QAO-RARECHAIN WHITE PAPER

Version: 2.1

08/09/2022

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Abstract. RareChain is a strategy-focused DeFi Ecosystem which includes its own governance token, (**QAO**) and its index (**RAIR**) that can be used on Rarechain API. QAO will also be used for staking to earn from many reward pools. RareChain will originally launch on Ethereum and subsequently migrate to its own blockchain solution. The main focus of RareChain is its API which will act as an index strategy creator that is programmable independently for each user within our platform where they can manage their strategies and create their own algorithms. At a later stage user-based trading data will be analyzed and compared along with an infinitely optimizable Artificial Intelligence for the real-time adjustments in the API weighting method. This will eventually enable smart index creation and training & deployment of complex AI-based models.

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Overview

Rarechain is a strategy-focused DeFi Ecosystem which includes its own governance token, Qao (QAO) and its smart index (RAIR100) that can be used on Rarechain API. QAO is also used for staking to earn from many reward pools.

RAIR Indexes (Responsible Artificial Intelligence Rarechain Indexes)

RAIR100 is built from 100 cryptocurrencies. RAIR100 will serve as a proof of concept for RareChain's API on top of which the iSmartAlpha indexes are built, where 100% collateralization needs to be maintained with constant rebalancing so the index is fully backed by the assets which it is tracking.

RAIR1000 is built only on testnets for a more elaborate index from over 1000 assets including stocks, bonds, ETFs, commodities, cryptocurrencies and other indices. RAIR1000 will serve as another proof of concept for RareChain's API where ultimately KYC will be required and where the same concept of collateralization will be maintained. RAIR1000's initial version which will trade only on testnets until regulatory approvals and will be tracking 100-300 indexes(covering over 10000 companies), 100-200 ETFs, 3 Diamond indexes, 10-20 commodities, 20-100 cryptocurrencies, 20-30 currencies, 6-10 metals products.

QAO is the governance token for RareChain with focus on voting and governance and the gradual complete decentralization of the RareChain ecosystem.

RareSwap is RareChain's own proprietary Swap solution for crypto trading and optimized for the use of indexes created via the RareChain API where only whitelisted tokens can be traded after an extensive verification process and acceptance by core methodologists and final vote from multisig of elected members.

RarePool is Rarechain's own staking pool solution optimized for automated staking.
Validator key owner: User & Service
Withdrawal key owner: User
Pool token: Yes
3rd Party Software: No
Min. Stake: 0.01ETH
Fee: 10%

RareChain's API is a de-facto index strategy creator that is programmable independently for each user within our platform where they can manage their strategies and create their own algorithms. Our objective is to have a fully functional and optimizable algorithms-based dynamic financial model, which has its settings shareable with extensive analysis data sets. User-based trading data will be analyzed and compared along with an infinitely optimizable Artificial Intelligence for the real-time adjustments in the weighting and rebalancing methods. With a decentralized approach to methodical diversification, we believe each can contribute regularly or not with various strategies with varied investment instruments. We also believe in the resource-based view of diversification and foremost in the power of the network to process asset analysis to minimize overall index risk and higher the potential of growth. Some of the use cases for RareChain's API include (but are not limited to):

- Markets AI analysis
- Custom Smart Indexes creation
- Train/deploy AI
- Data Verification
- Supply chain data optimization

Economics

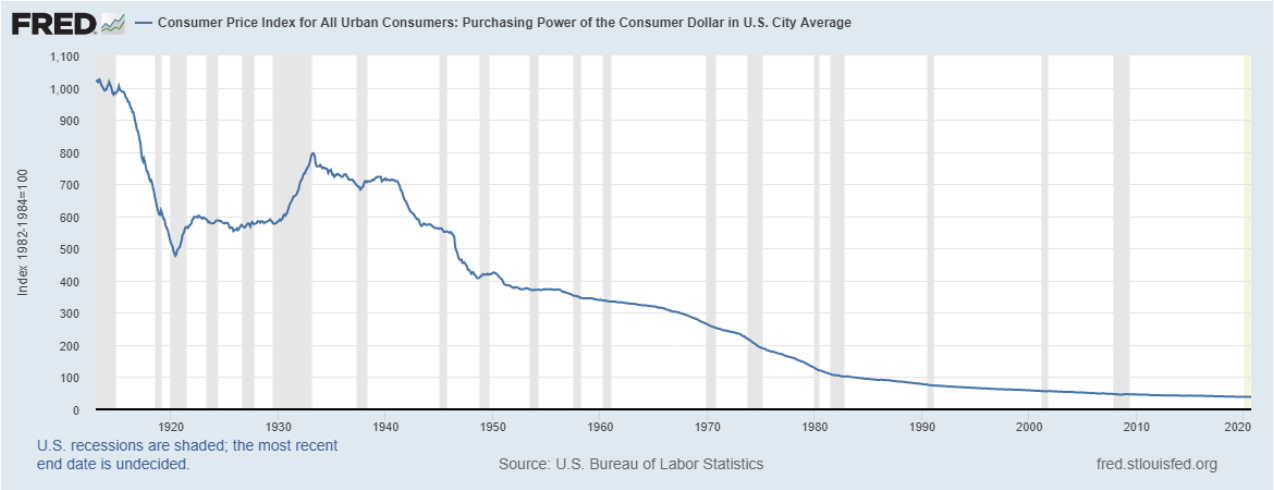
Stablecoin

The case for stablecoins

Stablecoins were a revolution in the crypto world. Without stablecoins there cannot be mass crypto adoption since merchants and non-crypto-natives will not accept the risk of huge price volatility. For the most part stablecoins are pegged to a FIAT currency (most commonly the US Dollar, but sometimes other currencies as well).

The USD, however, itself is not really stable (although it is the de-facto world reserve currency)! If we look at data provided by the Federal Reserve[1] we can see that the purchasing power of the USD has plummeted over 25 times over the past 100 years.

[1] https://fred.stlouisfed.org/series/CUUR0000SA0R



This begs the question - how stable are stablecoins really if they are pegged to the USD. Wasn't the original goal of Bitcoin to preserve our purchasing power against the rapid devaluation of global currencies.

Rarechain aims to address the above issues by creating fully backed iSmartAlpha indexes. The pegging mechanism will be fully transparent and track the prices of the assets they are backed with.

The iSmartAlpha Indexes are market indexes that can cover many cryptocurrencies, and eventually more traditional products like indexes, ETFs, Diamond indexes, commodities, currencies and metals products. It can use a dynamic weighting method which combines user-centric performance metrics and AI as well as traditional weighting methods.

The RAIR index (RAIR100) will serve as a proof of concept for the other major deliverable of the the RareChain project - a complex API enabling anyone to create intricate and AI-enabled indices on top of the Ethereum blockchain (and later on, on Rarechain's own blockchain).

The RAIRs will be managed via a governance token named QAO (Qualified Autonomous Organization) which is already under multisig with a 4/6 signatures required from elected members of the community.

The end result is RAIRs becoming the center of a Strategy-focused Ecosystem for DeFi and a revolution of community-driven asset management.

RAIR creation (issuance&redeem)

RAIR is created in a similar fashion to other collateral backed crypto-assets:

1. A user wants to lock some liquid cryptocurrency (MATIC, WETH) and open a RAIR100 position.
2. The user issue or trade or redeem with his/her collateral to the RAIR100 smart contract.(via TokenSet smart contracts)
3. The RareChain's API Oracle is queried to obtain the predictions from users and create rebalancing strategy mixing them with AI
4. Custom fees contract, the fees aggregate to a smart contract for automated distribution.

Value maintenance

RAIR100 is expected to always remain correctly priced as exact replicated versions can be launched by many users while following the same rebalancing rules.

On top of the above, governance token distribution is awarded to RAIR liquidity tokens holders to maximize liquidity on the Rareswap DEX.

RAIR100 is rebalancing on a daily basis based on community votes&AI.

Collateralization ratios

When a RAIR100 position is created, it is done so using a 100% collateralization ratio.

There are no liquidation risks for RAIR100 as it is always priced by the assets held in the smart contract of the token of its version.
Some other versions can be launched with different strategies and rebalancing mechanisms which would create different pricing for every strategy.
(Where they would rely on separated liquidity)

Fees

One of the core features of RAIR100 is the constant taxes and fees on creation and trading of it which reward the whole ecosystem.

This fee is equivalent to 2.8% of the RAIR position. Eventually if the RAIR position is open for long enough it will pay for itself by appreciating enough or by earning enough governance tokens to cover the initial cost.

Furthermore part of the fee collected is added to liquidity, creating aggregation for its liquidity, while rewarding stakers and developers on all trades.
RAIR100 taxes structure:
2.8%;
0.7% Liquidity
0.7% Stakers,
0.7% Maintenance
0.7% Devs fund

Governance token

The qualified autonomous organization (QAO)token is the governance token issued as a reward for participants in the ecosystem. QAO is a governance token with perpetual inflation and deflation, which will be rewarded to network liquidity participants who provide liquidity tokens for the approved pairs. The QAO main purpose is to be used for governance via voting on the system's parameters.

Issuance

The goal of Rarechain is to be fully decentralized. The path to decentralization will happen over time, since the project will need to be governed at least in the beginning.

Initial allocations of the RareChain project will be as follow:

- Liquidity pool: 4 500 000 000 000 tokens
- Initial Burn: 4 500 000 000 000 tokens
- QAO Treasury - 1 000 000 000 000 tokens per year, was applied only the first two years as smart contracts ownership of the token has been renounced.

QAO treasury is for community management of all spheres; Long-term Holding, Grants, Partnerships, Liquidity, Contributors Fund, Maintenance, Marketing, Development, Research. Each decision will be made by a vote of the whole community.

No other funds will be issued for the treasury as 10% of the fees collected from Rareswap and fees from RAIRs goes to the QAO treasury, this makes it sustainable and self-funded as a true QualiFied Autonomous Organization.

Deflation

The deflationary mechanics of the QAO tokens are as follows:

- Burnt Fees on Staking/Voting
- Buybacks and burn
- Proof-of-Burn Cards(https://opensea.io/collection/pob-cards)

Voting

Voting is intended as the main governance mechanism of the system. Pretty much all system parameters and functionality can be put up for a vote (including the voting rules). The initial set of rules under which voting will be held are described below. In order to be eligible for Voting QAO should be staked in the voting contract.

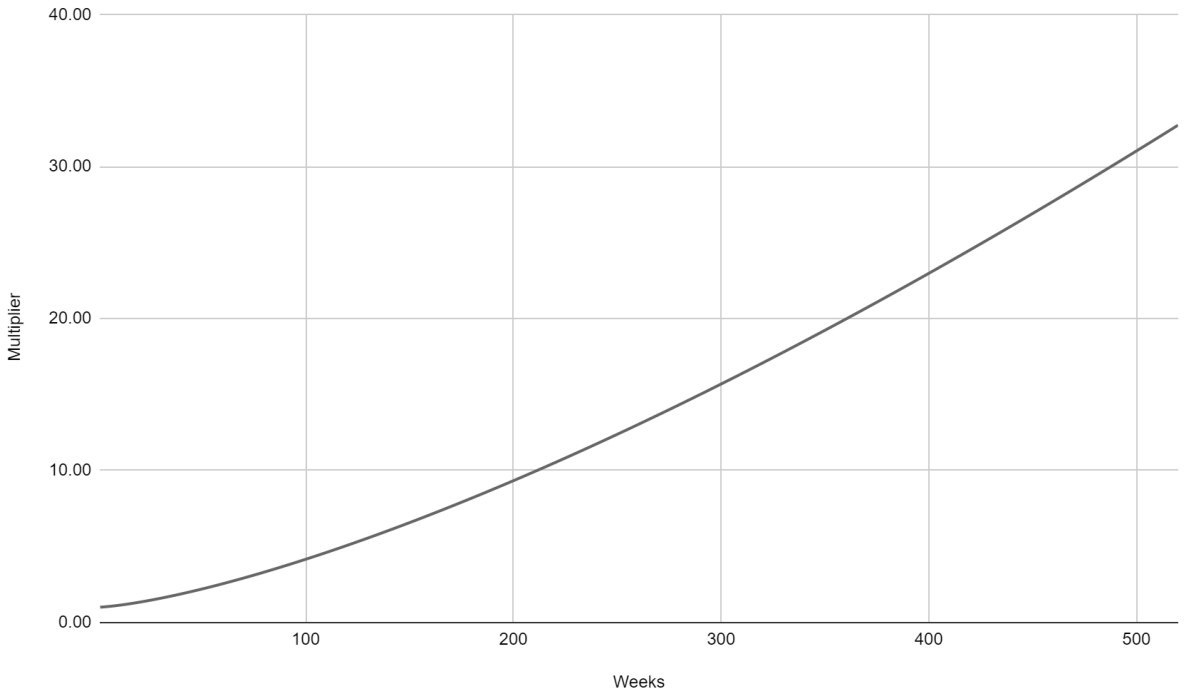
The goal for voting is to become easier over time and more distributed as the community grows. Due to this, even though QAO is perpetually inflationary, the amount of tokens needed to vote will be fixed to:

- 100 000 000 QAO needed to initiate a vote
- 1 000 000 000 QAO needed for a vote quorum - the minimum number of tokens that need to vote before the vote is considered valid.
- Proposal passes if 51% of the tokens which voted, voted for “Yes”

Only tokens which are staked in the voting module are eligible for voting and for receiving rewards. When the tokens are staked, it can be done so in two ways:

- Without duration - e.g. the tokens can be unstaked at any given point in time within 7 days minimum.
- With duration - a minimum of 1 week and a maximum of 10 years

Tokens staked with duration receive a duration multiplier which is used both for voting and for voting weight and for rewards. The multiplier (M) is determined by the following chart and formula, based on number of staked tokens (T) and staked duration in weeks (D):



$$M = 1 + 0.005 \times D^{1.4}$$

So for example, if a person stakes with no duration, he gets a multiplier of 1 - his voting power and rewards shares are equal to the staked tokens. If however he stakes for 104 weeks (2 years), he gets a reward multiplier of 4.33, so that for each token staked he gets 4.33 voting/reward shares.

The purpose of this is to incentivise people who are long-term committed to the protocol with better rewards and have them be the key decision takers.

Technical specification

Implementation

RareChain will be implemented in several stages. Initially the ecosystem will be deployed on Ethereum, at a later stage migrated to layer2 with zkSnarks and eventually transferred to its own blockchain solution. A more detailed roadmap of the expected implementation stages can be found below:

Project roadmap:

- **Stage 1:**
  - Deploy initial version of QAO on Ethereum
- **Stage 2**:
  - Deploy initial version of Rarechain's API
  - Deploy initial version of RAIR on Ethereum
  - Integrate QAO with RAIR100
- **Stage 3:**
  - Deploy initial version of RareSwap on Ethereum
  - Integrate QAO with RareSwap
- **Stage 4:**
  - Migrate to layer 2 on zkSnarks
- **Stage 5:**
  - Deploy own blockchain solution (RareChain)
  - Enable creation of more versions of RAIR
- **Stage 6:**
  - Optimize RareChain TPS
  - Optimize RareChain rewards for miners
- **Stage 7:**
  - Finalize RAIRs migration to RareChain
  - Migrate QAO to RareChain
- **Stage 8:**
  - Migrate RareSwap to RareChain
  - Introduce Proof-of-loyalty to RareChain

RareSwap

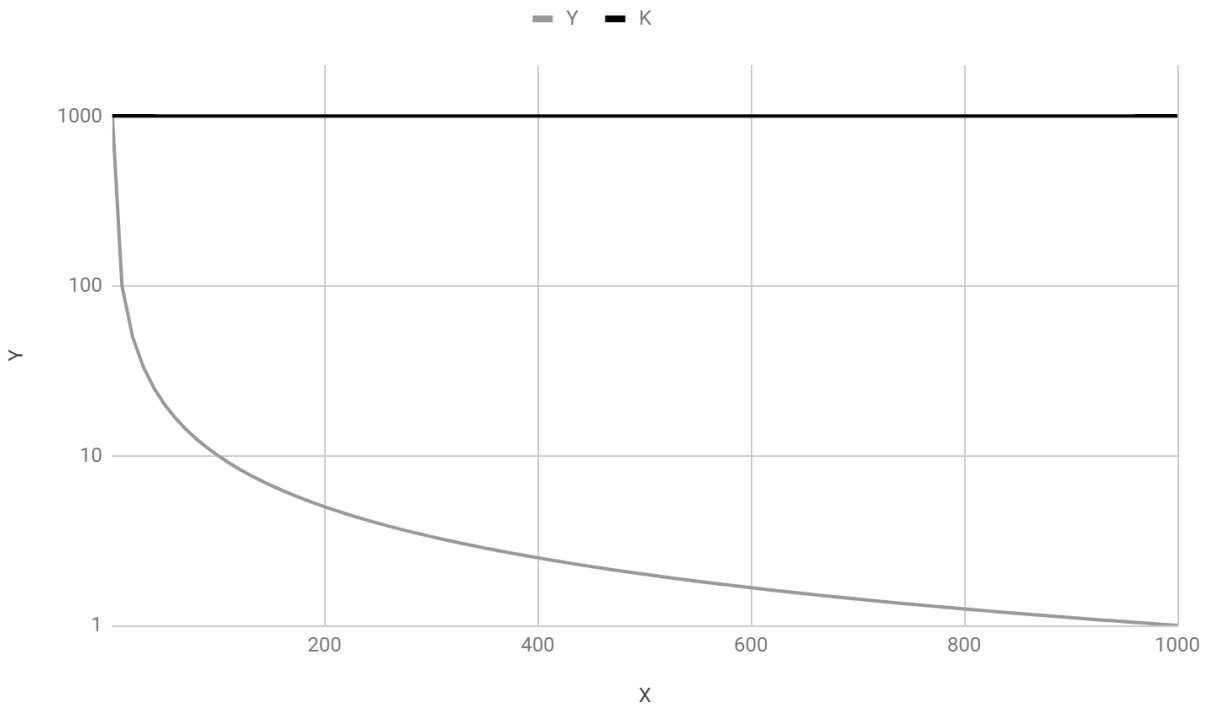
During the early stages of the project RAIR and QAO will be integrated with existing market swap solutions like UniSwap. Incentives will be offered to liquidity providers on those platforms in the form of QAO allocations proportional to the liquidity provided.

At a later stage the RareChain project will launch its own swap solution (RareSwap) , optimized for the usage of indexes created by the RareChain API. At this stage QAO incentives will be offered exclusively on the project's swap solution.

RareSwap will act like an automated market maker (AMM) similar to other DeFi solutions in this regard. Automated market makers are smart contracts that hold liquidity reserves (or liquidity pools) that traders can trade against. These reserves are funded by liquidity providers. Anyone can be a liquidity provider who deposits an equivalent value of two tokens in the pool. In return, traders pay a fee to the pool that is then distributed to liquidity providers according to their share of the pool[2].

RareSwap will follow the industry standard pricing model of:

$$x * y = k$$



*Constant product of x * y = k note the logarithmic vertical axis*

Let's illustrate this with an example:

So, let's consider a theoretical RAIR/USDT liquidity pool. Let x be the RAIR portion of the pool x and y the USDT portion of it. The swap solution takes these two quantities and multiplies them to calculate k which is the total liquidity in the pool. The basic premise is that k remains constant.

[2] https://academy.binance.com/en/articles/what-is-uniswap-and-how-does-it-work

Below is an explanation of the mechanic from Binance academy[3]:

Let's say Alice buys 1 ETH for 300 USDT using the ETH/USDT liquidity pool. By doing that, she increases the USDT portion of the pool and decreases the ETH portion of the pool. This effectively means that the price of ETH goes up. Why? There is less ETH in the pool after the transaction, and we know that the total liquidity (k) must remain constant. This mechanism is what determines the pricing. Ultimately, the price paid for this ETH is based on how much a given trade shifts the ratio between x and y.

It's worth noting that this model does not scale linearly. In effect, the larger the order is, the more it shifts the balance between x and y. This means that larger orders become exponentially more expensive compared to smaller orders, leading to larger and larger amounts of slippage. It also means that the larger a liquidity pool is, the easier it is to process large orders. Why? In that case, the shift between x and y is smaller.

RareSwap will incur a 0.3% fee on each trade, with the allocation of this fee distributed as current distribution of this reward pool.

RareSwap will also enable trading of derivatives backed by assets with inherent value.

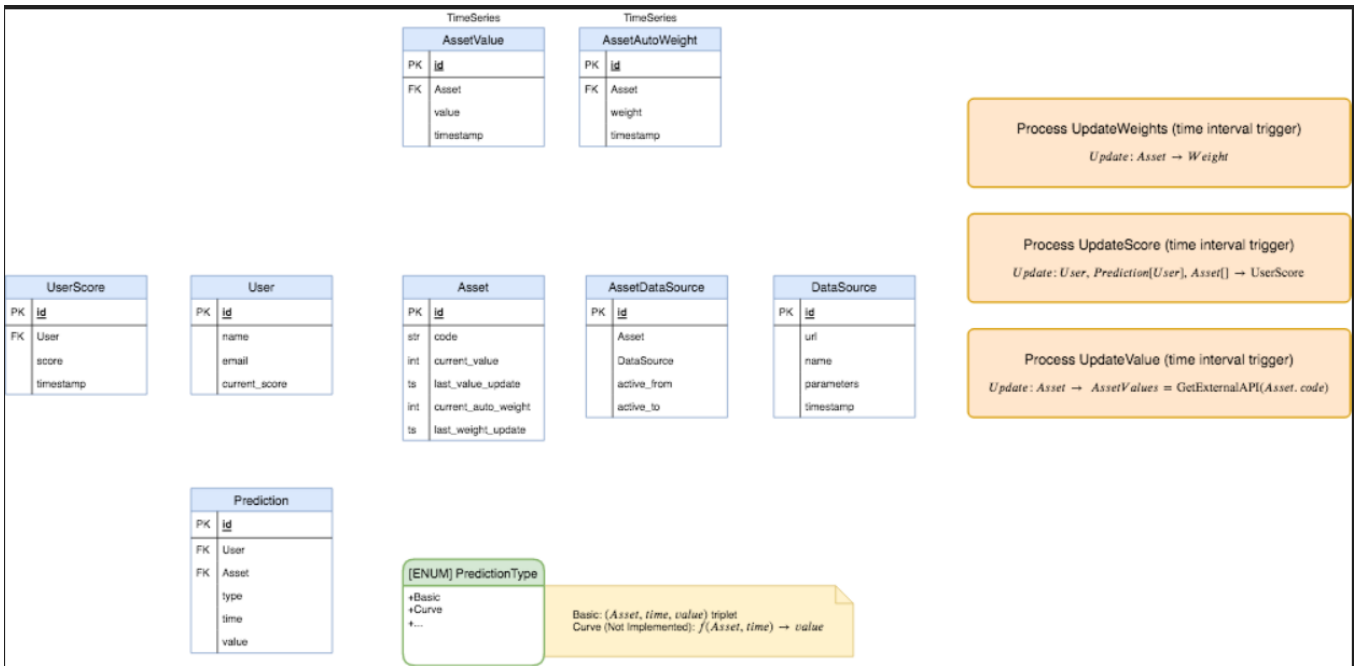
API

The goal of the RareChain API is to enable exclusive algorithm creation by and for the RareChain community. The endgame for the RareChain API is to become a human-understandable interface for connecting humans to AI with real-life applications. In the short (immediate) future it will enable users to create complex and transparent indices using various data sources.

Below is a shortlist of only part of the APIs which will be available through the rareChain API:

- Yahoo
- IEX Cloud
- Quandl
- Polygon
- Intrinio
- Alpaca Markets
- Aragon
- Algorand
- Perlin

[3] https://academy.binance.com/en/articles/what-is-uniswap-and-how-does-it-work



Each index which will be created in this way is going to be fully transparent (available for review to the entire community). Once the index is deployed, the API will enable the index owners to:

- Backtest the index performance
- Tokenize the indexes using various approaches:
    - **Active Fully Collateralized token creation** - where the owners will be able to automatically deploy a collateral backed token on the Ethereum network, via the RareChain API with flexibility to optimize strategy.
    - **Passive Fully Collateralized token creation** - where the owners will be able to automatically deploy a collateral backed token on the Ethereum network, via the RareChain API by retaining the same strategy.

All operations performed via the RareChain API will incur fees, which will be redistributed to stakers, treasury and possibly buyback&burn.

In the pipeline

The above functionalities are only part of what RareChain has in store for its users.

At a later stage, using the AI capabilities of the platform, users of the API and index creators will be able to:

- Optimize indexes
- Analyze multiple markets simultaneously
- Explore index and market correlations
- Perform automated technical analysis
- Analyze index and market fundamentals

Indexes themselves will be segmented in various baskets, as per their compositions:

- Developed
- Advanced
- Emerging

Product wise, RareChain wants to expand its ecosystem, by either developing or integrating with the following solutions:

- Decentralized Encrypted Ledger
- Password-Protected Transactions
- OTR messaging
- Custom Confirmation Payment
- Key-Locked Vaults
- Automated Transactions
- Complex voting rules
- Data Analytics
- P2p escrow transaction protocol
- Rarity Meter

Where to find us

www.QAO.io