TrueRepublic (draft)

Domains, Tokenomics, Dex, Chain and Nodes

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Content

1 Innovation:

- Decentralized, permanent democracy: at any time users can bring ideas to surface and evaluate the solutions of others.

- Domain structure: different organizations or groups have their own domain within the protocol, with its own set of rules.

- Anonymous and secure decision-making: anonymity and security in the evaluation and voting process, protecting the privacy of members' activities and preventing manipulation.

- Rewarding for engagement: the economic model encourages engagement and quality.

- Integration with DEX: a decentralized exchange allows for easy access to the PNYX coin

- Data security: POS block-chain, community driven and open-source

2 Introduction

Everyone's opinion should be taken into account when making collective decisions, yet technical barriers remain in place that prevent this. The most widely used form of decision-making is to assign the right to vote or make proposals to representatives or functionaries, which leads to power being concentrated in a few people and encourages corruption, censorship and "adverse selection". This outdated way of political participation does not correspond to the current technological capabilities and places a burden on anyone who wants to participate. In order to enhance decision-making, better methods of connecting people and allowing them to express their views should be developed.

If a group's wishes, opinions and ideas become transparent, they cannot be ignored by its representatives in the longer term. If we think of a political party, then transparency of will could soon lead to a situations where decisions would no longer be made by lobbyists or officials, but by the members of the party themselves. Such a party could be called a “proxy-party” as it is controlled by its members. MPs of such a party would articulate the will of the ordinary members and not their personal views, they would be “proxies” controlled by the members. If half of the regular party members are in favor of a proposal and the other half are against, then half of the MPs can vote in favor and the other half against. In this way, a tool that enables such transparency would also enable bottom-up democracy in the existing political system of representative democracy.

Any organization, not just political parties, can benefit from transparency of will and better outcomes when the decision-making process considers members' needs. However, certain requirements must be met to enable true transparency: low hurdles, anonymous and free expression and an incentive to engage with the ideas of others. Technically, any software protocol that enables such a market of ideas must be decentralized, since any centralization of power would sooner or later corrupt the system. In order to enable true decentralization in a protocol, an economic model is required that protects the rules from manipulation and thus ensures that the tasks necessary to maintain the system are fulfilled.

In connection with crypto-currencies, such economic models are called “tokenomics”. The combination of incentives and decision-making sounds alarming because we associate this with corruption. However, when incentives are undirected (rules-based and neutral), then it's quite the opposite. Crypto and blockchain technology are a double-edged sword. It can be used as a tool for the better, but ignoring its potential will only turn it against us. A famous banker reportedly said "Give me control of a nation's money and I care not who makes its laws". Regardless of whether this quote is genuine, there is some truth to it: if centralized money printing can be used for top-down domination, a decentralized, fair and transparent economy with fixed supply can be used to strengthen freedom.

TrueRepublic (TR) provides a way to connect people and enhance democracy by enabling better decision-making in a secure and transparent manner. It allows for anonymous voting, swarm intelligence and modern evaluation methods like systemic consensus. It is fully decentralized, community driven and open-source.

2.1 The 3-Pillars of TrueRepublic: Encouraged participation, Self-organization, Data security

• Encouraged participation

Engagement is work! The incentive model of TR provides an easy way for organizations to reward their members or customers for their ratings. Low technical hurdles enable a marketplace of ideas. As a result, engagement is no longer tedious work, but rather an enjoyable experience that will benefit the organization.

• Self-organization

The economic model enables self-organization and eliminates the need for moderation and censorship. There are mechanisms in place that allow members to decide for themselves what content should remain within the system, thus encouraging high-quality content (4.3).

• Data security

Block-chain technology ensures data security by virtue of its distributed ledger system, which operates based on a consensus protocol. This safeguards user anonymity due to the decentralized nature of the network, where only the user knows their true identity and representation in the system. The Proof of Stake network is a community-driven initiative that is powered by an open-source code that can be run without any permission (see also chapter 7 Nodes).

3 The Domain

Any user can open a domain and invite other users by adding their avatar name to the member list. The domain is the heart of TR and is used by a group to make their opinions, ideas and preferences transparent. Groups can be, for example, working groups, developer groups, clubs, organizations or bodies of a political party. Domains can be public or private. In private domains, members can be invited either by the admin or optional by every other member.

3.1 Lists

Each domain has a member list, a issue list and a suggestion list for each issue.

All lists can be ordered by placing stones. Each member has one stone per list. If two entries have the same number of stones, the order depends on the creation date (old > new). Entries in lists can be deleted at any time by the creator of the entry or at the request of more than 2/3 of the members.

Properties of any list:

- Name
- Stone field (ranking)
- Remove field

3.1.1 Issue list

The name of an issue entry could read for example "Election of the Board Chairman", the associated suggestion list can then contain names of candidates. Issues can optionally be provided with an expiry date when created. This makes sense if the issue is related to a specific date. Expired issues and related suggestions can not be altered and become invisible after a while, but can optionally be displayed. Property of the issue list:

- Name
- Stone field (ranking)
- Remove field
- Short description
- Link to an external forum, telegram, reddit.. (optional)
- Link to the corresponding suggestion-list
- Expiring date
  - Default (none)
- Remove after inactivity
  - Default (360 days)

3.1.2 The suggestion list

In the rating field evaluations can be made for every entry. The rating goes from -5 to +5 and is used for systemic consensus evaluations. Systemic consensus evaluations allow the consideration of resistance (see 3.2). The suggestion list is divided into three zones: green (top), yellow and red (bottom). In order to keep the list of suggestions clear, the number of entries considered for evaluation (green area) can be limited. The suggestions are ordered by the number of stones and need 5% approval in order to stay or enter the green zone. Suggestions that don't make it into the green zone remain in the yellow zone for a pre-defined time before sliding into the red zone. If the suggestions in the red area still do not get enough approval, they will be completely removed from the list after a while. The duration (dwell time) is adjustable. Example: Suppose the dwell time is set to one day, the suggestions with less than 5% support (stones) stays in the system for two days: one day in the yellow area, one day in the red area. During this time the suggestions have the opportunity to rise in the ranking by gaining more support. If this does not happen, they will be deleted. This way the suggestion list is automatically cleaned up without the need for an admin or moderator. Properties of the suggestion list:

- Name
- Stone field (ranking)
- Remove field
- Short description field
- External Link (optional)
- Rating field (-5 to +5)
- Color (Green, Yellow, Red)
- Maximum number of entries for evaluation (size of the green zone)
  - default = 12
- Dwell time
  - default = 1 day

3.2 Systemic Consensing

Imagine three people, Fritz, Anna and George, who are considering what they should get together as a reward for a hard day of work. Fritz, a vegan, has had bad experiences with the vegan options in most ice-cream stores, so scores ice-cream low, but he likes waffles and scores it high. Anna is mostly fine with all the options, scoring them all high. George is a recovering alcoholic and doesn't want to be tempted by others drinking around him, so scores beer very low. All three have significant resistance to the default solution, which would be getting nothing, so score it low. Waffles, as the least resisted option, is group's decision.

Which treat should we get?
Score proposals according to systemic

	Ice cream	**Waffles**	**Beer**	**Default solution: nothing**
Fritz	-3	0	1	-5
Anna	4	4	5	-5
George	3	2	-5	-4
Total	**4**	**6**	**1**	**-14**

In contrast, if each of them only voted for the preferred solution (binary), the decision would have been to drink beer.

Which treat should we get?
Score proposals according to binary

	Ice cream	**Waffles**	**Beer**	**Default solution: nothing**
Fritz	0	0	1	0
Anna	0	0	1	0
George	1	0	0	0
Total	**1**	**0**	**2**	**0**

Both methods of evaluation are supported bx TR. The binary poll is indicated by ranking.

3.3 The Admin

The user who created the domain has admin rights. This allows him to configure the domain for the respective task. The admin can set the options of the domain, but cannot delete content of others. Optionally, the admin position can be set electable. In this case the admin rights are always held by the member with the highest rank on the member list. In private domains the admin can add new members to the member list, but this right can also be given to every member of the domain. The admin can also remove names from the member list. Since list entries can be removed if 67% of the domain members

decide so, the admin can also be removed from the member list. In this case the highest ranking member on the list becomes admin.

3.4 Economic Model and Treasury-Wallet

The economic model pursues the following goals:
- Enhanced participation
- High quality of the submitted ideas
- Protection against troll and spam attacks
- Create an incentive to secure the network

To achieve these goals, rating and voting is rewarded with the internal currency PNYX-Coin, while the posting content has a cost. Another task is the protection against trolling and spam attacks and facilitation of content quality. For this reason, bringing content to the surface is associated with costs, while the evaluation of content is rewarded. Therefore, users usually have to evaluate other people's ideas before posting their own solutions. Dealing with the ideas of others first, also improves the quality of the content. Instead of earning the coin through rating and voting, the coins can also be bought on a decentralized exchange Dex (see 5).

Each domain has a treasury wallet which rewards user activity automatically. The treasury wallet gains as content is placed and drains as rewards are paid out. The creator of the domain has to pay for the initial balance of the treasury wallet, but anyone can top up the treasury wallet at any time. In contrast the payouts are only possible over the rewarding mechanisms. For details see the price section in the appendix (8.1).

In each domain, problem areas (issues) can be defined for which solution approaches (suggestions) can be introduced. Thanks to the implemented tokenomics, TR does not require moderation or hierarchies.

The economics of permanent decision-making in TR follows three simple principles:

I. PayToPut: Bringing in issues and suggestions incurs costs (fees) to ensure that only serious ideas are brought in. The fees are transferred to the domain wallet and are used for RateToEarn and VoteToEarn payouts.

II. RateToEarn: Users are rewarded for evaluating other people's ideas. The rating goes from +5 (maximum agreement) to -5 (maximum disagreement) to allow the application of systemic consensus algorithms.

III. VoteToEarn: Suggestions are ranked by the number of “stones” they receive, which are essentially upvotes and approvals. Every user has only one stone per list. Proposals need a 5% approval rate in order to remain on the list permanently (green area). Proposals with low approval ratings will slide from yellow to red after a few days before they leave the system permanently. Fast deletion of entries are possible with 2/3 majority. Users can earn tokens when they reset (or confirm) their stone after new suggestions have been added to the list.

3.4.1 Overview of Use-Cases for PNYX

- Companies, organizations and political parties can easily reward their members or employees for their participation in the evaluation and decision-making process
- Political parties can make the will of their members transparent
- Larger groups can unleash swarm intelligence
- Working groups can open a domain for decision making with peers
- Companies can find out what their customers think and how they rate their products
- Group members can put their ideas to surface and let peers evaluate them
- Coins can be donated to the favorite domains in order to draw attention to them
- Coins can be staked to secure the network and earn staking rewards by running a POS/POD validator node
- As a secure store of value
- Provide liquidity Dex and earn fees

3.4.2 Coin supply and release

The total number of PNYX is fixed with 21 million coins. The majority of coins will be released slowly over time through POS staking rewards and domain rewards (see 8.1). In order to secure the network, the stake of malicious nodes can be slashed. The same applies to the treasury wallet of domains which are inactive for a long period of time. Slashing takes coins out of circulation and slowly allocates them to active nodes and domains by the release mechanisms. The release in absolute terms is a function of the interest rates for domain and node staking multiplied with the total amount of staked coins. The interest rates of staking rewards depend on the fraction of released coins and is diminished proportionally if the release rate increases (see eq.5, Appendix). The relation between staking and coin release links inflation to the demand. Inflation decreases if the network is growing, which ensures a steady price increase, while reducing price volatility.

Coin distribution at launch:

- 7 initial nodes (testnet) for team members (700.000 coins, 3.2%)
- 500.000 coins loaded in the initial domain for testing (2.3 %)
- 500.000 coins as initial reserves in DEX liquidity pools (2.3 %)

3.5 Properties of the domain

- Unique domain name
- Member list
- Permission register
- Treasury wallet
- Issue list with suggestion lists for each entry

3.6 Domain options

- Admin position

    - Domain members can vote the admin (default)
    - Only the admin can appoint a new admin
      Note: Since the Member-List is ranked, with default option, the top member or consent (see list options majority or systemic consensus) has admin rights. If the admin left the domain, the user with the highest rank becomes admin.
- Create Issues (new entries on the issue-list)
    - Every member
    - Only admin
- Create suggestions (new entries on the suggestions-list)
    - Every member
    - Only admin
- On-boarding of new members
    - Only the Admin can send invitations (default)
    - Every member can send invitations
    - Domain is public, all users can join without invitation

- Exclude (delete) other members avatar names from the list of member
    - only by member voting
    - voting and Admin (default)

- Coin burn required

    - no (default)
    - yes

    Note: if this option is enabled, the user must burn defined amount of token, before he can be added to the member list. This option is primarily intended for the governance domain, where changes in the protocol are voted on.

4 Anonymity & Onboarding

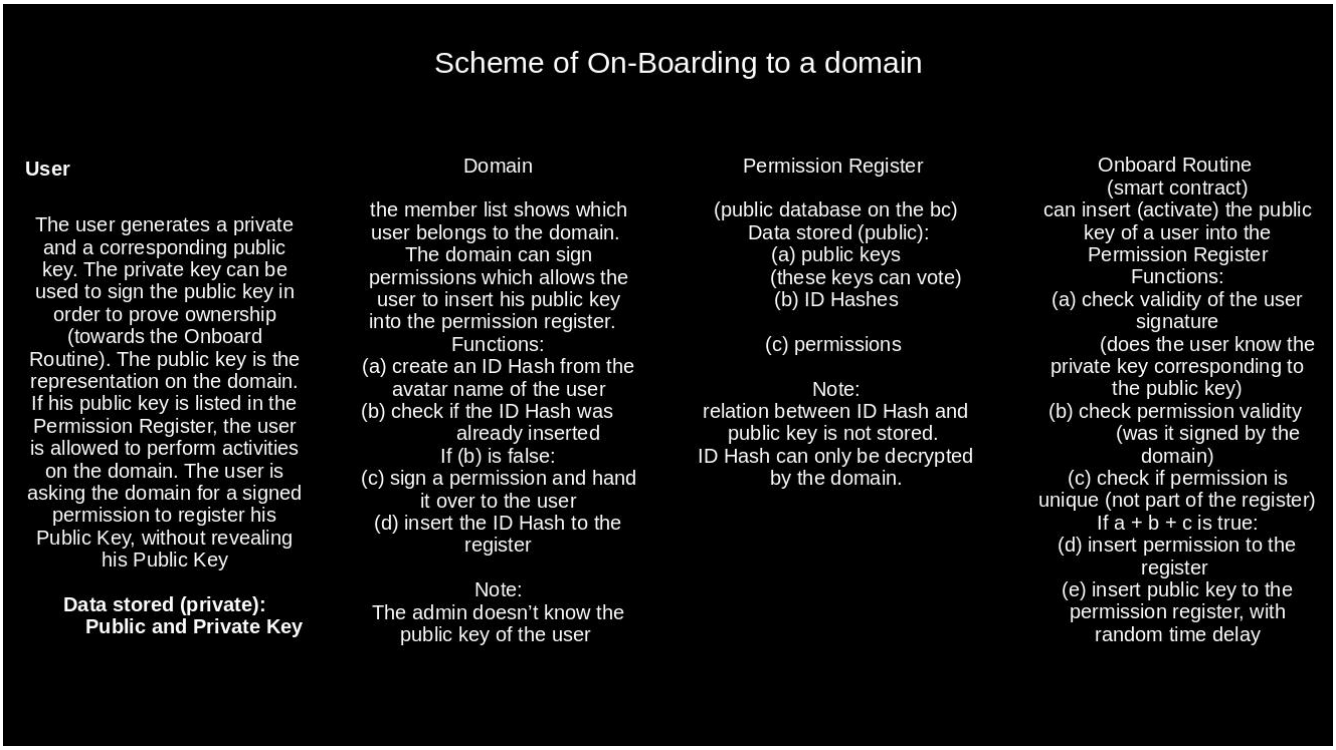
All user activities on the issue and suggestion list such as votes, ratings and suggestions are anonymous. Only the respective user knows what activities he has performed, as the system does not store the relation between avatar name and representation on the blockchain. This is possible because the onboarding process takes place in two separate steps.

Each user has a global asymmetric key pair (public and private key) and additional (asymmetric) key pairs used for activities inside of domains. The global key pair is tied to the unique avatar name of the user. So the relationship between avatar name and global key is public. With the global key pair, the user can authorize public activities. E.g. he can accept an invitation to join a domain and prove ownership of the avatar name.

The voting activities on the domain are authorized via the additional key pair. The goal is to ensure anonymous voting by not storing the relationship between avatar and representation on the domain. Only the user (client-software) knows that global and additional key pairs are controlled by the same entity. This is possible because the onboard process is divided into two steps: (i) adding an avatar name

and global public key to the domain's member list, (ii) allowing the user to add a public key to the "permission register" which allows him to execute activities on the domain.

The ‘permission register’ is emptied periodically, but all members (on the ’member-list’) can onboard again automatically. This gives the opportunity to exclude members from the domain, by deleting their names from the member list. Example: a member left the domain, but his key is still active, because the relationship between avatar and key in the permission register is unknown by the system the respective key in the permission register can not be deleted. After a ‘big purge’ event all keys are deleted from the permission register, only members of the domain can get permission by adding a (new) key to the permission register.



5 Dex

It does not peg or wrap assets, it manages funds directly in on-chain vaults, and secures those funds using economic security. It could be described as a cross-chain automated market maker (AMM), like Uniswap V1. Each pool consists of PNYX and another asset. Users can exchange PNYX against BTC, ETH or LUSD. A small liquidity provider fee (0.3%) is taken out of each trade and added to the reserves. While the PNYX-Asset reserve ratio is constantly shifting, fees make sure that the total combined reserve size increases with every trade. This functions as a payout to liquidity providers that is collected when they burn their pool tokens to withdraw their portion of total reserves. Guaranteed arbitrage opportunities from price fluctuations should push a steady flow of transactions through the system and increase the amount of fee revenue generated. In addition there is a 1% PNYX burning fee. This means that if 100 PNYX coins are purchased against one of the assets, only 99 PNYX are provided, while 1 PNYX is burned. The smart contracts are live on TRChain. Anyone can interact with them directly.

How to use it

The front-end is integrated into the TR-App which is open-source and designed to improve user experience when interacting with smart contracts. Anyone can use the source code to host an interface, or build their own. Hosted interfaces are independent of the TR-App, and should comply with their jurisdictional laws and regulations.

6 TRChain

TRChain is a decentralised cross-chain liquidity protocol which uses the Tendermint consensus engine, Cosmos-SDK state machine (https://v1.cosmos.network/resources/whitepaper) and GG20 Threshold Signature Scheme (TSS).

7 Nodes

TRNodes service the TRChain network, of which there is intended to be initially 7, but can scale to 175+. The design goal of TRChain is such that anyone can join the network with the required funds (permission-less) and be anonymous. TRChain takes this a step further by ensuring, that funds were earned at a Domain (Proof of Domain = PoD) and not bought. Proof of Stake (PoS) serves as a consensus mechanism in blockchain networks such as Ethereum, where participants deposit a certain amount of cryptocurrency (stake) as collateral to qualify as a validator and earn rewards. Slashing acts as a penalty for validators' misconduct, involving the confiscation of a portion of their staked cryptocurrency. While PoS boasts benefits such as energy efficiency and reduced hardware costs compared to Proof of Work, it faces centralization risks; because only a minority of validators operate with their own capital and bear the associated risks themselves. The majority validators has received their capital through a process known as “delegated staking”. Delegated staking allows users who cannot afford their own stake to participate in network rewards by delegating their Ether to validators. However, unlike validators, they have no direct influence on network governance. This threatens the neutrality and permissionlessness of the network as power is concentrated in a limited number of actors. TrueRepublic's domain structure allows the introduction of two additional simple regulations to mitigate centralization risks:

i. Stakingamounts must originate from a domain wallet directly.

ii. The total transfer from a domain to the staking address should not exceed 10% of the domain's overall total payouts.

The first regulation discourages investors from merely buying or lending large amounts of coins to establish numerous nodes. Instead, coins must be earned within a domain through ratings to make them qualify as a stake, ensuring that only active users become node operators later on. In addition, this regulation prevents delegated staking, as borrowed coins don’t qualify. The second rule makes it very difficult and costly to circumvent the first rule: investors cannot simply buy coins and create a “fake domain” to “launder” their coins.

In summary, while delegated PoS can lead to a decrease in coin supply and an increasein price, it comes at the expense of decentralization. Networks with real use cases do not require delegated PoS to create artificial demand at the expense of decentralization. POD offers these networks the ability to achieve security, decentralization and low energy consumption.

8 Appendix

8.1 Prices and Rewards

This chapter describes the calculation of prizes and rewards for activities related to domain activities and staking including variables and default values.

8.1.1 List of global constants and parameters and default values:

c_{dom}	# factor to calculate the initial coin-load needed to open a domain; c_{dom}= 2
c_{put}	# factor for put price (open issue, put suggestion); c_{put} = 15
stake	# stake = 100.000 PNYX
$supply_{max}$	# fix max PNYX supply; $supply_{max}$ = 22 million
c_{earn}	# factor for rewards (voting, stoning); c_{earn}= 1000
apy_{dom}	# initial interest rate for domain coin release per year; apy_{dom} = 0.25
apy_{node}	# initial interest rate for node staking (staking reward) per year; apy_{node} = 0.1

8.1.2 List of global input variables:

fee	# current transaction fee for a standard transaction
release	# number of coins in circulation
$f_{release}$	# fraction of released coins; $f_{release}$ = release / $supply_{max}$
T_{dom}	# approx time interval for domain payouts in years (1 sec = 1/(60*60*24*365.25)
T_{node}	# approx time interval for node payouts in years (1 sec = 1/(60*60*24*365.25)

8.1.3 List of domain related input variables:

treasure	# current number of coins in the treasury wallet of the respective domain
payout	# sum of domain payouts during a time interval (T_{dom})
n_{user}	# number of users in the domain

Minimum price for opening a new domain (initial treasure):

p_{dom} = fee*c_{dom}*c_{earn} eq.1

Reward for a single evaluation (VoteToEarn, RateToEarn):

p_{rew} = treasure/c_{earn} eq.2

Price for putting content:

p_{put} = min(p_{rew}*c_{put}, p_{rew}*n_{user}) eq.3

Amount of interest for a domain per time interval:

$$i_{dom} = min\left(treasure * apy_{dom} * T_{dom} * \left[1 - f_{release}\right], payout\right)$$ eq.4

Amount of node rewards per time interval (fees not included):

$$i_{node} = stake * apy_{node} * T_{node} * \left[1 - f_{release}\right]$$ eq.5

8.1.4 Principals and explanation of the price calculations:

Every activity on the blockchain generates costs (transaction fees). In order to protect the user from net losses through voting (fees are higher than rewards), the rewards (VoteToEarn) must at least compensate for the fees. Because of this, the minimum amount of coins needed to open a domain is calculated as a function of the transaction base-fee (eq.1). Rewards earned over the VoteToEarn mechanism, are calculated as a fraction of the domain treasure (eq.2). If this fraction ($1/c_{earn}$) equals 0.001, the coin load in the treasure must be at least a thousand times the cost of a single transaction in order to compensate the cost to the user. If the value of the treasure is twice that high ($c_{dom} = 2$), the user gets back twice the fee he has to pay. The following formula describes the relationship between treasure drainage (f_d) and the number of user payouts (n):

$f_d = (1/(1 + (1/c_{ear}))^n)$.

We can transform this formula in order to calculate how many payouts are possible before the treasure shrinks to 50% of its initial value ($f_d = 0.5$):

$n = -\log(f_d)/\log(1/c_{earn}+1)$.

So if the initial value of the treasure is 2000 times the transaction fee and each reward equals 0.001*treasure, the compensation point, where the payout equals the fee, will be reached after 694 payouts:

$-\log(0.5)/\log(1/1000+1) = 694$.

Once that point is reached, the domain needs another payload to remain profitable for the user. This can happen through direct payments, interest (token release) over time, or through users posting new proposals (PayToPut).
The idea behind the put price calculation (eq.3) is that the user who wants to make proposals has to pay for the evaluation of his ideas. The put price is a function of the VoteToEarn reward and the number of members in the domain. However, at larger domains with many users, this price would become very high. That's why the number of users considered in this calculation is constrained ($c_{put} = 15$).

Most of the token release occurs via staking rewards (interest) for nodes (eq. 5) or domains (eq. 4). The release depends on the amount staked in node-wallets or the domain treasure as well as the respective APY. In addition, the domain interest is limited to the amount of payout during the respective time interval. This ensures that only active domains get rewarded.