, target profit, and remuneration amount
- Conclusion of contracts for trust management of crypto-currency assets with investors
- Fixing the terms of concluded contracts with blockchain Ethereum Smart Contract technology to guarantee the completion of these conditions

Opportunities for Investors

The Membrana platform offers investors the following opportunities:

- Choosing suitable traders based on complete and definitive information of traders who offer their services on trust management
- Getting reliable data on past profitability of traders' commercial activities confirmed by a hash sum of transactions saved in blockchain
- Concluding a contract with a trader for the trust management of crypto-currency assets located on various crypto-currency exchanges in an investor's account
- Transferring own funds to the trust management by traders without transferring these funds directly to them. Membrana platform allows an investor to give traders an opportunity to manage funds, but not possessing the funds. Traders get the opportunity to trade with the investors' exchange accounts but they do not own these funds. Also, investors do not transfer their funds to Membrana platform
- Transfer of funds for management from one exchange account to several traders, indicating the amounts transferred for management in each currency.
- Setting restrictions on trading with an exchange account transferred to trust management, such as a set of allowed trading currencies, and maximum trading loss (stop loss)
- Obtaining information on the progress of the execution of concluded contracts

Membrana Technology

Safe Transfer of Funds in Trust Management

For the purpose of transfer of an investor's exchange account to a trader in trust management, an API key provided by the exchange is used. The API key is not transferred to the trader, but stored on Membrana's platform in a secure database. The trader trades on an exchange via the Membrana single trading terminal. Consequently, the trader does not have access to the investor's assets. All investors' funds remain on their exchange account, and are not transferred to the trader. Membrana also maintains the restrictions set at the contracting stage: stop loss, time period for trading by the API key, etc.

Contract Between Investors and Traders

To conclude the transaction between investors and traders an Ethereum Smart Contract is used. Traders' consideration is reserved in a Smart Contract, in advance, and it is automatically paid upon reaching the target profit set in a percent of the amount transferred in trust management, or upon expiration of the Smart Contract term.

Confirmation of Past Trader's Profitability Using Blockchain

All contracts concluded by traders via the Membrana platform will be saved to the database. This information is further used to calculate traders' success using indicators, such as ROI, rating, etc. These indicators will be provided to investors, giving them a

greater ability to select suitable traders.

The Membrana platform uses blockchain to validate traders' details. To do this, the hash sum of traders' transactions for the day is saved in the blockchain Ethereum Smart Contract. The block, where the hash sum is saved, is dated and cannot be counterfeited; therefore, the validity of all data on traders' transactions of exchange is confirmed by their hash sum in the blockchain—in the block dated with the respective date of transaction. Thus, it is impossible to save only profitable transactions in the database and their hash sum externally as far as at the moment of saving, because it is not known which transactions are profitable.

Distribution of investor's assets among several independent traders.

The Membrana platform allows the investor to transfer, to trader, only part of his funds in the exchange account, as is stated in the contract terms. The remaining funds remain under the investor's full control and can be used for independent trading, transfer of these funds to another trader, or withdrawal from an exchange account.

Trade in crypto-currencies is actually carried out from one exchange account by different traders or by the investor himself. In spite of this, the Membrana platform provides isolated and independent trading within the amounts transferred to trust management for each trader and the investor himself.

At the time of the conclusion of the contract, the investor determines the amount transferred from trust management in the accounting currency to be used.

Fees for Using Membrana

Membrana's fee is 0.5% of the amount is transferred into trust management. For more detailed information refer to the Membrana Business Overview.

Advantages of Membrana

For Traders:

- Possibility to attract investments in trust management
- Single trading terminal inside the platform supporting various exchanges
- Support of all major crypto-currency exchanges in one trading terminal
- Participation in trader's rating based on his results
- Terms of a transaction between trader and investor are set in Smart Contract and are unchangeable
- Trader's commission fee is set for transaction at the moment of contracting
- The ability to trade on exchanges and work with contracts via mobile phone

For Investors:

- Safety and transparency of all transactions
- Funds are always in investors' accounts
- Possibility to select the most successful trader for investment according to his rating.
- Assurance of reliable information about a trader's success
- All conditions of transaction are set in Smart Contract and are unchangeable
- Choice of accounting currency: BTC, ETH, and USD
- Distribution of funds on one exchange account between several traders for trust management
- Partial transfer of funds from the exchange account to trust management allowing for self-management of funds which are not transferred for trust management.
- Ability to work with the Membrana platform via mobile phone
- User-friendly interface for working with several contracts and traders

For Cryptocurrency Trading Ecosystem:

- Additional possibilities for investments
- Inflow of assets on the market from new investors
- Increased number and volume of transactions on cryptocurrency exchanges
- Relaxation in requirements for entering cryptocurrency trading, it is sufficient to just select traders and transfer assets to them.
- Increase in traders' income, and their quantity
- Improvement of trust management reputation on cryptocurrency market

TECHNOLOGIES USED

Ethereum Smart Contract

To conclude a transaction for trust management between investors and traders, the Ethereum Smart Contract is used. A Smart Contract contains all of the details of the agreement. On the Smart Contract account, an investor reserves a trader's consideration in advance, in the amount to be paid upon reaching the target profit. The consideration is automatically paid to the trader upon the expiration of contract term and the receipt of income by the trader. The contract may be terminated ahead of time, if the target profit is received by the trader, or if the investor undertakes a prohibited action. Examples of a prohibited action include an investor withdrawing money from the exchange account, or carrying out a transaction on this account without express permission. To get information on the current state of the exchange account, Smart Contract uses oracles as described below.

Ethereum

Exchange API

Most crypto-currency exchanges provide an Application Programming Interface ("API") for automatic transactions. The API is accessed by a certain exchange account using an API key, which is obtained by the account owner for use on the exchange website.

The Membrana platform provides traders with the single trading terminal to carry out transactions on any supported exchange. Membrana translates each transaction

via the exchange API using API keys owned by the trader, or transferred to traders in trust management. API keys are stored in a protected database within the Membrana platform.

Fund Security for Investors

The technology implemented on the Membrana platform provides fund security for investors--funds are transferred to traders in trust management. The funds are not directly transferred to traders under any circumstances, nor do traders have access to investors' API keys. API keys are stored on the Membrana platform in a secure database. Traders carry out transactions via the single trading terminal on Membrana platform. Each trust management contract has specific currency restrictions which are available for trading, thus, it is impossible for traders to utilize investors' funds for a dummy currency.

Protection of Investor's API Keys

Security of original API keys is ensured by a backend system. The backend system manages the functionality of the personal account and trading terminal, and does not allow access to the server that directly interacts with the exchange. The trading system is in an isolated environment, and access to transactions via this system is possible only by a signature authorization session, using the ECDSA algorithm.

Oracles

An oracle is a software component providing data to Ethereum from the external world. These data can be further used by Smart Contracts.

On the Membrana platform, oracles are used by the backend system to obtain and record information in blockchain, data on the currency balance in the exchange account, transactions of certain exchange accounts, cryptocurrency exchange rates, and transactions of certain traders.

MetaMask

User authorization on the Membrana platform is executed using MetaMask. MetaMask is a plug-in for web browsers (currently supported by Chrome and Firefox), enabling users to carry out blockchain transactions in Ethereum via a JavaScript web3 object without a private key. The Membrana platform uses web3 to work with the Smart Contract.

Stack of Web Technologies

The interaction of users with Membrana system takes place via website. The site is based on SPA (Single Page Application) technology. The following technology stack is used:

- MongoDB
- Node.JS
- Web3
- RabbitMQ
- Redux
- React.JS

Mobile browsers that support authorization in Ethereum

Using modern technologies to create a user interface allows the Membrana platform interface to work on both desktop browsers and mobile devices in browsers that support Ethereum authorization, such as Cipher and Toshi. The Membrana website is also adapted for mobile devices.

ALGORITHM OF MEMBRANA SYSTEM OPERATION

Authorization

In a desktop browser, the user installs the MetaMask plug-in for the Internet browser and logs into Ethereum using Metamask.

On mobile devices, the user installs a browser which supports the authorization in the blockchain Ethereum network. Cipher or Toshi browsers are available at this time. The authorization occurs through browser's interface.

Addition the API Key

A user logs into the crypto-currency exchange website and requests an API key for automatic transactions. In addition, there is an option for adding the API key to be used on membrana.io website, wherein the key itself, and its name, are entered for a better understanding of the key assignment. For example: "key for investments".

If this key is passed to the trader for trust management, then the added API key enables the user to limit the number of currencies available for trading while at the same time, ensuring that USD, BTC and ETH (the designated currencies) are readily accessible. Such limits protect an investor from a trader buying illiquid, fraudulent or other undesirable currencies with the investor's funds.

After adding the API key to Membrana, the possibility of self-trading through this key emerges via the single trading terminal (for traders). It also becomes possible to use this API key to conclude contracts for trust management of funds on the exchange account, to which this key belongs (for investors).

For one exchange account, only one API key may be added into Membrana system.

Trust Management Offer from Traders

A trader, who is willing to receive funds in trust management, sets the parameters of the contract with an investor:

- Accounting currency: BTC, ETH or USD. will be used for transferring to the trader, calculating profit according to the contract, and the payouts between the parties
- Target profit to close out the contract as a percentage of the amount transferred into trust management
- The minimum investment amount and in which accounting currency
- Contract term
- Stop loss: the maximum allowable loss (as a percentage of the initial amount of assets)
- Amount of trader's commission (as a percentage of the target profit)

Trader Selection by Investors

An investor, who is willing to transfer funds into a trust management, looks through the list of active offers from traders, in a convenient way, with the exclusion of unsuitable options, and the help of various filters—such as trader's reputation, profitability, contract amount, contract duration, etc.

While viewing the trader's profile, one can see the history of his trades made through the Membrana platform. This trading history allows an investor to make an analysis of the trader's success. The reliability of this data is confirmed by the hash sum (sha256) stored in the Ethereum block. Any user has the opportunity to check the data of the trader's transactions by taking transactions for any week in the past, counting their sha256 amount (available on a number of websites), and comparing it to the one recorded on the address of a special smart contract of the Membrana platform which is published on websites such as http://etherscan.io

Conclusion of a Contract

Having chosen a suitable offer, the investor sends an application to the trader for the conclusion of a contract. To manage this account,, the investor must have an account on the cryptocurrency exchange, and an API key added to the Membrana platform.

The investor sets the amount transferred for management in the accounting currency, even if the investor has other currencies in the exchange account. However, the accounting currency must be on the investor's account and must be greater than or equal to the amount transferred for management. The Membrana platform provides the type of distribution in which the trader can only trade the amount transferred in the specified accounting currency. All other funds remain under the full control of the investor.

The trader then accepts the application. The concluded contract is recorded in the Ethereum Smart Contract. The maximum commission is transferred from the investor's Ethereum wallet to the Smart Contract, and is reserved there for payment to the trader in the future.

Traders' Rating

Each trader who uses the Membrana platform participates in a traders' rating. The rating system is based on a comprehensive analysis of the trader's past results. Such parameters include: the trader's ROI, the number of contracts awarded, the number of profitable contracts, the total amount of funds which is currently under management and/or has been managed in the past.

The traders' rating is:

- A convenient tool used for finding a trader
- A convenient tool used for assessing the performance of a particular trader
- A motivating factor for traders
- An indicator of the successful performance of the Membrana platform.

Termination of contract

The contract between the trader and investor can be terminated for a variety reasons.

Achievement of the Target Profit

The contract is automatically completed if the target profit recorded at the time of the transaction conclusion is achieved. The reserved trader's payout is then paid in full.

Expiration of a Contract

When the contract expires, it is completed, creating two options:

Option 1: The trader's trading result is negative. In this case, the trader's payout reserved in the Smart Contract is not paid to the trader; it is returned to the investor in full.

Option 2: The trader's trading result is positive. In this case, the trader gets paid in accordance with the terms of the contract. The trader's payout is calculated as the ratio of actual profit to a target profit. Any unpaid portion of the payout reserve is returned to the investor.

Stop Loss

In order to protect the investor from large losses, a stop loss value as a percentage of the initial amount in the accounting currency is fixed in the Smart Contract. If the amount of funds decreases to a certain value, as a result of transactions made by the trader, the contract is automatically completed. Thus, the consideration is not paid to the trader, and is returned to the investor's Ethereum wallet. All currencies purchased by trader are automatically exchanged for the accounting currency at the exchange rate.

When calculating a stop loss, the amount of orders on the exchange for the purchase of such currencies is taken into account. The most profitable bid for buying a currency may have insufficient volume; thus, the next bid is taken, and so forth.

Prohibited Investor Action

The investor is not allowed to withdraw money from the exchange account in an amount exceeding the amount of money transferred for management by traders. Similarly, an investor is not allowed to make transactions from an exchange account for an amount exceeding available funds. If there are insufficient funds for a transaction, the Oracle notifies the Smart Contract and the transaction is automatically terminated; however, the investor forfeits the reserved commission which is paid to the trader in full. Examples of some Prohibited Investor Actions include:

Example 1: The investor has 10 BTC in his exchange account. Out of these 10, the investor transferred 3 BTC to the trader for management. Then, the investor withdrew 8 BTC from his exchange account. This is a prohibited action because the 3 BTC are now unavailable to a trader for trading under the terms of the contract. Therefore, the violation causes the automatic cancellation of the contract, and the trader receives his payout in full.

Example 2: The investor has 10 BTC in the exchange account. Out of these 10, the investor transfers 3 BTC to the trader for management. Then, the investor exchanged 9 BTC for 90 ETH through the exchange interface. Since this creates a shortage in the amount of the designated accounting currency, it is a prohibited action by the investor. Therefore, the violation causes the automatic cancellation of the contract, and the trader receives his payout in full.

The following is an example of an allowable transaction:

Example 3: The investor has 10 BTC in the exchange account. Out of these 10, he transfers 3 BTC to the trader for management. Then, the investor withdraws 7 BTC from his account and purchases a car. This is allowed because 3 BTC are still available to the trader for trading under the contract.

Early termination of the contract

The investor has the opportunity to terminate the contract immediately if the current financial result under this contract is negative. At the same time, all active applications under the contract will be canceled. All currencies that are not included in the list of desired ones are converted to the accounting currency at the exchange price.

Payouts Between Investors and Traders
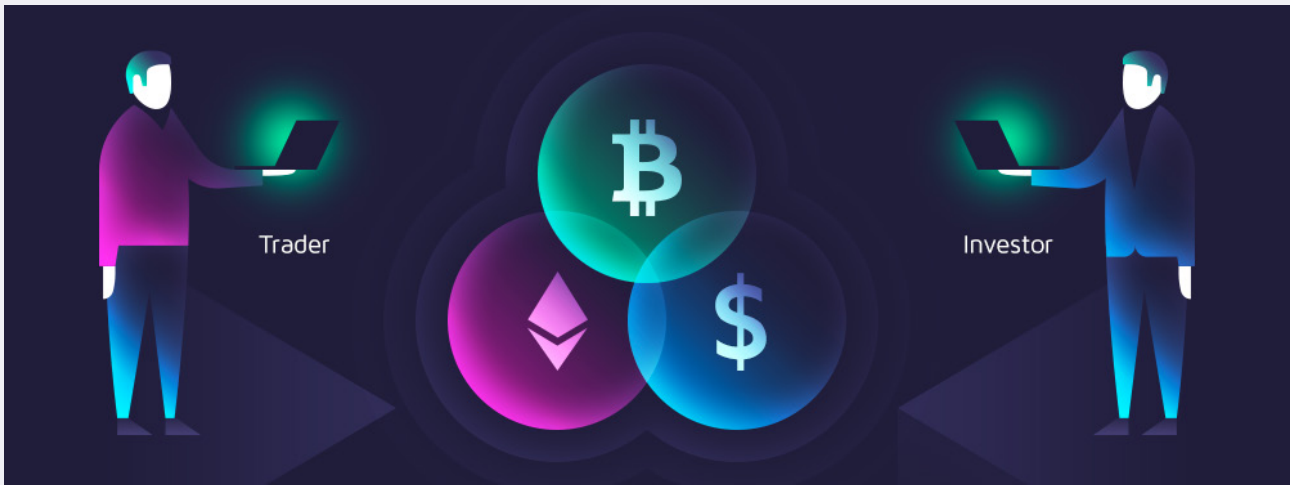
When concluding a transaction for trust management, the currency of settlement is fixed. There is an option to choose among BTC, ETH or USD. To make any settlement under the contract, for example, the calculation of profit or loss achieved and all currencies on the investor's exchange account are converted into the accounting currency at the exchange price at the time of settlement. Concurrently, the volume of applications on the exchange for the purchase of these currencies is taken into account.

At the moment of termination of a contract, irrespective of reason, all currencies purchased by the trader are exchanged for payout at the exchange price.

Often, there can be a situation in which the trader receives a profit exceeding the target. This is due to the possibility that the timing of the last transaction and the exact hit on the value of the target profit is different. In this case, as well as when the target profit is achieved, the contract is closed, and the investor is invoiced to pay for the trader's services while receiving additional profit. The amount of this additional consideration is defined in the contract, as a percentage of the profit received.

Example of a contract between an investor and a trader

Trader Bob has been trading on crypto-currency exchanges for a long time, earned a lot of money, and feels confident enough to manage other people's money in order to

get revenue from his trading. Bob visits the Membrana website and sets up the contract parameters that suit him:

- Accounting currency - BTC
- The minimum volume is 12 BTC
- Target profit - 20%
- Max loss - 10%
- Terms of the contract - 30 days
- Commission - 30%

Investor Alice has an account on the Bittrex exchange. This account has currencies of 10 BTC and 50 ETH. Alice plans to transfer some of these funds to the trust management of an experienced trader. In traders' ratings on the Membrana website, Alice finds Bob, and in his profile, she reads the conditions on which Bob is ready to take money for management.

The first thing that Alice notes is that a minimum of 12 BTC is needed to enter into a contract; however, she only has 10 BTCs are on her account. Alice decides to get authorized on the Membrana website through Metamask, receives the API key from her account on the Bittrex website, and adds this key to the Membrana website. Now Alica has the opportunity to trade her own funds through the single trading terminal on the Membrana website, as well as transfer her funds to trust management.
Alice uses the Membrana trade terminal and exchanges 20 ETH for 2 BTC. The transaction occurs instantly and she now has the necessary 12 BTCs to contract with Bob.

Alice sends a request to Bob to conclude a contract through the Membrana website. Bob receives the request within 24 hours. Alice transfers, to the address of the Membrana Smart Contract, the maximum amount of Bob's award equal contract amount (the amount * the target profit * the trader's reward = 12 BTC * 20% * 30% = 0.72 BTC = 7.2 ETH (conversion to BTC-> ETH at the exchange price). Bob does not receive his commission, but he sees that it is reserved at the address of the Membrana Smart Contract.
For the whole month, Bob trades through the Membrana trade terminal with money received for management purposes. At the same time, the remaining funds in Alice's exchange account (30 ETH) are not available to him; however, they are available to

Alice. Alice removes 15 ETH from the exchange and spends them on her needs. For the remaining 15 ETH, Alice buys 15,000 USDT, considering it a good investment. Bob cannot see these changes in Alice's exchange account, but he can continue to trade with the funds transferred to him.

In 20 days, the Membrana platform sees that if to sell all the currencies that Bob bought at the exchange price, taking into account the volume of current orders in the exchange order book, for the BTC accounting currency, 14.4 BTC will be received. This means that the target profit of the contract (12 BTC * 120% = 14.4 BTC) has been achieved by Bob, and Membrana automatically terminates the contract. All currencies that Bob bought are automatically exchanged for the BTC accounting currency at the exchange's rate. Bob's commission, which was reserved all this time in the Smart Contract (7.2 ETH), is paid to Bob in full, because the target profit of the contract is fully achieved. Now Alisa has 14.4 BTC and 15000 USDT on her exchange account.

Notes:

- Alice had the opportunity to enter into other contracts with other traders and even with Bob himself for the amount that she had at her disposal
- Bob had the opportunity to contract with other investors along with Alice's current contract
- Bob had the opportunity to act as an investor himself and transfer his funds to the management of another trader, but those funds should be money from an exchange account already owned by Bob

THE HIGH-LEVEL PLATFORM ARCHITECTURE (ALPHA VERSION)
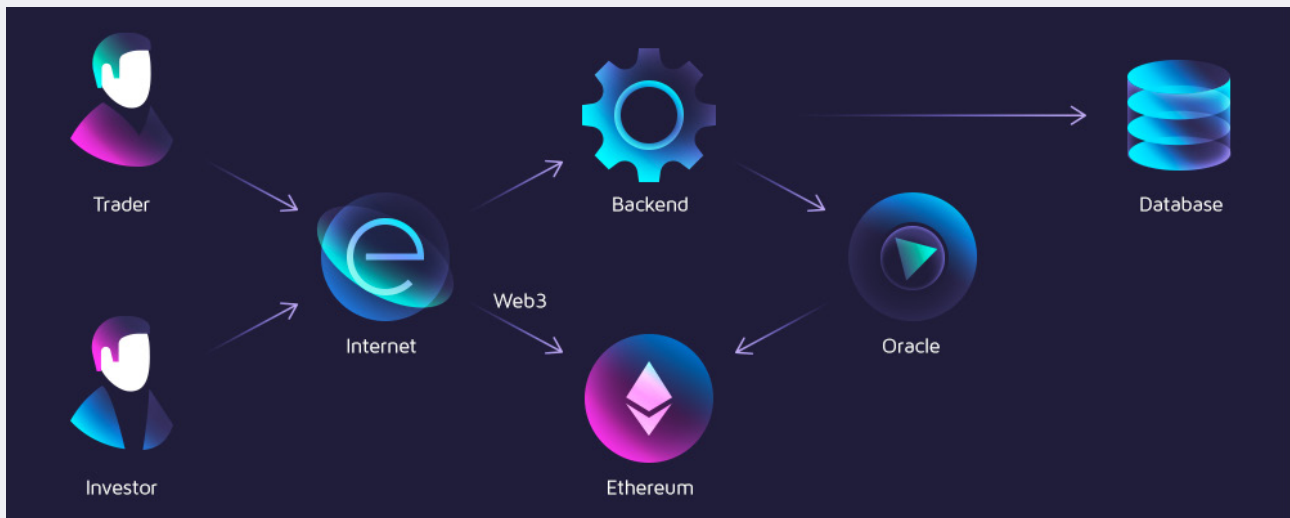
Frontend

The frontend subsystem of the Membrana.io platform, which interacts with users, is a dynamic web page created using React technology.

The Internet browser uses MetaMask plug-in, allowing users to make transactions from their Ethereum wallets. MetaMask also provides a web3 object to work with Ethereum automatically.

On mobile devices, the Membrana platform runs through special browsers that support authorization on the Ethereum network, such as Cipher and Toshi. The frontend system is published on GitHub: https://github.com/MembranaPlatform/Frontend

Backend

The server part of the Membrana.io platform is responsible for processing user requests made through the website. The backend is created using Node.js.

Database

In order to store all necessary information in the system, the MongoDB database is used. The database interacts with the backend.

Ethereum Blockchain

The Membrana platform uses Ethereum blockchain. The technology of the Smart Contract is used to consolidate all of the terms of the transactions between investors and traders for trust asset management. Also, in the process of initiating transactions by traders, data (hash sums) on these transactions are stored in blockchain to confirm the reliability of data in the future.

Ethereum interacts with the platform's frontend. All transactions are signed by a specific user's key. In order to log onto the Membrana platform, users log-in with MetaMask or a special mobile browser (Cipher, Toshi).

Etherscan.io

The website http://etherscan.io allows users to view information about Smart Contracts and blockchain wallets on the Ethereum network. The address of the Smart Contract, in which the transactions between the investor and the trader within the Membrana platform take place, is public. Anyone has the opportunity to see the following information on the website www.etherscan.io:

• Deal between investor and trader
• Receipt of the sum of the future commission of the trader to the address of the Smart Contract
• Payment of commission to the trader upon termination of the contract
• Refund of funds to an investor which was not used for a trader's payout.
• Hash sum of transactions of a specific trader for the week, confirming the reliability of information about those transactions in the Membrana system.

Oracles

On the Membrana platform, oracles are used by the backend to obtain and record in blockchain, with data of transactions of a certain exchange account, crypto-currency rates, and transactions of a specific trader.

In the Membrana platform, oracles are used to obtain and record in blockchain data about transactions and balances of a specific exchange account.

Microservices

Microservices work on Membrana servers and provide the platform with information, such as exchange rates, the history of transactions on exchanges, the results of the completion of a specific order. This approach allows a user to easily scale the system, as well as ensure its stable operations. For example, for this purpose, each micro service can be duplicated on independent servers.

SMART CONTRACT CODE

Smart Contracts for the Membrana platform can be found in the official GitHub repository: https://github.com/MembranaPlatform.

An example of the code of MembranaInstance.sol (alpha version)—the main Smart Contract, is shown below. The code implements the functionality of concluding and executing a trust management transaction between an investor and a trader:

```solidity
pragma solidity ^0.4.15;
contract MembranaDeals {address public be =
0x873A2832898b17b5C12355769A7E2DAe6c2f92f7};
enum state { paid, verified, halted, finished}
  enum currencyType { USDT, BTC, ETH}
  struct Deal {
    state  currentState;
    uint  start;
    uint  deadline;
    uint  maxLoss;
    uint  startBalance;
    uint  targetBalance;
    uint  amount;
    currencyType  currency;
    string  investor;
    address  investorAddress;
    string  trader;
    address  traderAddress;
  }
  Deal[] public deals;
  function MercatusDeals() public payable{
    revert();
  }
  modifier onlyBe() {
   require(msg.sender == be);
   _;
  }
  modifier inState(uint dealId, state s) {
    require(deals[dealId].currentState == s);
```

```
  _;
 }
 function getState(uint dealId) public constant returns (uint)  {
    return uint(deals[dealId].currentState);
 }
 function getStart(uint dealId) public constant returns (uint)  {
    return deals[dealId].start;
 }
 function setVerified(uint dealId) public  onlyBe inState(dealId, state.paid)
{
      deals[dealId].currentState = state.verified;
 }
 function setHalted(uint dealId) public  onlyBe {
      require(deals[dealId].currentState == state.paid || deals[dealId].
currentState == state.verified);
      require(deals[dealId].amount != 0);
      deals[dealId].amount = 0;
      deals[dealId].traderAddress.transfer(deals[dealId].amount);
      deals[dealId].currentState = state.halted;
 }
function getSplit(uint finishAmount, uint startBalance, uint targetBalance,
uint amount) public pure returns (uint) {
      return ((finishAmount - startBalance) * amount) / ((targetBalance -
startBalance) );
 }
 function setFinished(uint dealId, uint finishAmount) public  onlyBe
inState(dealId, state.verified) {
      require(deals[dealId].amount != 0);
      deals[dealId].amount = 0;
      if(finishAmount <= deals[dealId].startBalance){
        deals[dealId].investorAddress.transfer(deals[dealId].amount);
      }else if(finishAmount>deals[dealId].targetBalance){
        deals[dealId].traderAddress.transfer(deals[dealId].amount);
      }
      else{
         uint split = getSplit(finishAmount, deals[dealId].startBalance,
deals[dealId].targetBalance, deals[dealId].amount);
         deals[dealId].traderAddress.transfer(split);
         deals[dealId].investorAddress.transfer(deals[dealId].amount - split);
      }
      deals[dealId].currentState = state.finished;
 }
    function getDealsCount() public constant returns (uint){
        return deals.length;
    }
function () external payable  {
  revert();
 }
function makeDeal(uint _duration, uint _maxLoss, uint _startBalance, uint
```

```
_targetBalance, uint _amount,  string _investor, address _investorAddress,
string _trader, address _traderAddress, uint offer, uint _currency)
    payable public {
      require( _currency >= 0 &&  _currency < 3  );
      require(msg.value == _amount);
        deals.push(Deal({
            currentState: state.paid,
            start: now,
            deadline: 0,
            maxLoss: _maxLoss,
            startBalance: _startBalance,
            targetBalance: _targetBalance,
            amount: _amount,
            currency: currencyType(_currency),
            investor: _investor,
            investorAddress: _investorAddress,
            trader: _trader,
            traderAddress: _traderAddress
        }));
        deals[deals.length-1].deadline = now +  _duration * 86400;
      spawnInstance(msg.sender,deals.length-1, now, offer);
    }
    event spawnInstance(address indexed from, uint indexed dealId, uint start,
uint offer);
}
```

MEMBRANA PLATFORM INTERFACE (ALPHA VERSION)

Currently, the Alpha version of the Membrana platform is available for open testing:
alpha.membrana.io

Below are the screenshots of the interfaces.

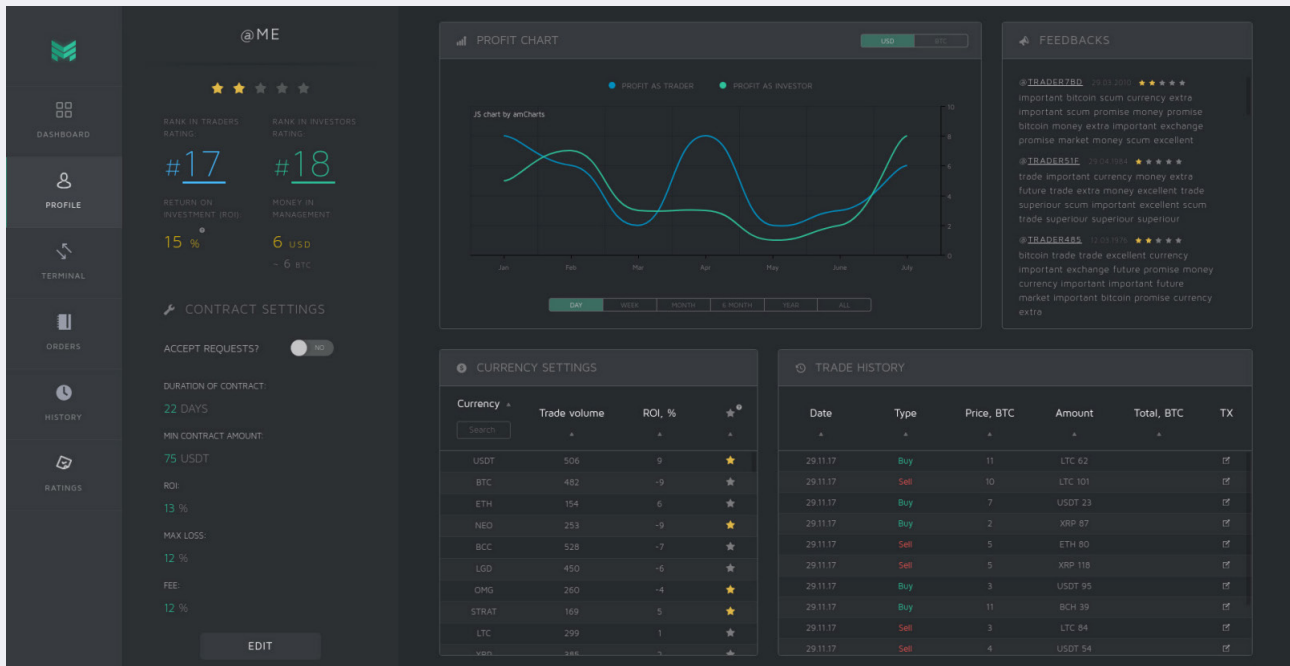## Single Trading Terminal for Traders

Trader's Rating

Investor's Personal Account
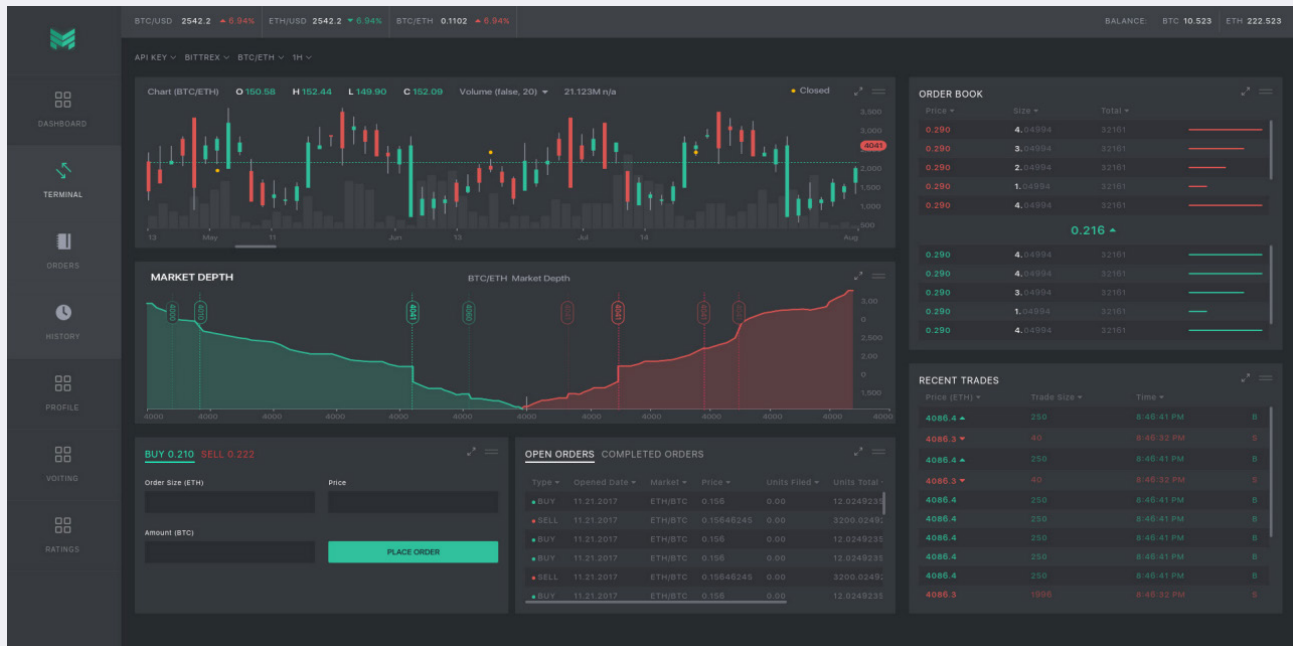
Trader's Profile

PERSPECTIVE FUNCTIONALITY

API of the Membrana Platform

The entire functionality of the Membrana platform is presented not only in the user interface on the website, but also through the API. The API will allow traders to automatically trade with their own funds and/or funds received for trust management.

The Membrana API will give trading robots the ability to act as traders which will greatly expand the circle of potential users of the platform. It also provides a great opportunity for the trading robots to raise additional funds and generate more profit.

Specialized News Feed

The trader has the opportunity to view the news feed for each currency simultaneously with the standard indicators in the trading terminal which enhances the trader's ability to fully analyze market conditions. This information is not only based on technical indicators, but also from information received from the outside world.

The news feed has convenient settings. The trader can choose the news he is interested in and also view only relevant information impacting his crypto-currency transactional decisions.

Trust management of Ethereum wallet funds

The investor has the opportunity to transfer assets for trust management to the trader that are not only the funds in his exchange account, but also the ETH from his own Ethereum wallet. This simplifies the process of concluding a trust management contract for an investor because such things as registration on the exchange, as well as the confirmation of identity, and sending of funds to the exchange account are not needed.

Investor's funds within the Ethereum wallet are sent to a special Smart Contract of Membrana platform and are reserved there until the end of the contract period. The Membrana platform transfers to the trader his own funds on the exchange account for trading.

Upon termination of the contract, the investor's funds are returned to the Ethereum wallet in ETH along with any profit. The trader also receives his reward ETH.

This approach also gives an opportunity for a trader to trade investors' money on any supported exchange, as the Membrana platform has funds on all exchanges.

Contracts with compensation of possible losses by the trader

To increase the degree of trust between the investor and the trader, the Membrana platform gives the trader the opportunity to deposit funds, in advance, for use for partial compensation of an investor's possible losses.

If, upon the completion of the contract, the result of the trader's trade is negative, these funds will be transferred to the investor. Even if compensation for the investor's loss is a small part of total loss, this approach greatly increases the trader's interest in successful trading and builds investors' confidence in their respective traders.

Example: Trader Alice is ready to take 10 BTC under control for a period of 30 days with a target profit of 20% and a maximum loss of 10%. To increase the investor's confidence and interest of the proposal, Alice is ready to compensate for 30% of the possible loss. Investor Bob makes a deal with Alice and Alice accepts 10 BTC for management. After 20 days, the contract gets terminated earlier due to reaching maximum loss of 10%. Investor Bob lost 10 BTC * 10% = 1 BTC. Bob receives 1 BTC * 30% = 0.3 BTC as a compensation for loss from Alice's funds which were reserved at the time of the contract. Thus, Alice participated in assuming part of the loss from the unsuccessfully terminated contract.

Conditional exchange orders

The Membrana platform allows the trader to place conditional orders on the exchanges. Conditional orders are placed on the exchange when certain predetermined conditions are satisfied, such as: the current price, trading volume, and/or other market parameters.

Manager Contract: Contract between two investors

The investor has the opportunity to delegate the task of choosing a successful trader to another, more experienced investor. That is why a special type of experienced investor - manager contract can be created. An experienced investor gets the opportunity to make deals with traders on behalf of his customer by transferring the customer's funds to traders for management. In such cases, the experienced investor will receive a commission.

The Economy of the Membrana token

The Membrana platform has its own Ethereum token - MBR. MBR refers to the type of utility token involved in the platform functionality. Membrana users get access to the main system functions for free. The main functions include: trading through a single terminal on any supported exchange, finding a suitable investor or trader, concluding a contract between the investor and the trader, and contract support until its termination. Additional functions are available only to users who have a corresponding number of tokens in their wallet. In this case, users do not spend their tokens, only hold them in their account.

You can read more details about the tokens economy in the Business Overview.

PROJECT ROADMAP

Below you can read Membrana.io project roadmap.

Q1 2017 Concept Development

This quarter started with the concept development of cryptocurrency asset trust management. We searched for solutions to the main problems of trust management market:

- Loss of control over investment capital
- Risks associated with the participation of intermediary in transaction
- Lack of trust between investors and traders
- Lack of assurance of the validity of a trader's past trading results
- Possible falsification of trading results

Q2 2017 Verification of Concept Viability

In the 2nd quarter, we focused on the complete verification of concept viability under different scenarios of participant's behavior. An additional audit was conducted to ensure the safety of investor assets, with the study and analysis of all known potential risks. Optimization of internal processes was performed

Q3 2017 Creation of Interfaces

In this quarter, development of platform interfaces was carried out.

α Q1 2018. Alpha Version

The last quarter of 2017 had its focus on the development of platform architecture and implementation of its alpha version with the following functionality:

- Authorization using MetaMask
- Addition of API keys of Bittrex cryptocurrency exchange
- Sending, receiving requests for trust management
- Placement of orders on the crypto-currency exchange through the internal trading terminal
- Viewing contract conditions in Etherscan system
- Updating trader's rating based on contract deliverables
- Support for the mobile version of the site using browsers with authorization support in Ethereum (Cipher, Toshi)
- Q4 is concluded with closed testing of alpha version.

β Q2 2018. Beta Version

This quarter starts with the open testing of the beta version with updated functionality:

- Distribution of currency balances on an exchange account for transfer to several traders for management
- Updating trader's and investor's ratings based on contract deliverables
- Recording results of trader's trades in blockchain
- Support for Binance and Kukoin exchanges
- Sale of certain currencies at the market price at closing of the contract on the condition of stop loss
- Attraction of real users, holding a contest of traders

Q3 2018. RTM Release

Membrana.io platform is released with full functionality, and it is ready to enter the market:

- Supporting most crypto-currency exchanges with API keys
- Exchange of text messages between investor and trader
- Connection of DEX Exchange Herdius

- Publication of the Membrana API for trading on supported exchanges in automatic mode (trading bots)

Q4 2018. Additional functionality and prediction of the trader's ROI

- Contracts with security. The trader reserves his own funds in the contract to partially recover the possible loss of the investor.
- Algorithmic orders: iceberg orders, peg orders, trailing orders and others
- Currency news feed. The ability to review news in trading terminal regarding a particular currency simultaneously with the price change chart.
- Using artificial intelligence to predict the expected trader's return on investments (ROI), based on cooperation with the MIROCANA project
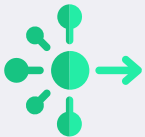
Q1 2019. API of Membrana platform

- API (Application Programming Interface), which provides access to the functionality of the Membrana platform
- The ability to trade on any supported exchange in automatic mode

Q2 2019. Trust management of Ethereum wallet funds

- An opportunity for the investor to transfer funds to management from his Ethereum wallet with no requirements to have accounts on the crypto-currency exchange
- Manager contract: the contract between two investors

Q3 2019. Connection of decentralized exchanges DEX

- Trading on decentralized DEX exchanges through a single terminal Membrana
- Transfer of funds on a decentralized exchange to trust management
- Trading on decentralized exchanges through the API Membrana platform

Q4 2019. OTC / Dark Pool

- Support for decentralized inter-exchange trade
- Own trading platform for OTC transactions
- A hidden list of orders to buy and sell currency
- Secure transactions based on smart contract
- Transactions with a large amounts of currencies without affecting the market situation

TEAM

Evgeniy Buyev, CEO

Serial entrepreneur
Trader of cryptocurrency assets since 2015

linkedin.com/in/eugenebuev

Maxim Khukhro, CTO

Expert in machine learning and Java
AI researcher, 8 years at Intel Corporation

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Marketing in SxS corporation
Launched several business start-ups
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Kirill Romanov, COO

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Marketing since 2009

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Igor Knyazev, Backend and Solidity Developer

Developed his own trading platform
Developer of Solidity since 2016; Expert in blockchain
and Smart Contract technologies

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Vyacheslav Mychkin, Frontend Developer and mobile developer

Full Stack and JavaScript developer
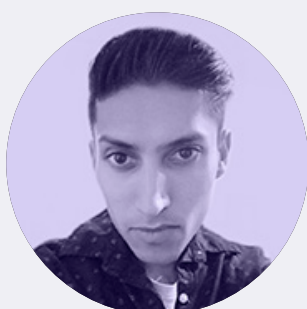Mobile applications (Android, iOS)

linkedin.com/in/vyacheslavmychkin

Sonder S. Lim, regional brand manager, Asia

Supporter of crypto-currency assets, the founder of a
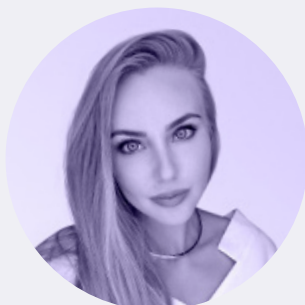marketing agency, a strategic content manager

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Adam Joseph, regional brand manager, India

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Website

Platform Demo Version
Platform Alpha Version

GitHub

Telegram

Medium

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