

Goldberg Polyhedron based Crypto-Economic Systems

Goldberg Polyhedron based Voting Systems:

Engineering an Hyper-Scalable Structured Mesh of Atomic Decentralized Independent Economic Entities (ADIEEs) to facilitate and guarantee retribution for a Decentralized Software Workforce while also letting the Community own the Collective Intellectual Property to neutralize any attack vector from hostile actors.

Self-Sustainable Goldberg Polyhedron based Crypto-Economic Systems:

The reason behind the engineering of such Crypto-Economic System is the need for a Universal Solution to scale VR Entertainment and to bring Accessibility to the open metaverse to Everyone, being The Open Metaverse the Censorship-Resistant Network that guarantees the Integrity of every Human's Thought and lets Anyone (or Anything) have Unlimited Creative Freedom.

The Virtual Land dilemma (Scarcity vs Abundance) problem is presented here:

<https://twitter.com/punk6529/status/1439520036704722945?s=20>

The solution (Expanding Goldberg Polyhedron based Metaspaces) is presented here:

https://en.wikipedia.org/wiki/List_of_geodesic_polyhedra_and_Goldberg_polyhedra#Icosahedral

The paper is used to present this Architecture for Crypto-Economic System through a living example:

**Solarity,
The first Alive Virtual World.**

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Abstract:

(Decisional) Power is considered the ability to probabilistically induce a certain evolution of states of a system.

Decentralized Power is Peers' Self-Support based on Objective Data and Symmetrically Shared Ownership.

Theoretical Decentralized Governance is used to map Decisional Power onto a Sphere's Surface (the Surface is Homogeneously Distant from its center) and thanks to Goldberg Polyhedrons we can equally divide this "Sphere of Power" into Fixed Pentagons and Variable (but always increasing) Hexagons.

Using Game Theory we can have higher magnitudes of accuracy on predictions of successful state evolutions.

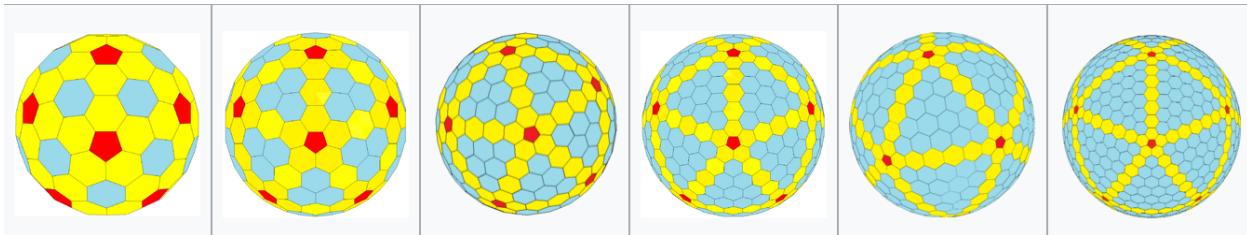
Using a Cryptographically-Secured Chain of (System) States we're able to achieve Immutable, Transparent & Algorithmical Policies.

Welcome to Crypto-Economic Systems.

Decentralized, Immutable, Transparent, Algorithmical & Game-Theoretically Fair Policy Making on a Collectively Owned System.

Goldberg Expansion:

A really convenient Algorithm that enables the creation of two classes, Pentagons (Always 12) and Hexagons (Automatically created through the Algorithm, a really convenient predictable behavior).



This is not only a breakthrough math-rediscovery for Continuous Funding in DAOs but also a really incredibly useful tool to use as the base of a Decentralized Governance System and a really really cool way of having Metaverses Backed by NFTs.

In every of those examples we've witnessed the extremely useful property of Goldberg Polyhedrons to scale Algorithmically & in a Predictable Way.

Goldberg Polyhedrons based Voting Systems:

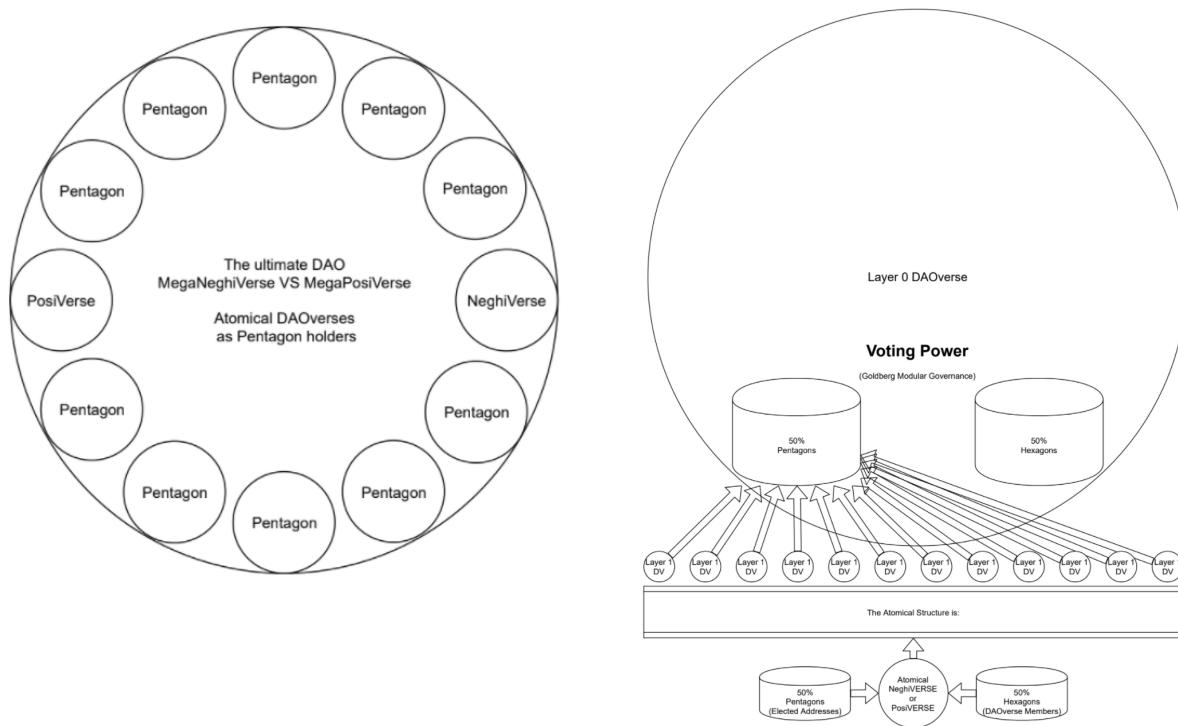
The breakthrough (for DAOs of DAOs Architecture) here is the “Goldberg (Polyhedron) Modular Governance”.

We can have a G.P. based Voting System where the “Pentagons” are other underlying atomic (or recursive) G.P.V.S. that have Hexagons and Pentagons (Pentagons are Elected by the Hexagons).

It's like the logical gate “AND” of two Bits given by Democratic Voting (Land-At-Stakes Model) of Hexagons and the Democratic Voting (One-Vote-One-Head) of Pentagons.

The Recursive Composability of Goldberg Voting Systems makes them the perfect building blocks for the Open Metaverse, offering a Coordinated Decentralization that's perfectly suited for many degrees of application and offering as many layers of governance as needed. (Having G.V.S. as Pentagons of a Bigger G.V.S.)

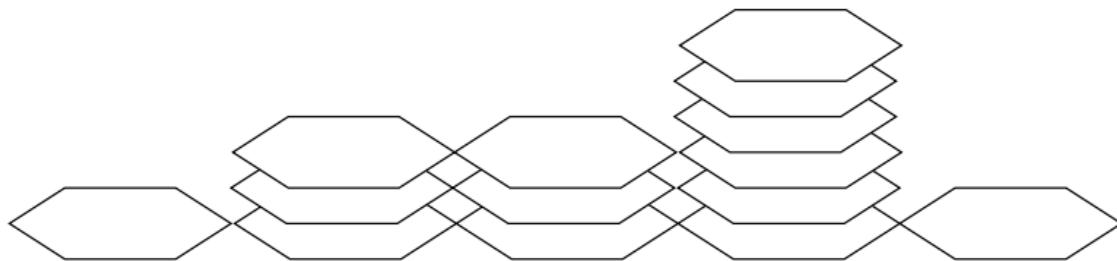
Thanks to the Recursive Composability we can build complex Architectures of Decentralized Governance.



Land-At-Stakes Model for Hexagons Governance:

(Land-At-Stakes Model where Goldberg Upgrades count as Voting Power)

Have a function that allows the Hexagon holder to Increase its Voting Power by contributing to a Public Cause.



In the practicality: Let users buy additional & equal Volumes (3D Land NFTs) of Voting Power by allowing the creation of such new Voting Power, Automatically from a Smart Contract that Mints the new Land Volume and transfers the Economic Value Exchanged for the Voting Power to the commonly owned Treasury.

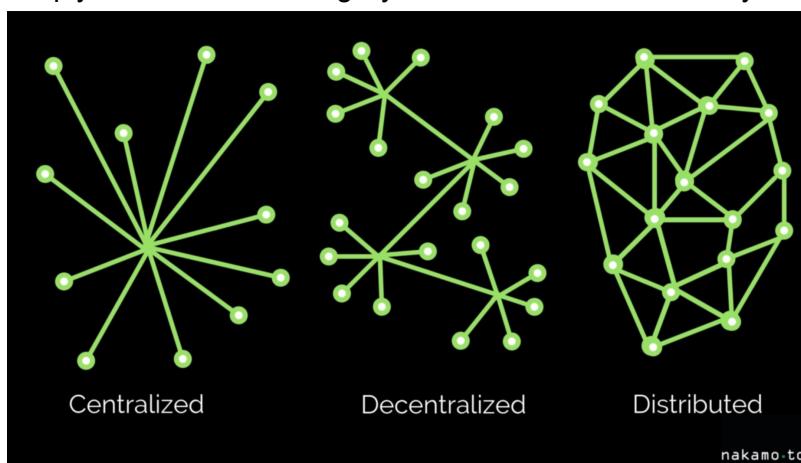
This Model of Governance is extremely useful when the Intellectual Property produced with an “unethical” but really effective transformation from Economic Value to Negentropy is Owned by the Universal Collective above any other, the Human Civilization.

(Means if Everything is OpenSource)

One-Vote-One-Head Model for Pentagons Governance:

(One-Vote-One-Head Model where each & every address have equal voting power)

Simply a Distributed Voting System where each and every Pentagon has Equal Voting Power.



GPVS Architectures

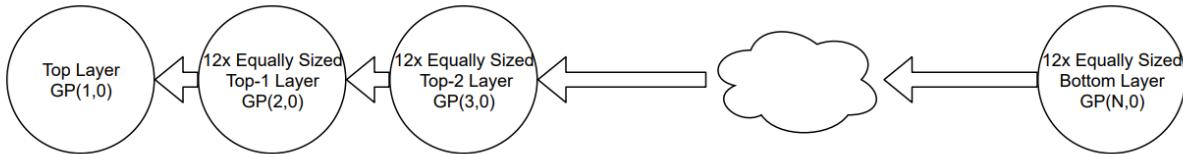
Goldberg Polyhedron based Voting Systems
Architectures explained:

Number of Governance Layers: N

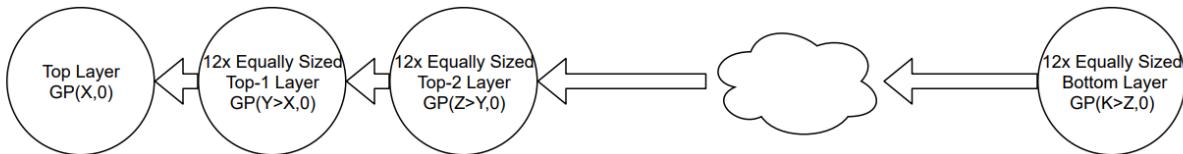
Total number of voting systems: $\Sigma(12^i)$ i from 0 to (N-1)

Total number of Hexagons in all Systems: $\Sigma(10X^2+2-12) X$ for each Polyhedron

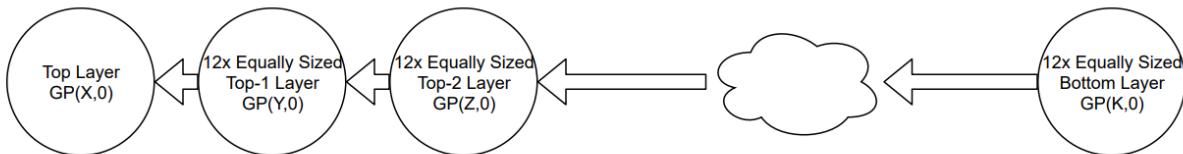
Fully Ordered Reversed-Hierarchy:



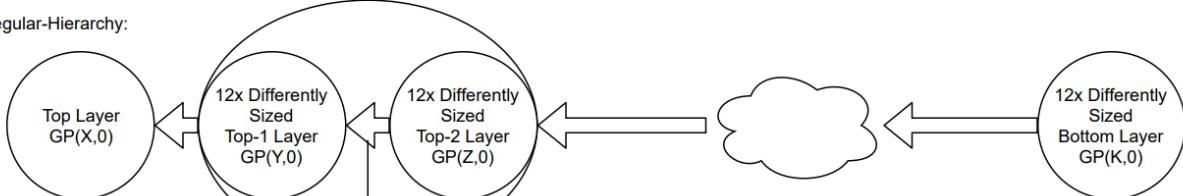
Reversed-Hierarchy:



Regular-Hierarchy:



Regular-Hierarchy:

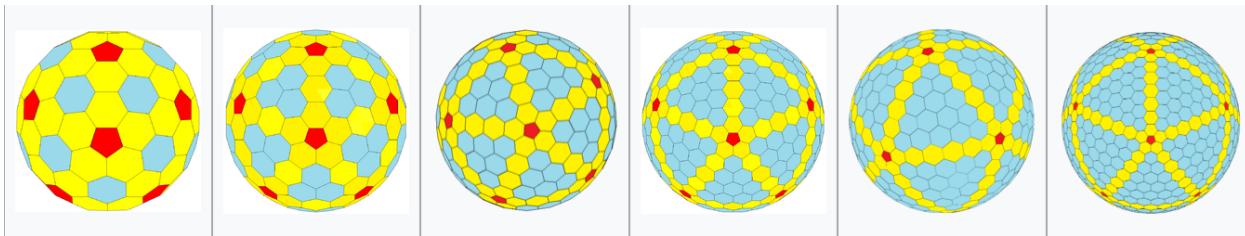


A= Physical Voting System
B= Virtual Voting System

Goldberg Ballot:
1) Hexagons Vote to Elect 12 Pentagons
2.A) Hexagons Vote to Elect 1 Pentagon To Be Sent Above
2.B) 12 Pentagons Vote and the Democratic Result Signal is sent Above

Goldberg Fractionalization:

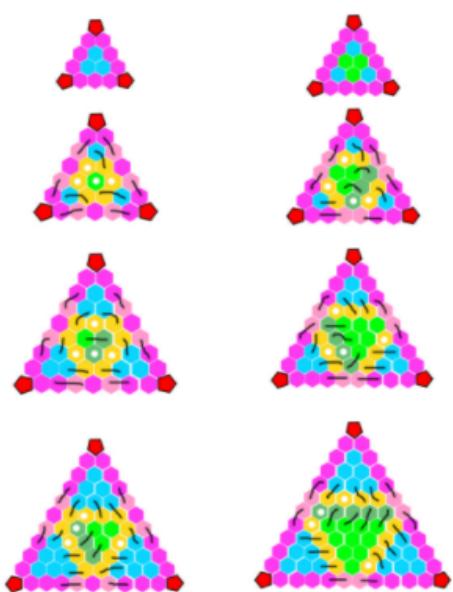
The breakthrough (for NFTs Fractionalization) is the expandability of Goldberg Polyhedrons:



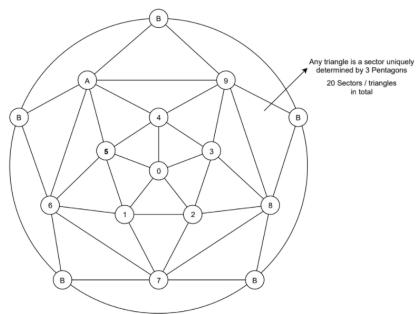
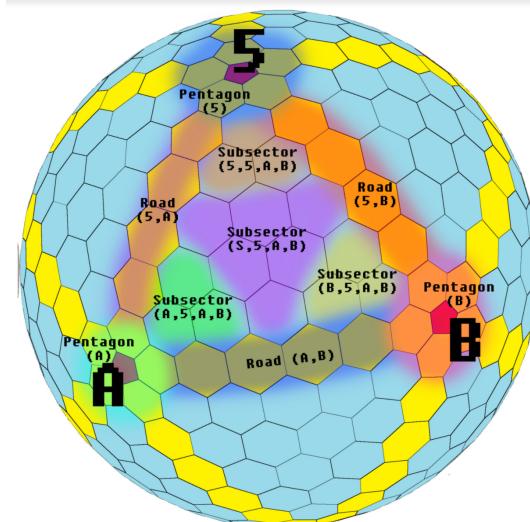
Again, we can assign [X%] Ownership of an NFT to a Fixed Quantity of 12 Pentagons (can either be another NFT-Backed G.P.V.S. or Addresses) and [(100-X)%] Ownership of the same NFT to Hexagons that can be Expanded Indefinitely (eg: A growing Fan-Base/Community).

This feature enables the creation of Spherical Virtual Worlds (G.P. based Virtual Worlds) that have a theme at its core, like the story of the life of Punk #6529. Some “Rights” can be diluted to growing Hexagons and to the fixed 12 Pentagons, and the Planet could Expand whenever its Community wanted.

There are really Infinite Applications for Goldberg Polyhedrons.



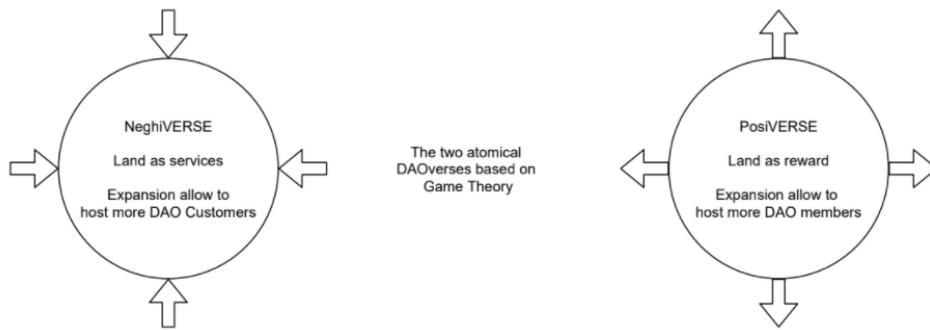
(This is an example of the expansion of a “Triangular Sector” in Goldberg Polyhedrons)



This is a Graph Representation of Goldberg Polyhedrons.

DAOverses:

The breakthrough (for a Huge VR Metaverse Running on Solana) is finding the perfect Symmetrical Atomic DAO Architectures (for the Love of the Loss Function) that are:



In Neghiverses we have a Subscription Model (Using Land Dynamism) that is:

>Layer 0: Basic Subscription Plan (Tinder Premium)

>Layer 1: +1 Subscription Tier (Tinder Gold)

>Layer N: +N Subscription Tier

The Economic Value is “Catalyzed” towards the Treasury from components outside the system.

(NegiVERSEs are For-Profit Virtual Worlds)

In Posiverses we have a Contributors Model (Using Land Dynamism) that is:

>Layer 0: Good Normie

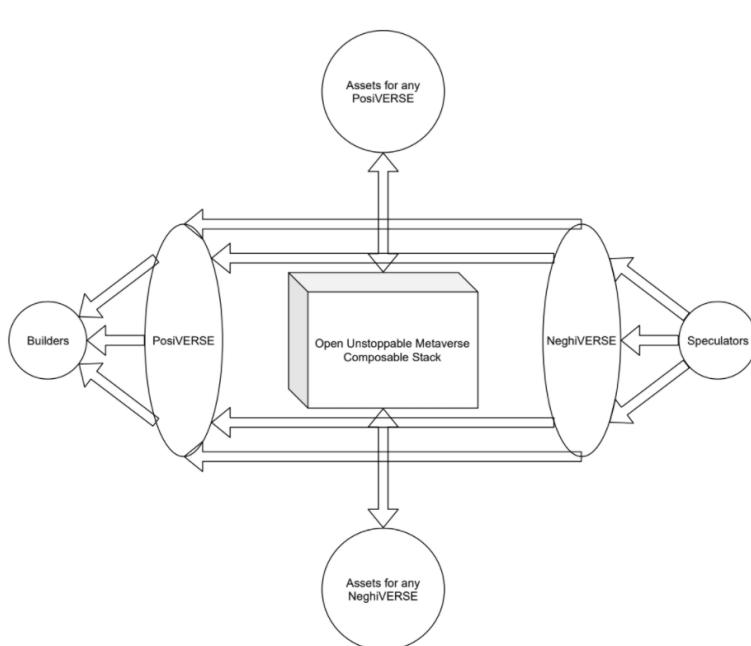
>Layer 1: Bro

>Layer N: Grand Master

The Economic Value is “Dissipated” towards each Contributor, from the common treasury to each & every component inside the system, equally.

(PosiVERSEs are NOT-For-Profit Virtual Worlds)

The exchange between PosiVERSEs and NegiVERSEs will usually be an exchange of Intellectual Property for Economic Value.



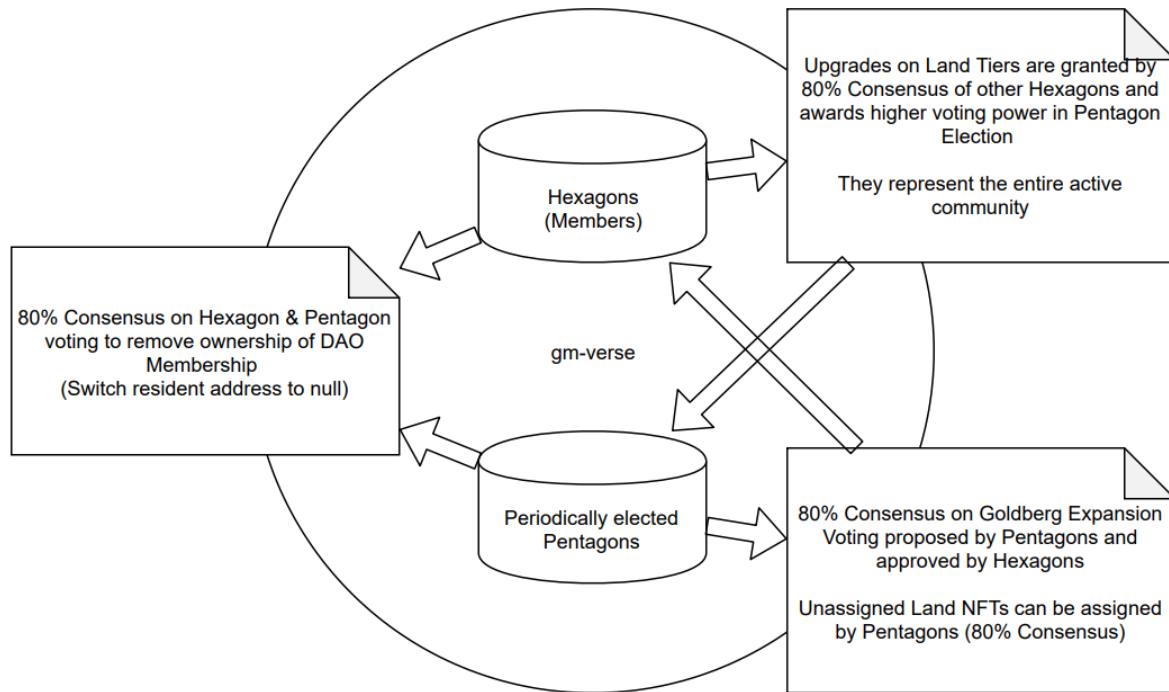
If every builder agrees on a censorship-resistant truth layer (that also happens to be the fastest and cheapest) they can invest their Collective Intellectual Property so that its way easier to Compound Knowledge with the Future Generations.

Also, it's gonna be super cool once we have built A SINGLE SDK to let every DAO using the G.P.V.S. model a way to own a 3D VR metaverse in Solana's Galaxy.

The Most Efficient Non-Profit DAO:

The gm-verse, representing Solarity's community of builders and creators.

Reputational Tokens System

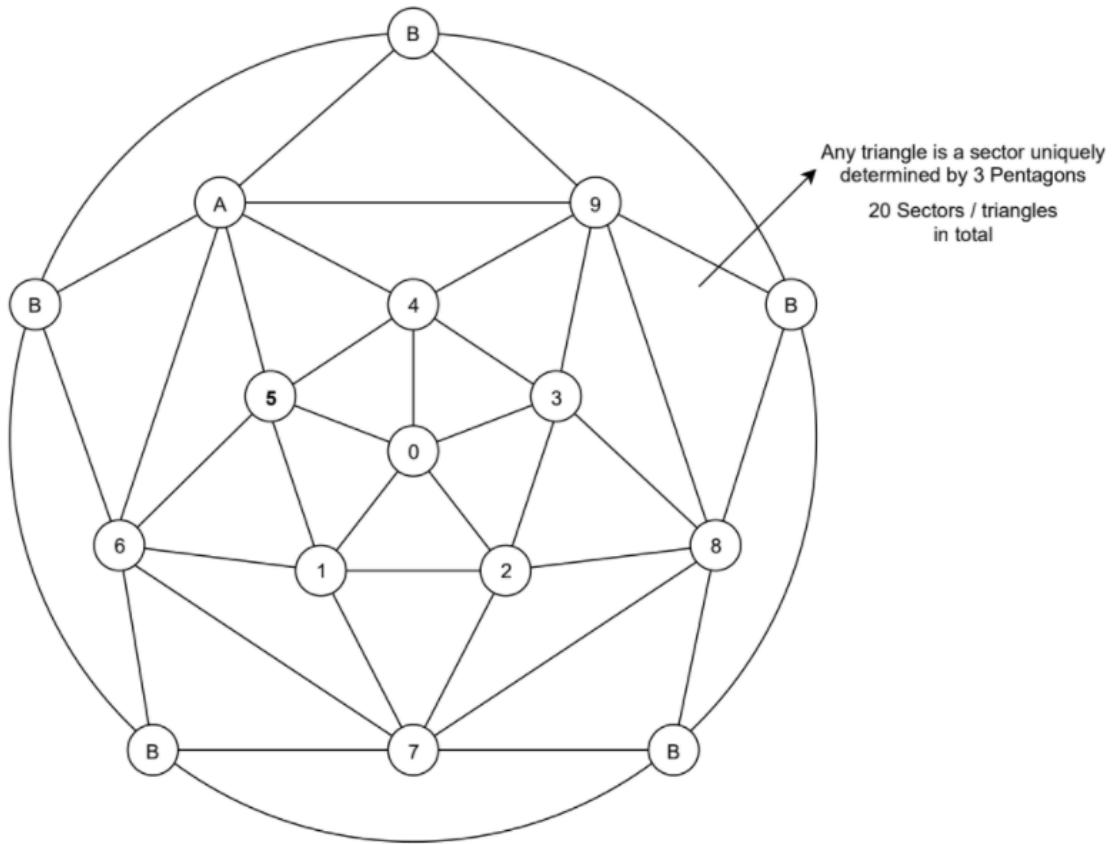


The Perfect DAO of DAOs:

A NeghiVERSE Model with Periodically Elected PosiVERSEs as Pentagons:

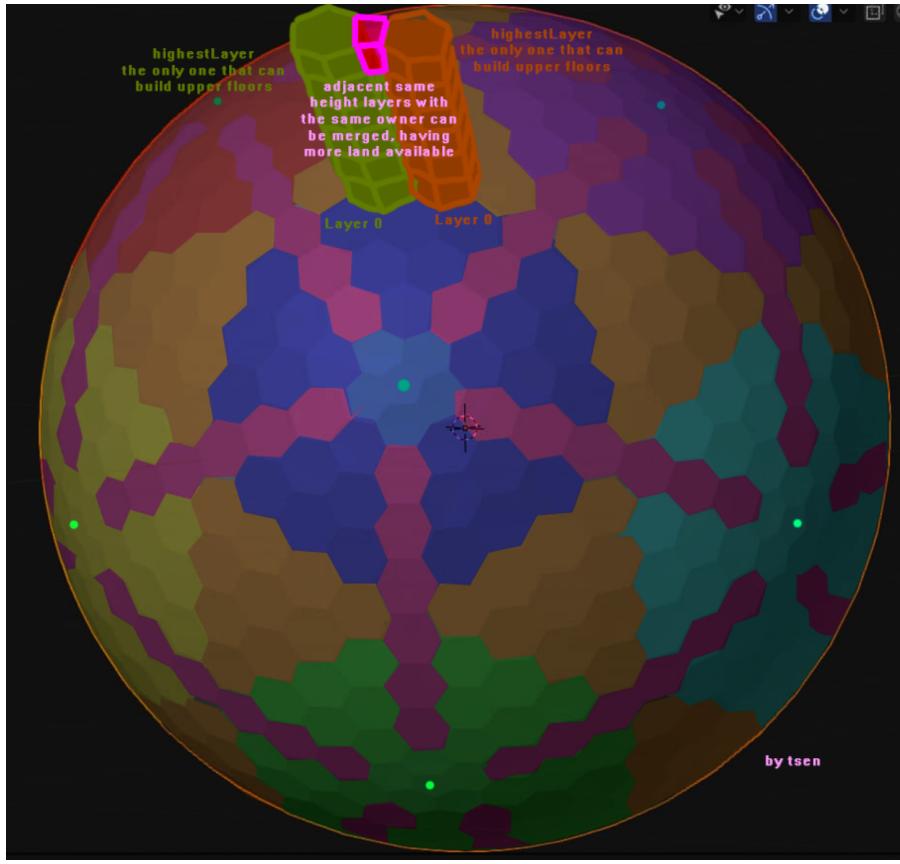
(Land as Software Governance & Goldberg Funding)

The perfect DAO (at this stage in Crypto, where much is to be built yet) is a DAO in which participants can Periodically Elect some Representatives (Pentagons) and use the Land Upgrade Function to Fund the Elected PosiVERSE that have the “Control” of the Pentagon for the duration of the Election (a G.P.V.S. that's composed of a Team to satisfy the NeghiVERSE's Desires).



Here's the graph representing any Goldberg Polyhedron, Nodes are Pentagons.

(There's only one B Node)



To clarify, let's consider this Colored Goldberg Polyhedron.

The "Blues" have a certain Area of Influence

(fixed disposition, all Areas of Influence are expanded equally if the World is expanded)

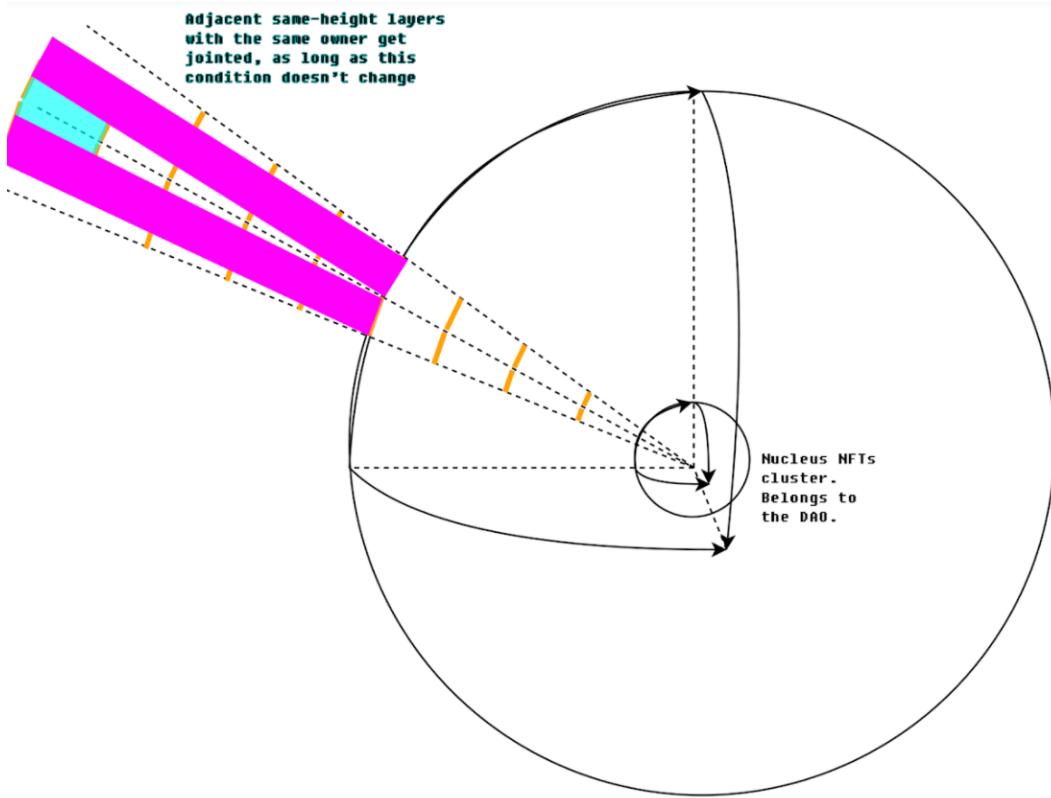
At the center of the Blues' Area of Influence there's a Pentagon
(one of the 12 that any Goldberg Polyhedron because of Geometry)

- 1) The Blue Hexagons Vote to elect a DAO of Builders (a PosiVERSE)
- 2) The Blue Hexagons that Want, Can upgrade Land to have both a bigger Volume to be utilized in a VR World but also Additional Voting Power for Software Governance.

The process is repeated indefinitely.

(The Additional Voting Power from Land Upgrades doesn't influence the Election of the PosiVERSE because for the Election, only Layer 0s Hexagons can vote.

Land is used for Software Governance and Agile Decision Making)



The cool part is that by design, upgrades are constructed extending the Hexagon Surface Perpendicularly to itself. This way (the Pink part in the Scheme) Volumes are of the Same Size and People are Incentivized to Own Adjacent Same-Layer Volumes because you get the Volume of "Floating Air" that's between Volumes.

This way you get more space for free. (This doesn't influence Voting)

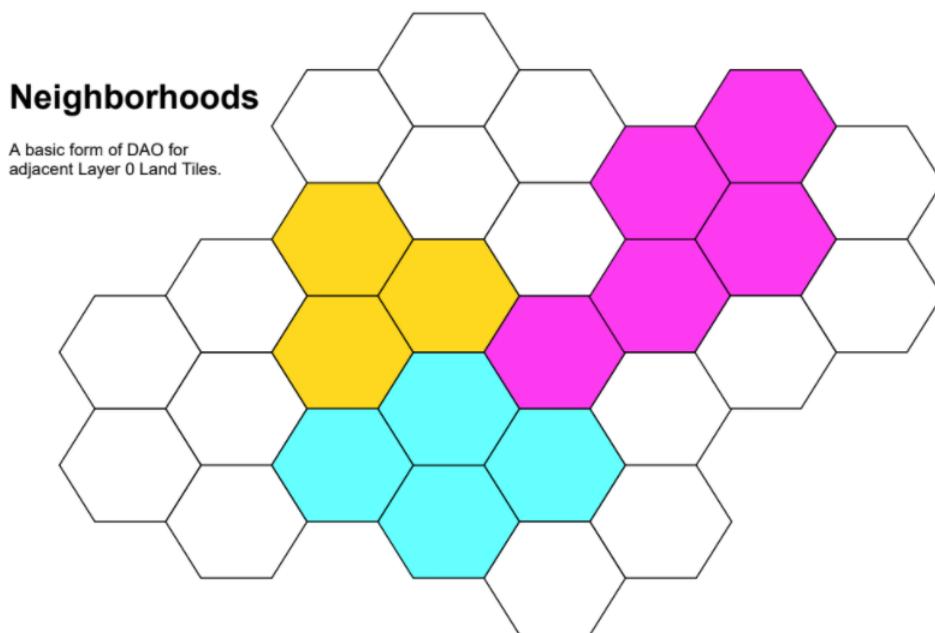
A Self-Assembling World:

Since the entire World is built using just 1* kind of Equal Land Parcels, it's suited to Self-Evolve and Assemble as its Users want.

(A consequence of choosing a perfectly regular structure such as the Goldberg Polyhedron)

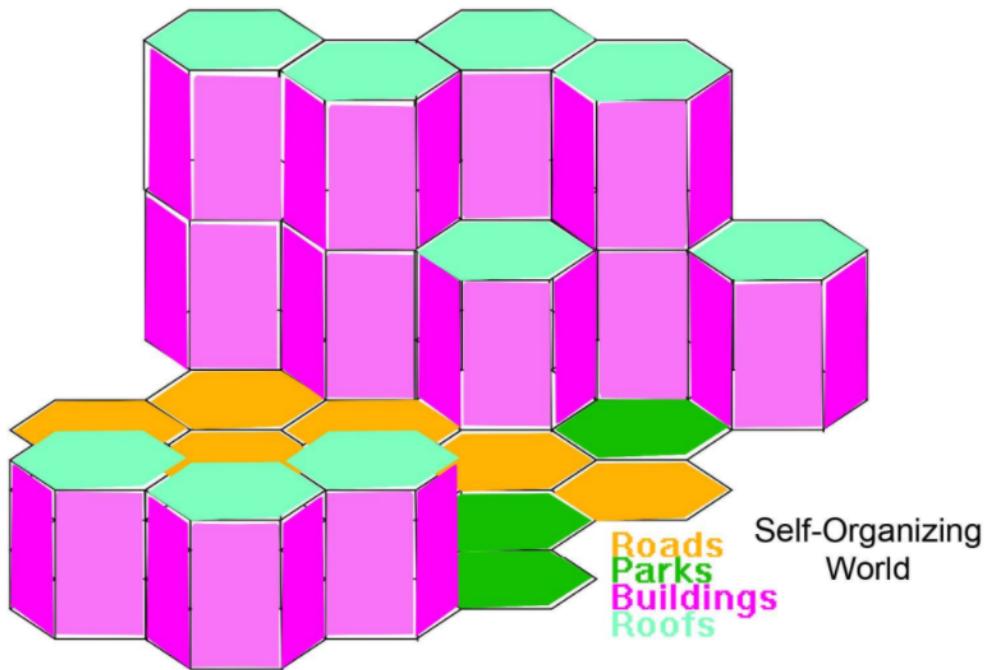
Solarity's users can Self-Organize in Neighborhoods, a primitive form of a DAO, at the moment the only use of a Neighborhood is to sell a cluster of Land together.

(If Rough Consensus is reached)



*(2, we also have Pentagons but in Solarity for example we'll have 3'147'212 Total Land Parcels but only 12 Pentagons, so the world is pretty much Equal Hexagons)

This is an overview of how the world will look like:



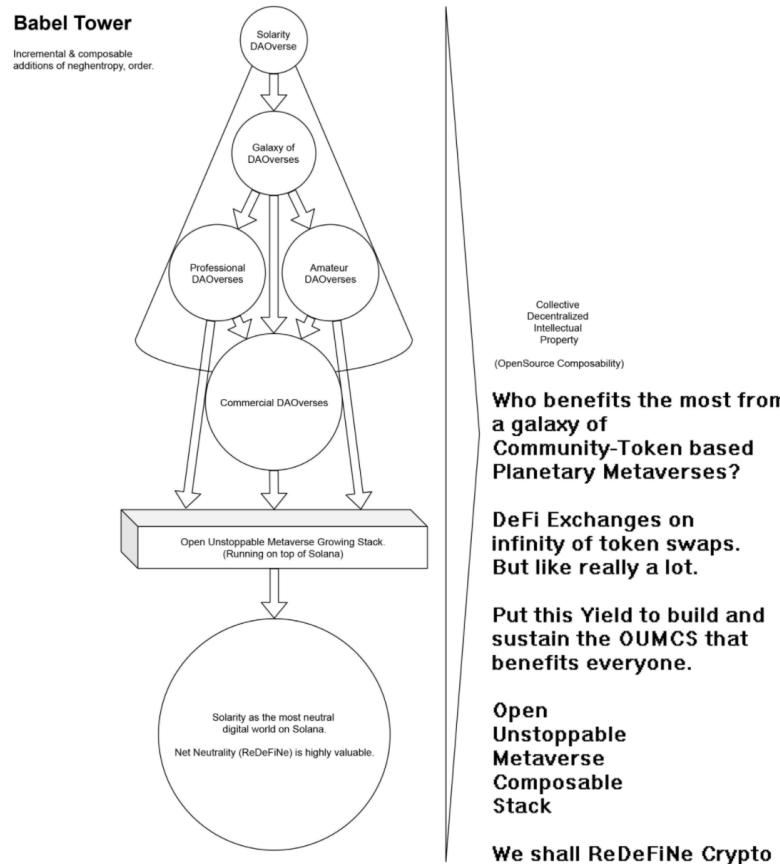
- 1) Roads are public Layer 0 Tiles that enable Users to move freely inside the Virtual World. They are the main carriers of Users Attention.
There are 30 Roads interconnecting all of the 12 Pentagons in Solarity and Users can build more Roads to capture Users Attention and redirect the flow towards their buildings. A lot of planning is advised if LandOwners want to achieve Peak Land Performance.
- 2) Parks are basically just Roads but Green. Their Purpose is to Maximize Buildings Value & Users Attention Rate of Engagement. This is the Times Square Effect.
Lots of Screens and Skyscrapers with a Layer 0 Square at its middle to Amplify the Rate of Engagement.
(Skyscrapers have more visibility if their sides aren't covered by other skyscrapers)
- 3) The Pink Buildings are Volumes of Land of which Land Owners can do pretty much all they want. This includes having Private or Public Buildings (Permissionless Virtual World).
Buildings can be composed and a Continuous World can emerge from a Discrete Structure.
- 4) Roofs are the Highest Existing Layer in "Hexagon based Skyscrapers".
Roofs are gonna be used when Energy & Resources Scarcity is introduced into the World.

A Self-Organizing Galaxy of Atomic Decentralized Independent Economic Entities:

(That can also effortlessly become Algorithmically Expandable Land-based Virtual Worlds)

Hyper-Scalability is what was prioritized in Solarity's Design.

Our Governance Structure combined with Virtual Worlds will bring a Cambrian Explosion of different and Exotic DAOs to Solana using the Incredible Composability of Goldberg Voting Systems.



It's crucial for the success of Solarity that the Metaverse becomes a Structured Mesh of Atomic Decentralized Independent Economic Entities.

Goldberg DAO-VERSEs (VR Land + Land Governance) serve this purpose specifically since this is a really convenient way to have a Public Treasury with Public Balance to Ensure the Fees Collection to keep the Platform Independent and Self-Sustainable.

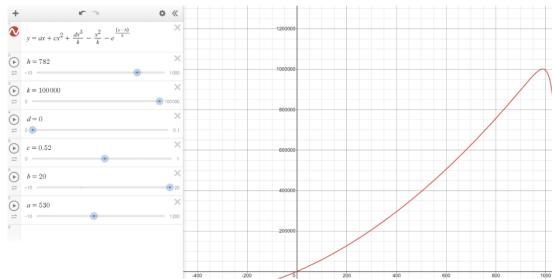
This is vital to achieve the Status of Absolutely Neutral Platform.

Each & Every DAO-VERSEs Contribution will be added to the Collectively Owned Stack of Intellectual Property: the Open Unstoppable Metaverse Composable Stack.

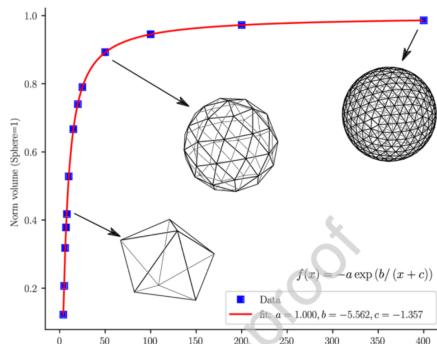
How do we facilitate this transition?

Using a DAO-VERSEs Launcher Application that will let anyone Create & Govern its Goldberg Polyhedron based Crypto-Economic Systems.

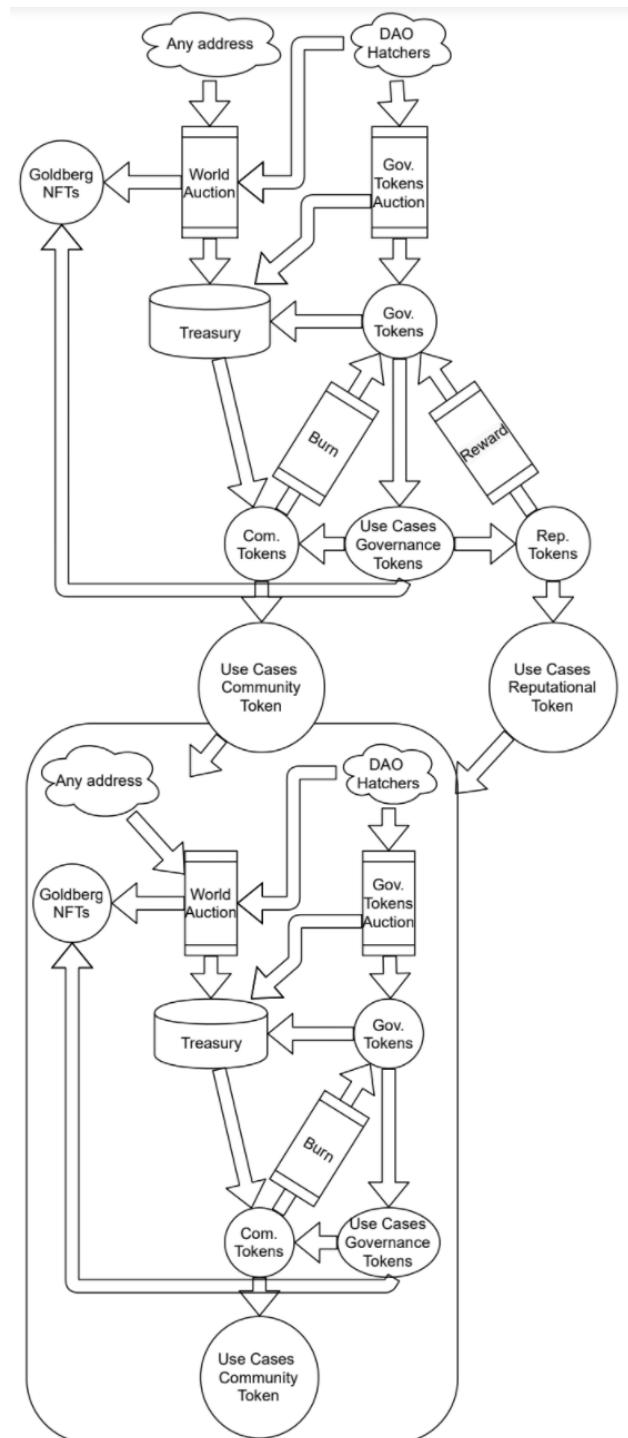
This will be done using a Cost Function that will require an X amount of Community Tokens to be Burned to create the Desired Size Token-Based Planetary Metaverse.



Funzione per Costo di Goldberg Poliedro in base al GP(x,0) dove x e' il numero di tiles piu' corto tra un pentagono e l'altro.

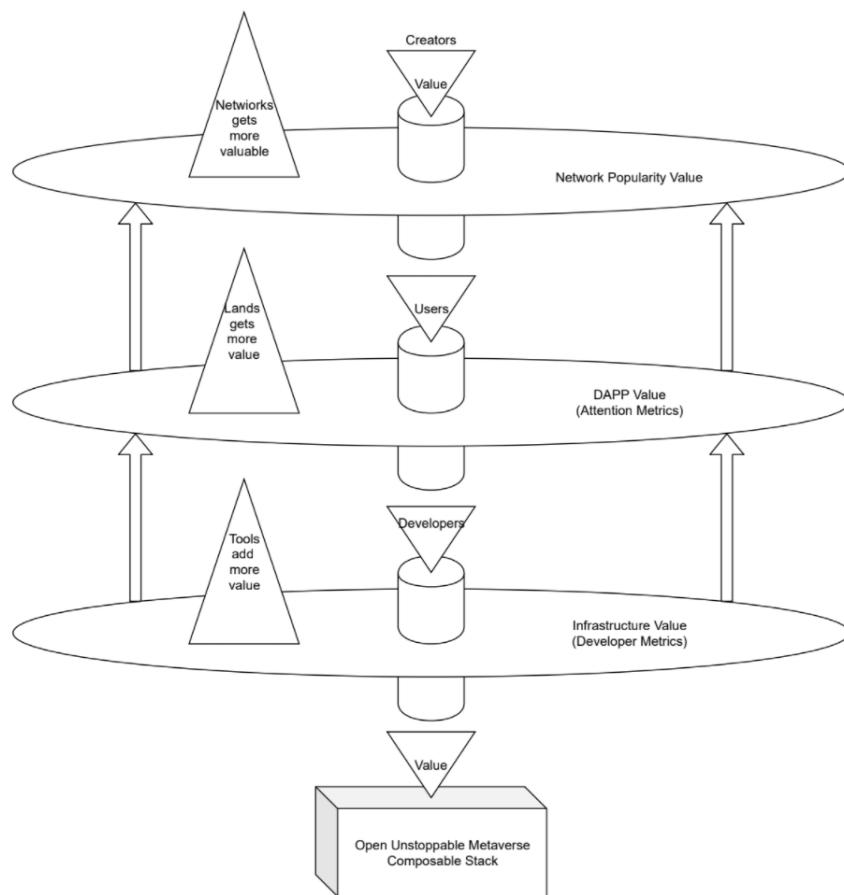


It's easy to imagine that this Innovation will do for Metaverses on Solana what ICOs did to Ethereum, open a door with Infinite Possibilities.



Land Upgrades as Ecosystem Development Funding:

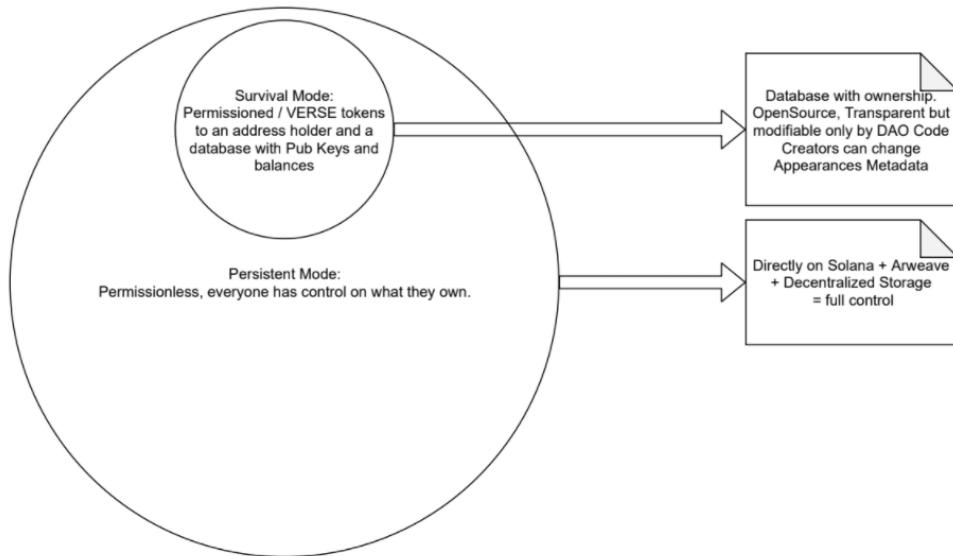
This is an Overview of what happens with Goldberg Funding



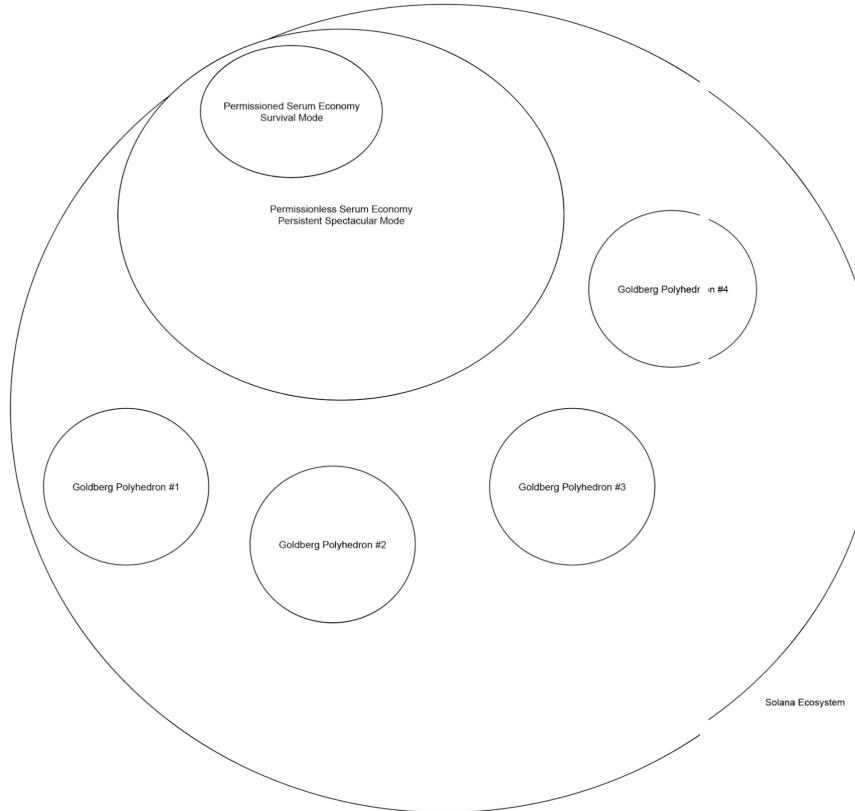
- 1) At the foundation of Solarity's Metaverse will be the Open Unstoppable Metaverse Composable Stack.
- 2) At the foundation of Solarity's DAPP will be Infrastructural Value Added (Tools Compounding).
- 3) Due to the Observed Phenomena of Virtual Land Value Appreciation, Solarity empowers the Ecosystem with the Most Efficient Modular Governance & Goldberg Funding while also letting the Virtual Land capture most of the Value of the Metaverse's Economy. This is a Win-Win Scenario for People that have interests in the Development of the Solana Ecosystem since they get to help the Ecosystem to Grow while also obtaining Subjectively-Valuable Virtual Land.
- 4) The Surface Effect is that if Solarity becomes the Peak Performance Metaverse it's being engineered to, this will increase the Network Value of all the Solana Ecosystem and Every Ecosystem's Protocol.

Solarity's Virtual Economies (Leveraging on Scalability):

Solarity will have 2 Main Meta-Economies.



The Survival Mode Economy, a Permissioned Economy, and the Persistent Mode, a Permissionless Economy. (They are explained later in this paper)

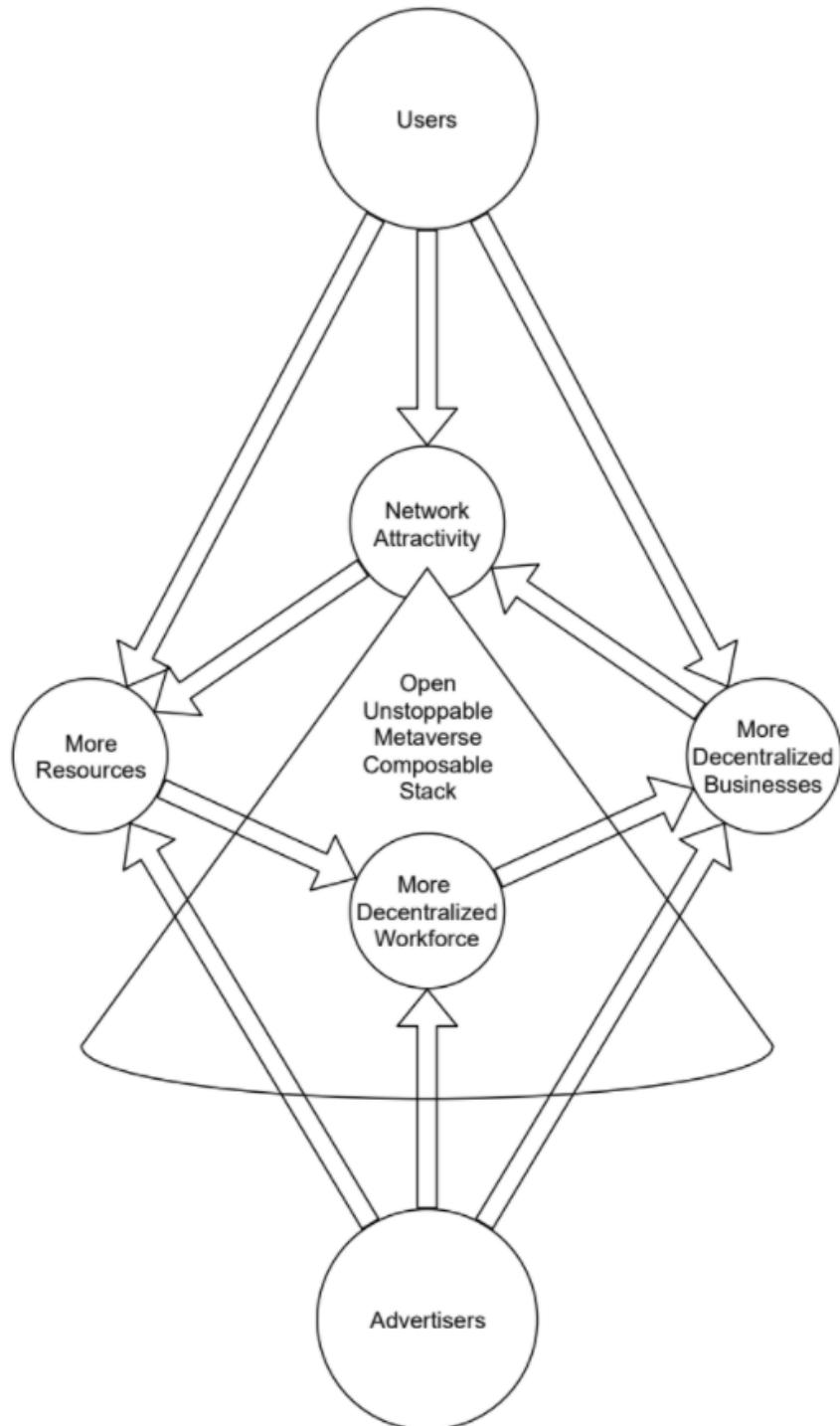


This is an overview of the Meta-Economies that could populate the Solana Ecosystem if everyone used a Goldberg Crypto-Economic System.

(Everyone could have Customized Solarity-Like Virtual Worlds and Token-based Economies)

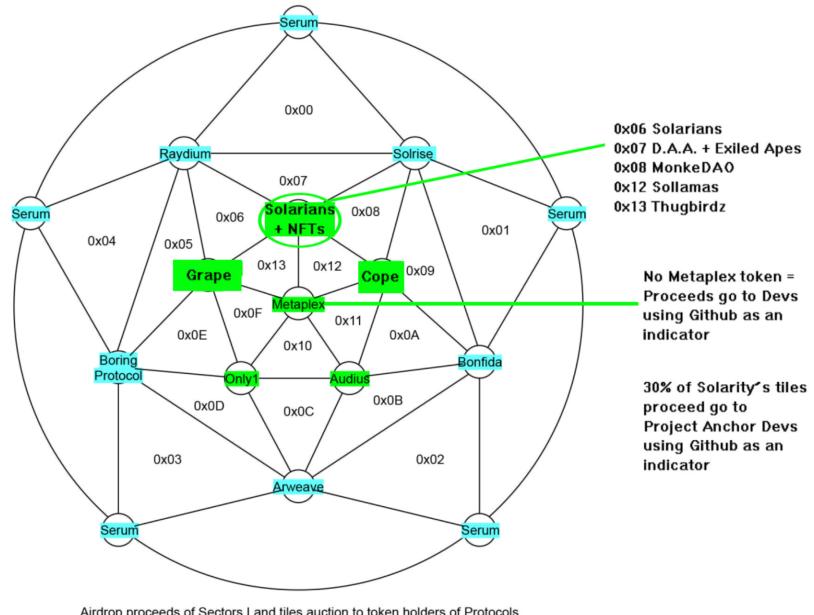
Law of conservation of Information:

It's hard to imagine the Short Term benefits of Solarity but its Effects will only get more Perceivable with time as the Open Unstoppable Metaverse Composable Stack grows and every new DAO-VERSE compounds its Intellectual Property Creation with the rest of the Stack.



Action Plan:

Strategic Protocol Synergies in the Solana Ecosystem:



Here's a List of Synergies between Solarity & Pentagon Protocols:

Serum: Market Engine for Solarity's Economies & every other VR Planet Economy.

Raydium: Exchange for every new VR Planet's Token.

Solrise: Have VR Buildings for Funds Managers that host Solrise Funds.

Grape: Construct the Social Network Backbone for the Metaverse.

Cope: Cope is cool.

Metaplex: Construct the Solana Metaverse's Backbone.

Boring: Build the Privacy focused Network where the Metaverse Data will travel on.

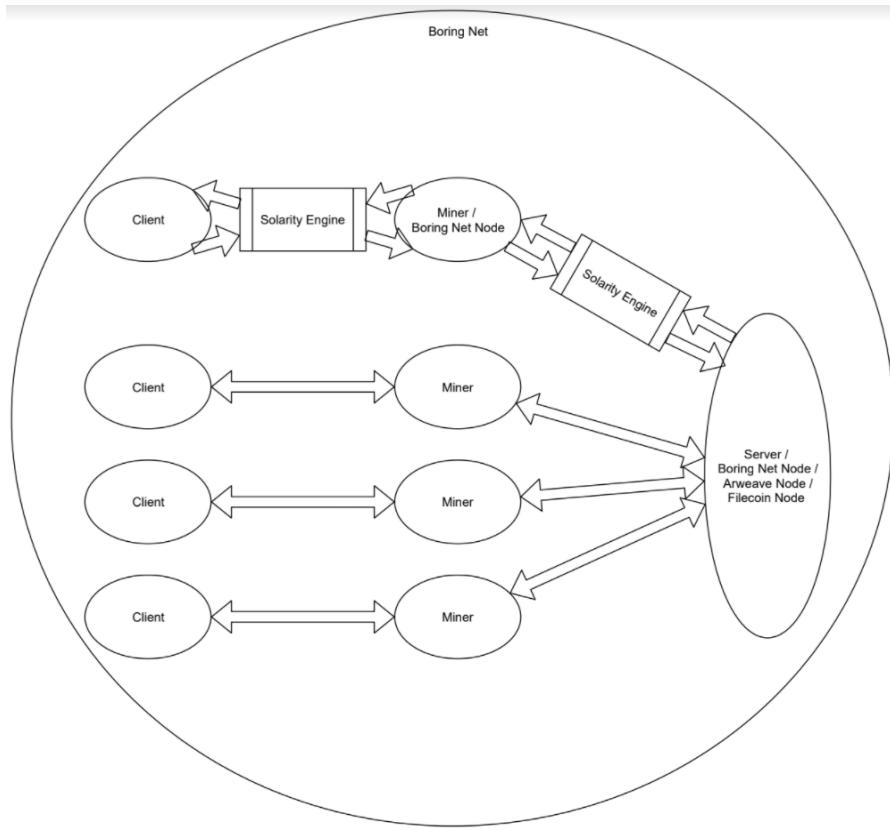
Only1: Construct the Social Network Backbone for the Metaverse.

Audius: Be the Decentralized Sound Provider of the Metaverse.

Bonfida: Use Solana Name System as Username System for Solarity.

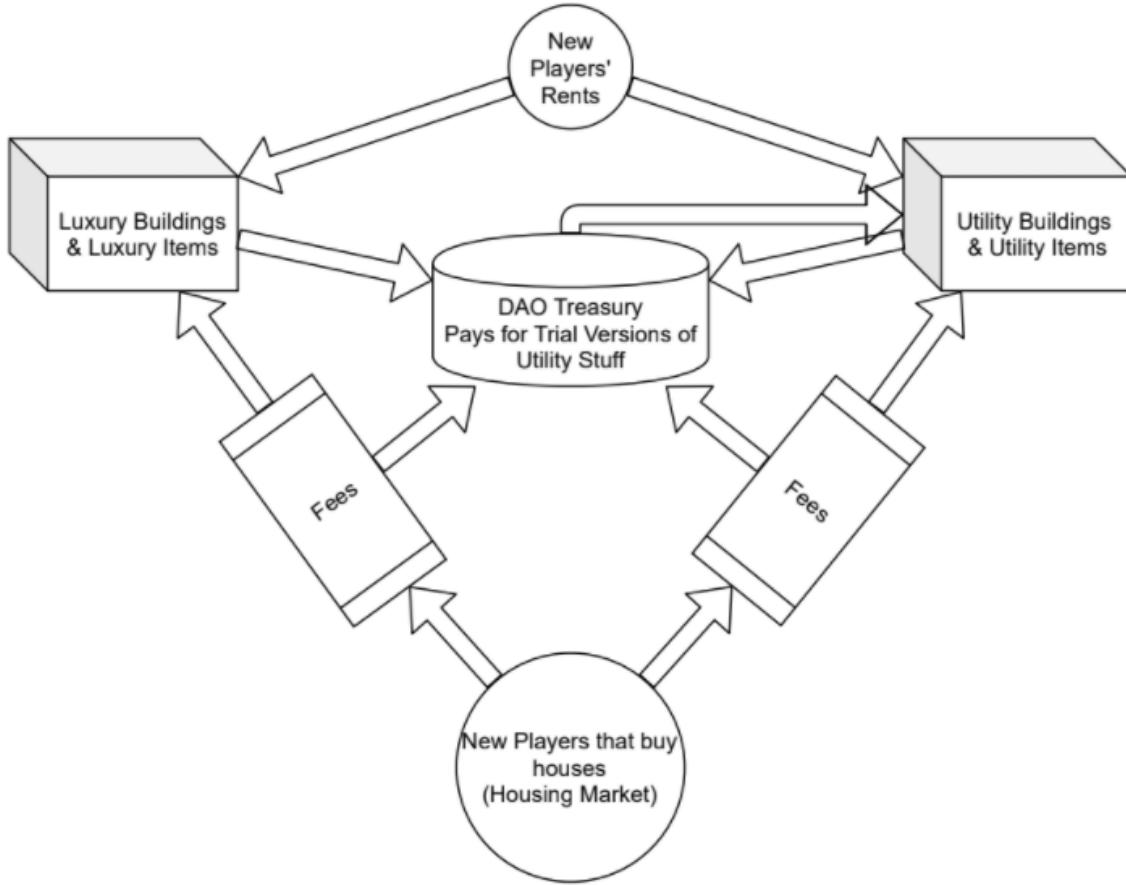
Arweave: Arweave is as important as Solana for the open Metaverse.

Possible Boring Protocol Ecosystem Synergy: (Tier 2 Metaverses)



Solarity's Miners would also be Boring Network Nodes, this would be beneficial for both Solarity & Boring since more nodes would mean more Performance & Safety.

Digital Nations Concept & Digital Passport (Land NFTs): (& Overall discussion about Luxury approach (Flexers) vs Utility approach (Game Enjoyers))



Land in NeghiVERSEs (Solarity) is an Access Token for the Virtual World that it's representing.

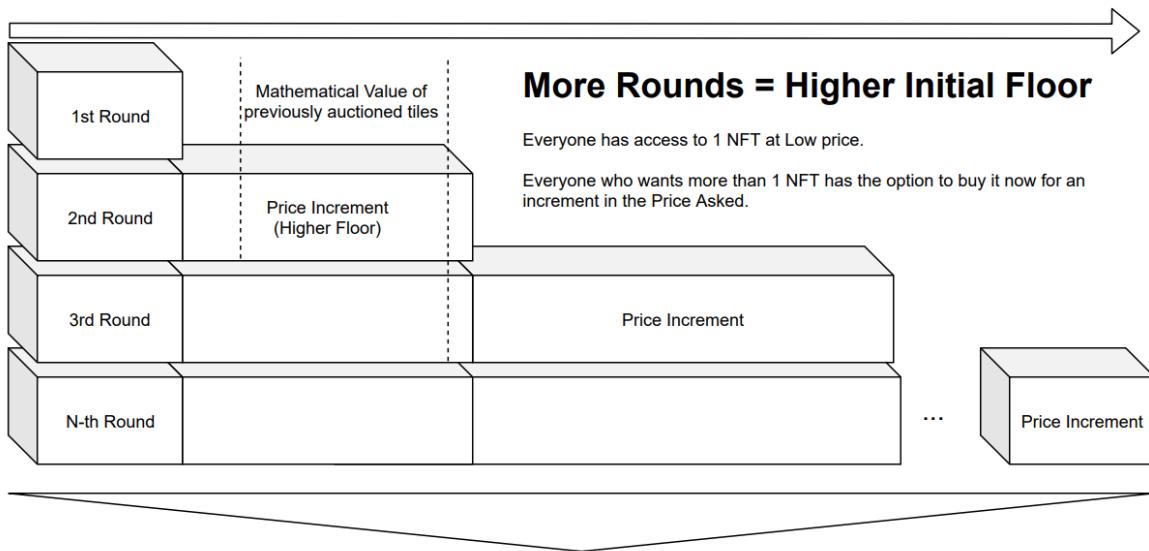
It's way easier to think about it in terms of (Planets) Digital Nations and (Land) Passports, Non-Fungible Access Tokens, NFATs.

Since we don't want anyone left outside of Solarity, we'll let the LandOwners Lend their Land to offer the "Passport" to other Players that will be able to enjoy Solarity without owning Land. New Users will be presented with the choice between Luxury Buildings and Utility Buildings.
(This opens the doors to a Huge Land-as-Collateral Applications)

Solarity will Sponsor some Utility Buildings Owners to pay them the Rent to offer Free Accesses to New Users.

Like in every other Economy, Solarity will have a Luxury Market and a Utility Market. Luxury Assets will differ from Utility Assets mainly in the Price Metric & in the approach to Market Distribution. Luxury Items will be Pricey and feel Exclusive (a Highly Curated Experience) while Utility Items will be Cheap and feel useful (The minimum needed to enjoy the game).

Land Auction Walkthrough:



The Land Auction will be pretty straightforward:

- 1) Each Address can Mint ONLY a single NFT Land for each Auction Round.
- 2) Each Auction Round lasts 1 hour.
- 3) Each Consecutive Round makes the Land NFTs More Expensive to be Minted.
- 4) The Auction is over if nobody Minted a Land NFT in the last Round.
- 5) At the end of the Auction, Un-Minted Land NFTs will become “Natural Reserves” that will have a special Use-Case in Survival Mode.
- 6) As soon as the Land NFT is Minted, it fully belongs to the owner address.

This is the total amount of NFTs in Solarity's World:

$$X, Y, Z = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B\}$$

$$X, Y, Z, T = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, S\}$$

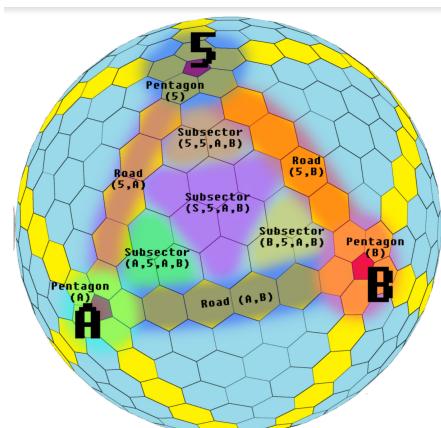
$$\text{Pentagons (X)} \Rightarrow 12 \times 1 P + 60 H1$$

$$\text{Roads (X,Y)} \Rightarrow 30 \times 558 H1$$

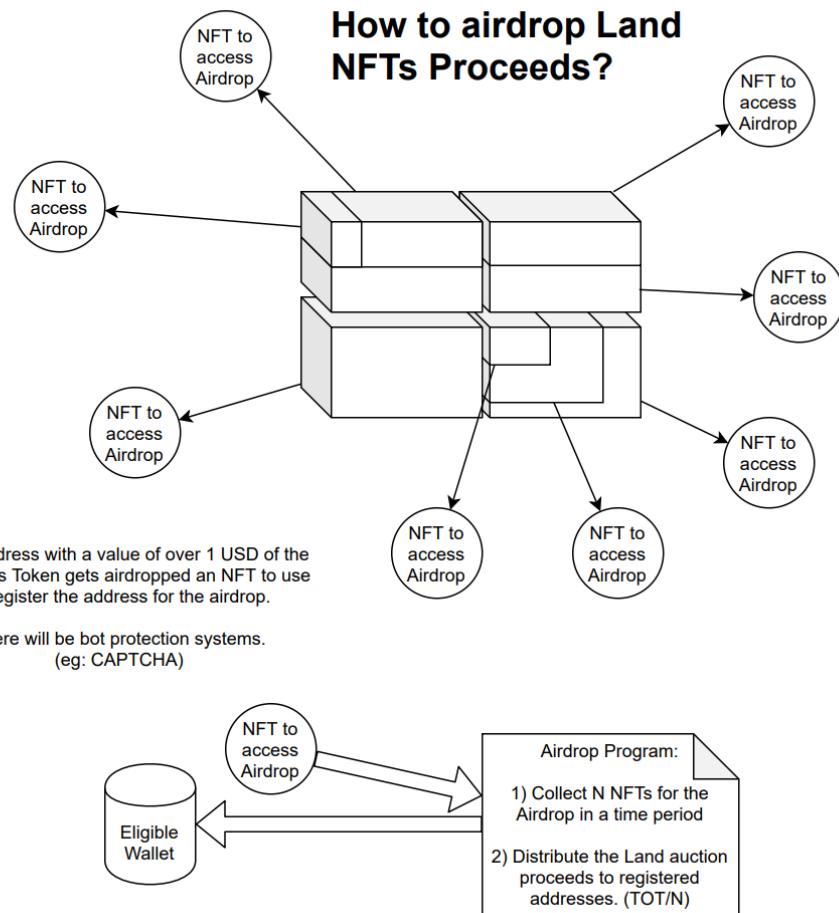
$$\text{Sectors (X,Y,Z)} \Rightarrow 20 \times 156520 H2 \text{ (contain Sub-sectors)}$$

$$\text{Sub-sectors (T,X,Y,Z)} \Rightarrow (60 \times 38781 + 20 \times 40177) H2$$

$$\text{Total: } 12 P + 16800 H1 + 3130400 H2 = 3147212 \text{ NFTs}$$



Airdrop to Pentagons Token Holders:



The proceeds of the Land sold in Areas of Influence of Pentagons (Protocols), will go entirely to the community of that Pentagon (Protocol).

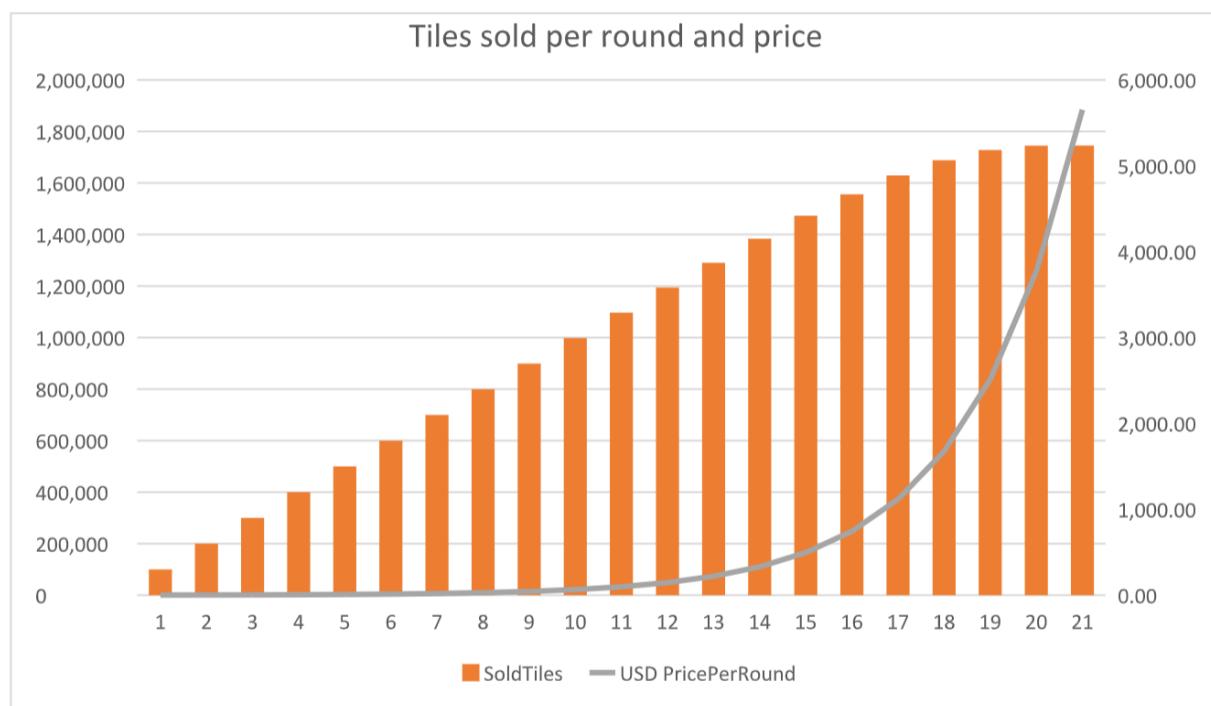
We'll have a snapshot of Token Holders Holdings and we'll airdrop an NFT to let users claim the "Airdrop".

We estimate a potential participation to the land auction of 100.000 people, based on similar initiatives in the past.

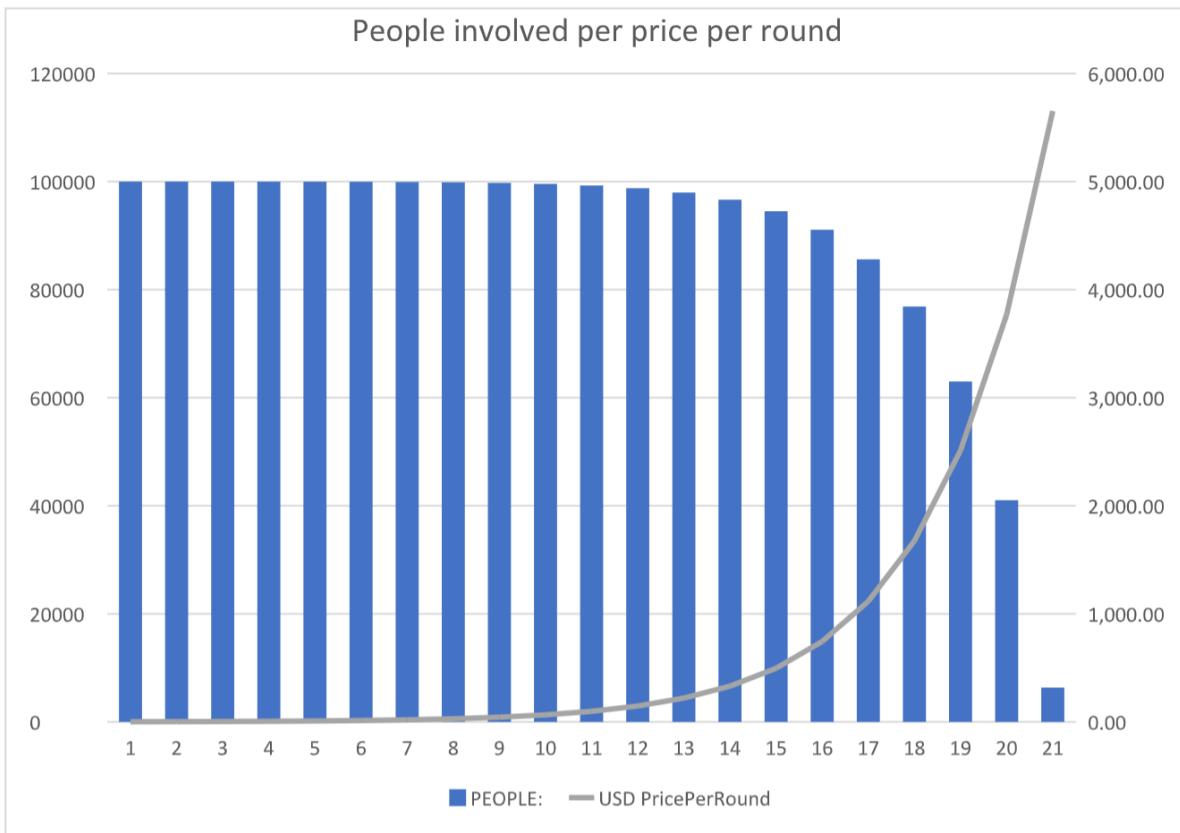
Taken into consideration the gradual increase of the single tile's cost round after round we created a probabilistic model that forecast the participation to each round and therefore the potential outcome of Solarity's land auction.

According to our estimates most number of round will be 21, after which no one will keep bidding due to the high parcel unit cost.

The amount of tiles sold should increase regularly until hitting price level around the 2.000\$ treshold, after which sales will flatten out.



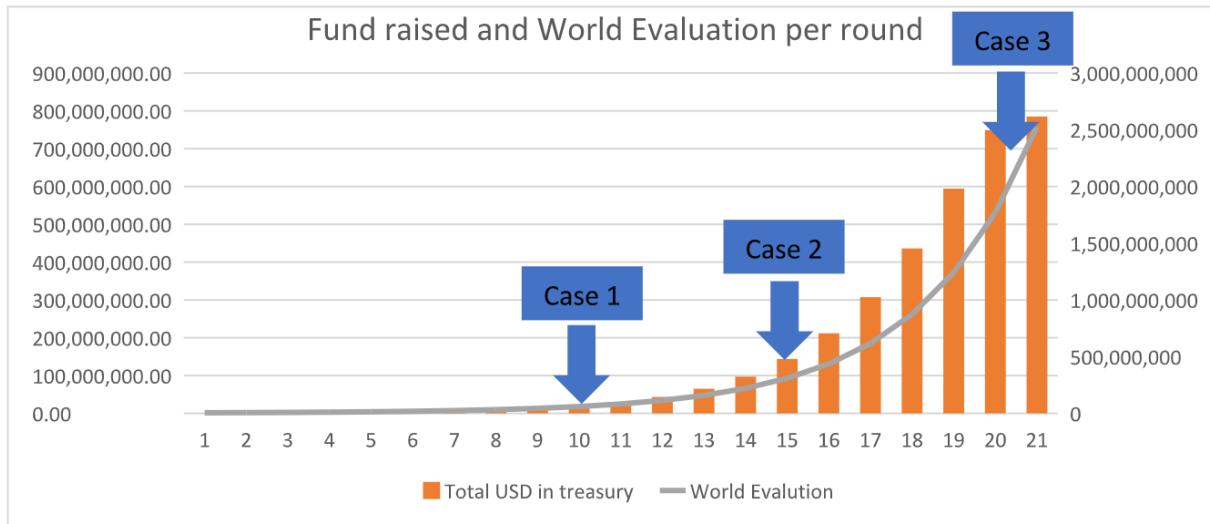
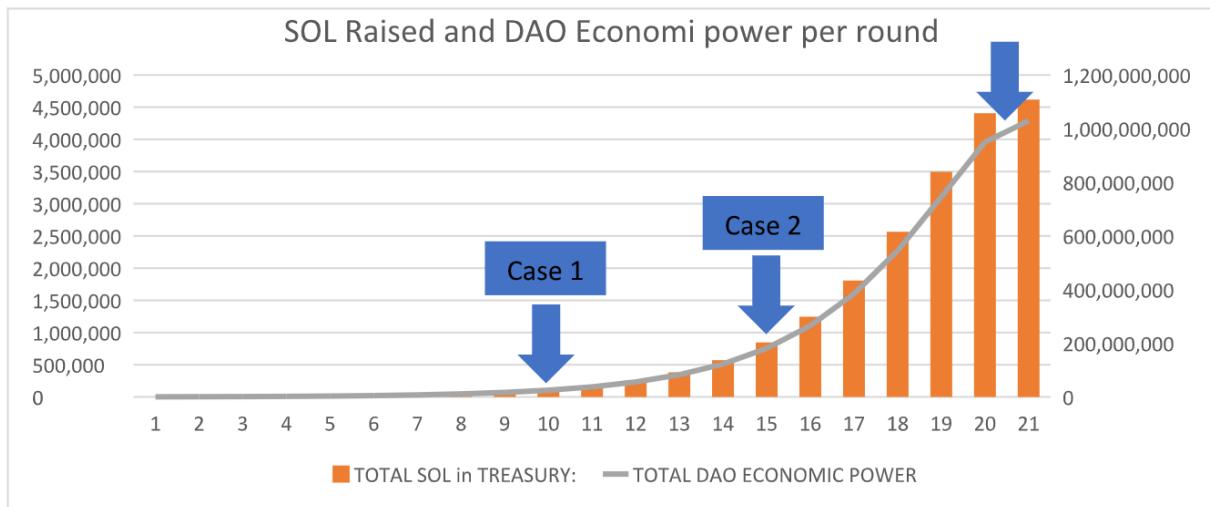
We expect that people participating to the auction will stay mostly stable till past half of the number of round, after which an increasingly stiff decline will begin.



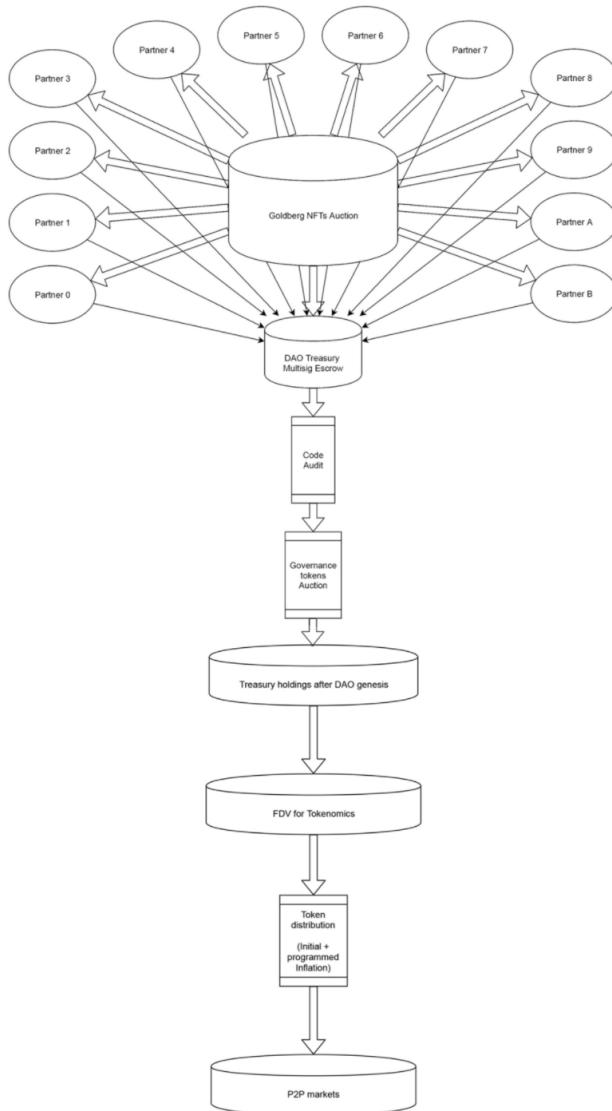
While we consider 21 round the maximum achievable we recognize that different scenarios could take place based on bidder expectations and consideration, using Decentraland as a mean of comparison:

- The first one is the case in which bidders will attribute to Solarity land mass the same value of Decentraland (roughly 70 USD millions), therefore giving Solarity parcels a much lower value due to their higher availability. This scenario will occur at the 10th round.
- The second one is the case in which bidders will attribute to Solarity single parcel the same value of Decentraland's one (roughly 775 USD). This would occur at the round 15.
- Finally the most optimistic scenario is one where bidders, expecting Solarity land to increase in value in the future as much as Decentraland one, will bid until the average cost of all the tiles purchased will match the value of a single tiles of Decentraland. This will happen between round 19 and 20, with the first tile costing 1,7 USD and the last one costing 5.652 USD.

These 3 scenarios give very different outcome in terms of raised funds, SOL in treasury and DAO Economic Power, as well as overall evaluation of Solarity's world. Having said this even the less optimistic one forecast a gain for Solarity's treasury of over 50 milion USD.



This is a more detailed overview of how the auction should look like:



Overview on the Token Distribution:

Token allocation
100Pi M tokens as initial supply.

30% Community FUND
20% Treasury
16% Airdrop over time
15% DAO Hatchers
12% Founding Leaders
7% Hackathons

+ Programmed inflation to early stakers.

Community fund:	
First 500 Twitter followers	5.000.000,00 5,31%
Partners Fund	50.000.000,00 53,05%
Solana Builders	10.000.000,00 10,61%
VR AR Builders	10.000.000,00 10,61%
Artists/Grants/Ambassadors	10.000.000,00 10,61%
Bug Hunting / Beta Testing Fund	9.000.000,00 9,55%
Social Media Giveaways	247.779,61 0,26%
SUM 94.247.779,61 100,00%	

VERSE Tokens
(Economy)

This will be considered the Solarity DAO Genesis.
(DAO Hatching)

Crypto-Economic System Explained:

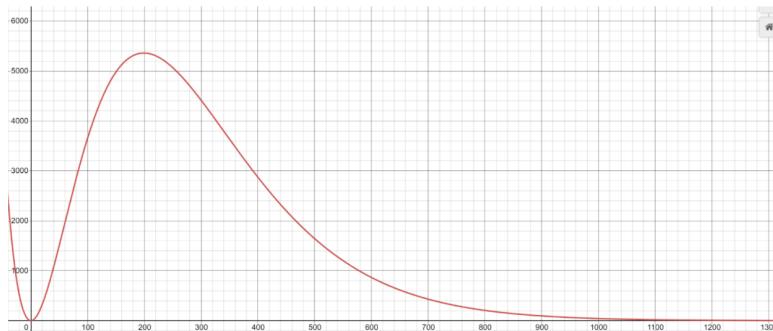
This is the Function we'll use to calculate the costs for the Land Upgrades:

(1 Land Upgrade = 1 Additional 3D Volume in VR World + 1 Additional Vote for dGovernance)

Land Economics: Upgrade costs.

To upgrade floors of your parcel you pay $(0.99^N \cdot N^2)$ where N is the layer level.

Y-Axis VERSE tokens per Floor Upgrade, X-Axis Floors



To calculate how much it is to upgrade K floors: $(\text{SOMMATORIA}(0.99^i \cdot i^2) \text{ per i da 0 a K.})$

$$\int_0^{10} 0.99^x x^2 dx = 309.19$$

Total cost to upgrade a parcel to the 10th floor

Total value unlocked (Every parcel upgraded to the 10th fl.) =

= $309.19 \cdot N_{\text{Total_Parcels}}$ = 9.7B of VERSE tokens

How much to the 200th Floor?

$$\int_0^{200} 0.99^x x^2 dx = 642348.$$

For a building of $250m^2$:

Total value unlocked ($250m^2$ to the 200th fl.) = $25 \cdot 642348 = 16M$ of VERSE tokens

Why would you build 200 floors? VR Hotel / Apartments ready to be populated.

Why would you want that? 3D VR Cloud Computed Metaspace.

It's Engineered to have an increasing cost until a "Peak of Optimum", the 200th floor.

The total expenses for the entire planet to reach the 200th floor would be around 2 Trillion VERSE Tokens.

The initial Supply is 314M Tokens and the total demand (If everyone wanted to have 200 Floors) would be 2M of Millions of Community Tokens.

When an upgrade is performed, the community tokens are transferred to the Solarity DAO that uses them as explained later in this paper.

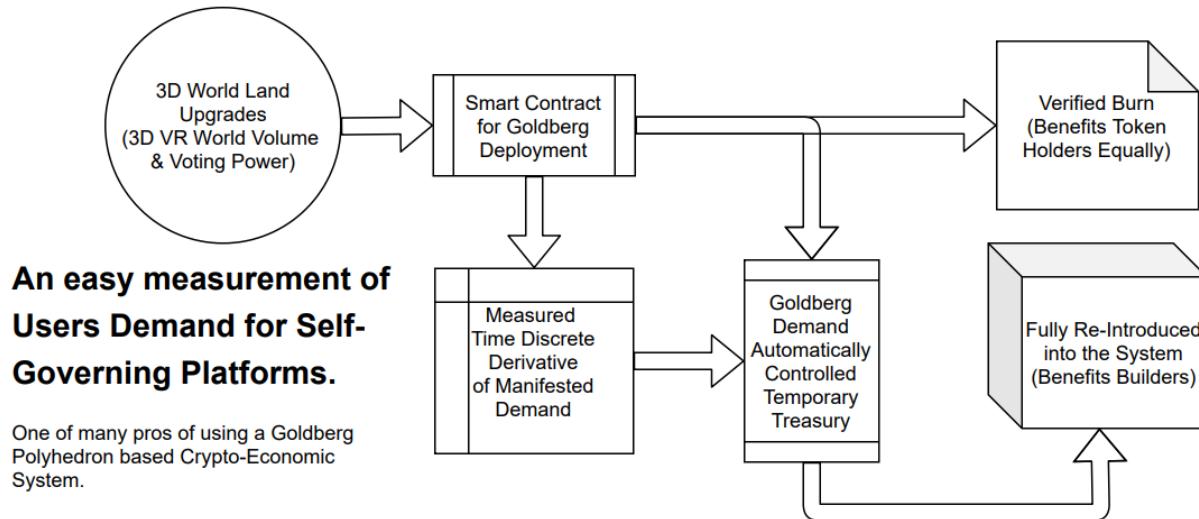
The important part is that using this design, the Solarity DAO is able to have 6370 Economic Cycles.

(It would receive 314M Tokens, 6370 Times, and would use these tokens to pay Creators & Builders)

This is an overview of how we can measure the “Demand” for the Platform (Solarity’s Virtual World) by measuring the time it takes to complete a Full Economic Cycle and use the measurement as a Bias Enhancement for DAOs Expenses.

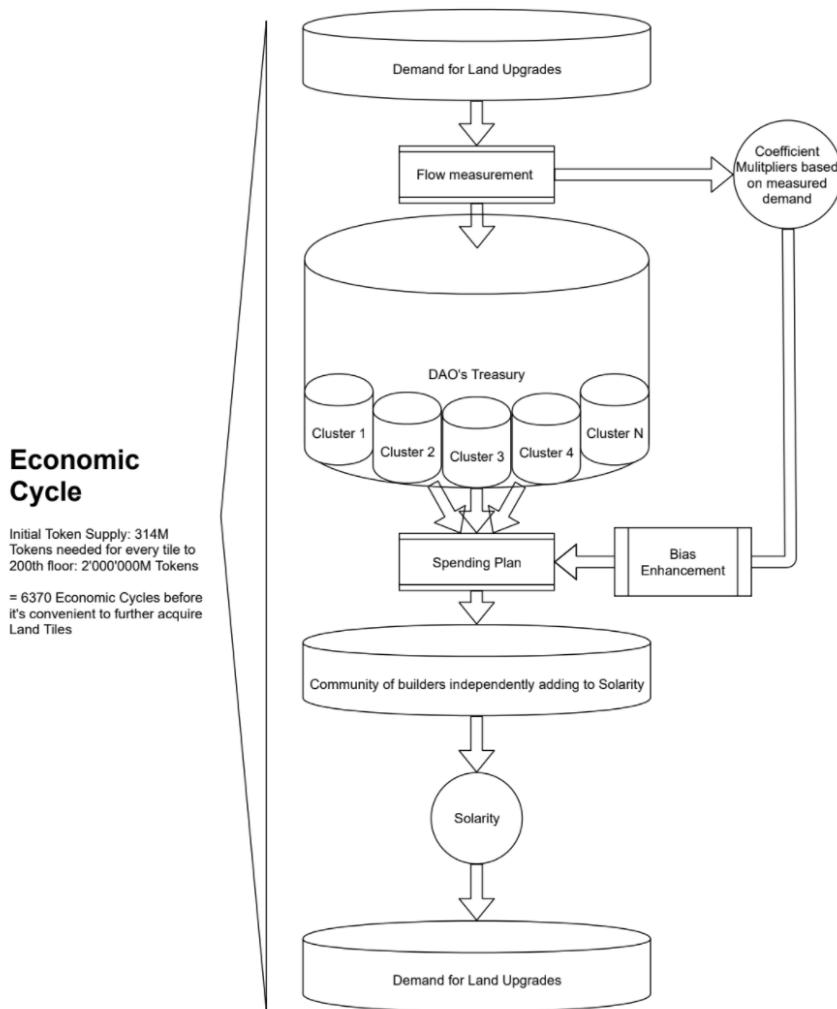
This is a Component of the Crypto-Economic System.

(DAO can choose whether to Burn the Tokens required for Land Upgrades or to Re-Introduce them strategically into the System for Protocol’s Self-Development)

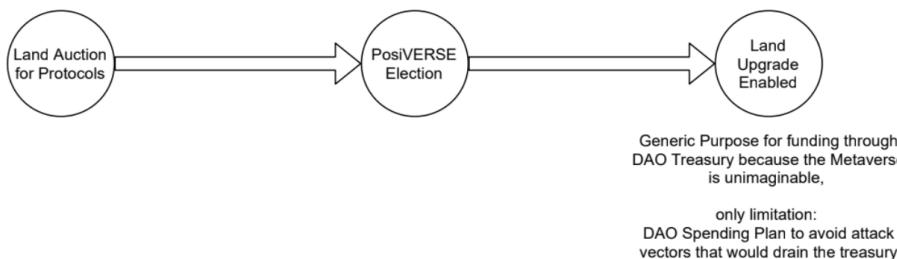


The cool part here is using the Time Derivative of Land Upgrades to have a way of measuring demand to use that to tune other components in the Crypto-Economic System.

The Macroeconomic Effect of such choice in Solarity's world would be (exaggerating ever-increasing demand to reasonable levels) the creation of 6370 Economic Cycles, each of the same Economic Value Volume. This Economic Value Volume would be either Controlled Decently by the Self-Identified DAO (Funding = Governance) to ideally be able to put it to good use or brutally periodically & equally distributed to a Not-For-Profit Expandable Goldberg Voting System with Dynamical Democratic Self-Imposed Governance representing the people that had most skin in the game into this Peak Performance MetaSpace.
(Potentially lasting forever due to the suitability of the Goldberg Polyhedron to represent ownership in any Asset)

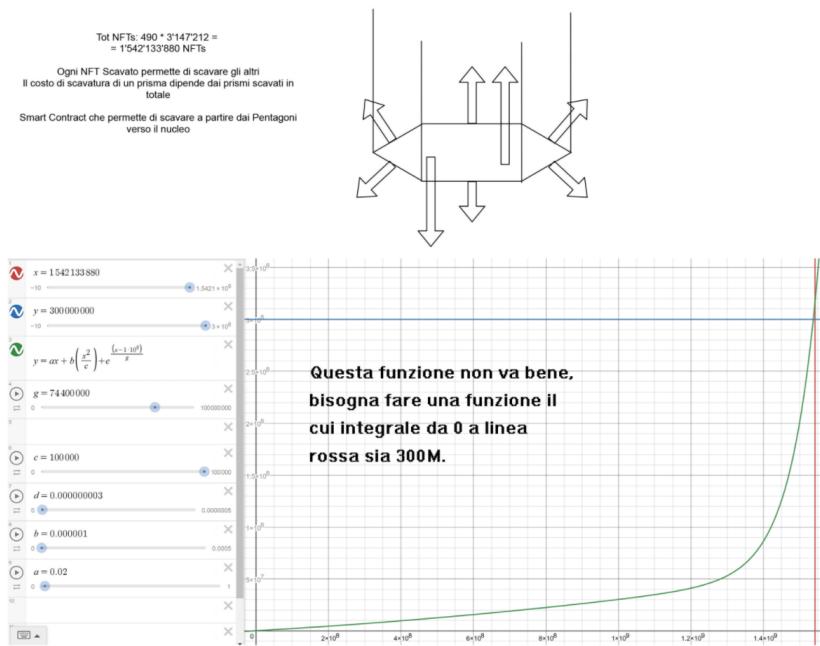


How Pentagon Governance works



As we feature an Infinitely Expandable Surface World, we'll also have an Extremely Scarce Underworld. This is the Beauty of using the Goldberg Polyhedron as the structure for Solarity's Virtual World.

(The cost for Underworld Parcel Unlocks increases with every unlock in the Underworld, at first it's cheap, later it becomes expensive. To have the Underworld fully unlocked, the community needs to burn 300M Tokens)



The Underworld in Solarity will belong to no-one.

Everyone will be able to leave their presence signs on walls through Graffiti ecc.

The Coolest thing about the Underworld is that in a Radius R, Users will be able to Claim Underworld Chambers, these are the scarcest Land NFTs in Solarity's Virtual World.
(There can't be more than a Single Underworld Chamber in a 3D Radius of R (R to be defined))

To unlock the Underworld Land Volumes, Users will need to Burn VERSE tokens.

To unlock the entire Underworld the community would need to Burn 300M Tokens, almost 96% of all the Initial Token Supply.

This means that not all of the Underworld Volume will probably be accessible.

However at Solarity's Core (It's a Sphere so it has a nucleus/core) there's going to be a really cool place involving Satoshi Nakamoto.

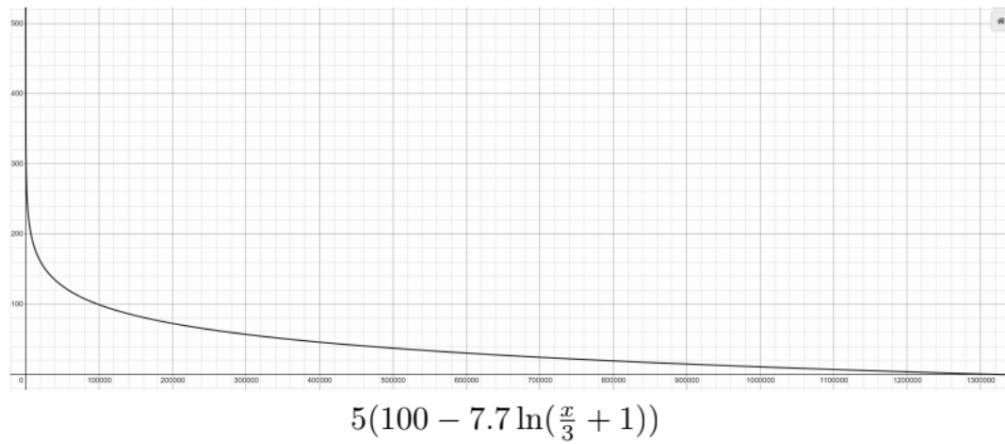
The coolest feature about the Underworld is the Proof Of Concept of having different Game Engine's Parameters for Each Land Volume. (Descending Gradient of Gravity to experience Less Gravity the Closer you get to the Nucleus).

Now to incentivize the population of Solarity's Virtual World, the DAO will airdrop 50M of Community tokens to the first 1.3M Verified (Bot Protection) Addresses registered on Solarity's Survival Mode.

By airdropping this supply of tokens in the Survival Mode (an Adiabatic Economic Environment, explained later in the paper) we're basically funding the community of Early Solarity Creators.

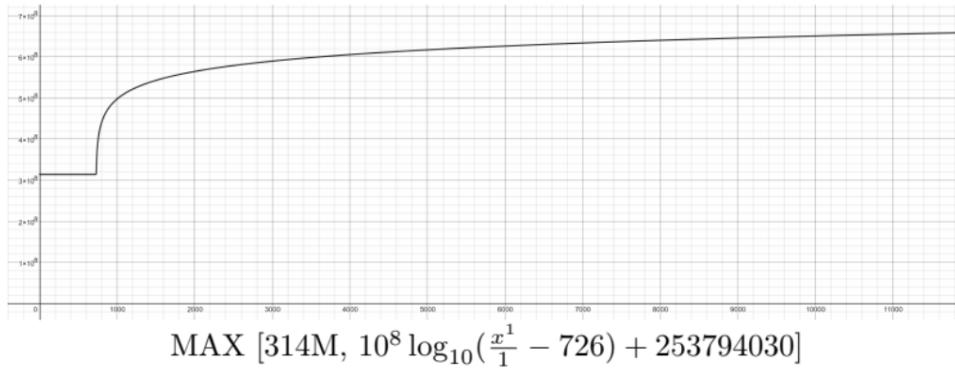
Airdrop of 50M VERSE tokens to first 1.3M Users as discussed in the whitepaper.

(This part will be enriched soon)



Last but not least, the VERSE Tokens Programmed Inflation:

7.10 \$VERSE tokens programmed inflation



From the second year Solarity will airdrop new tokens to token holders that staked the most during the previous years, using the formula:

$$a \log_{10}(\frac{x^c}{b} - d) + k$$

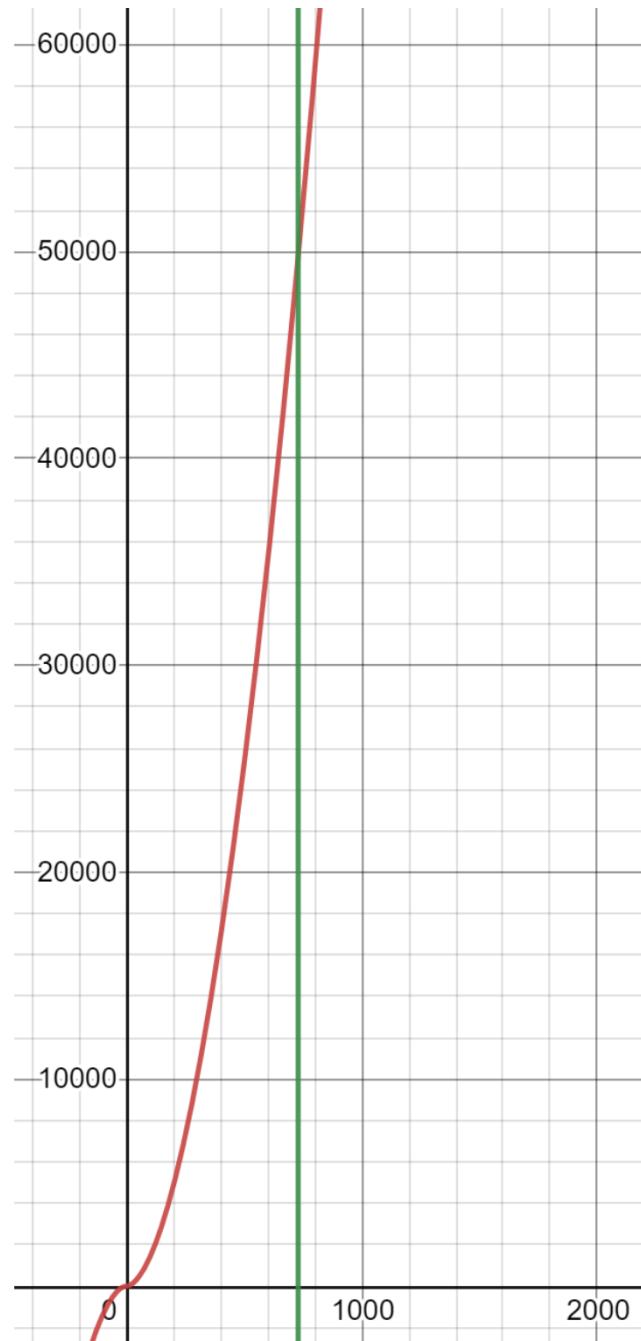
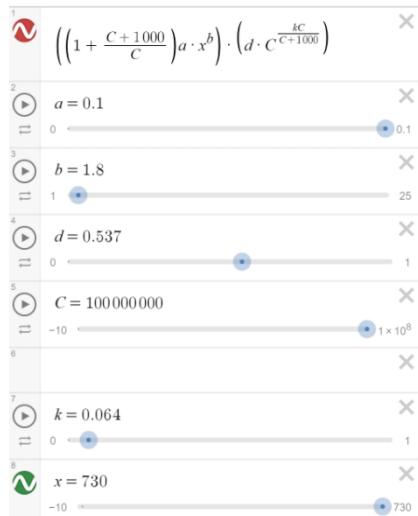
We'll have a Staking Period that begins when we'll inaugurate the TestNet and the DAPP's Beta.

To calculate the Staking Points to receive Inflation Rewards we'll use this formula:

It's a really cool formula that enables Users that Stake 1k (Thousand) Tokens to receive 53.5% as much Staking Points as Users that Stake 300M (Millions).

This is super cool because it Leverages the Playing Field for Small Fishes vs Whales.

(School of Fishes VS Whales)



100M stake points:

49.7k points

300M stake points:

53.4k points

10M stake points

42.9k points

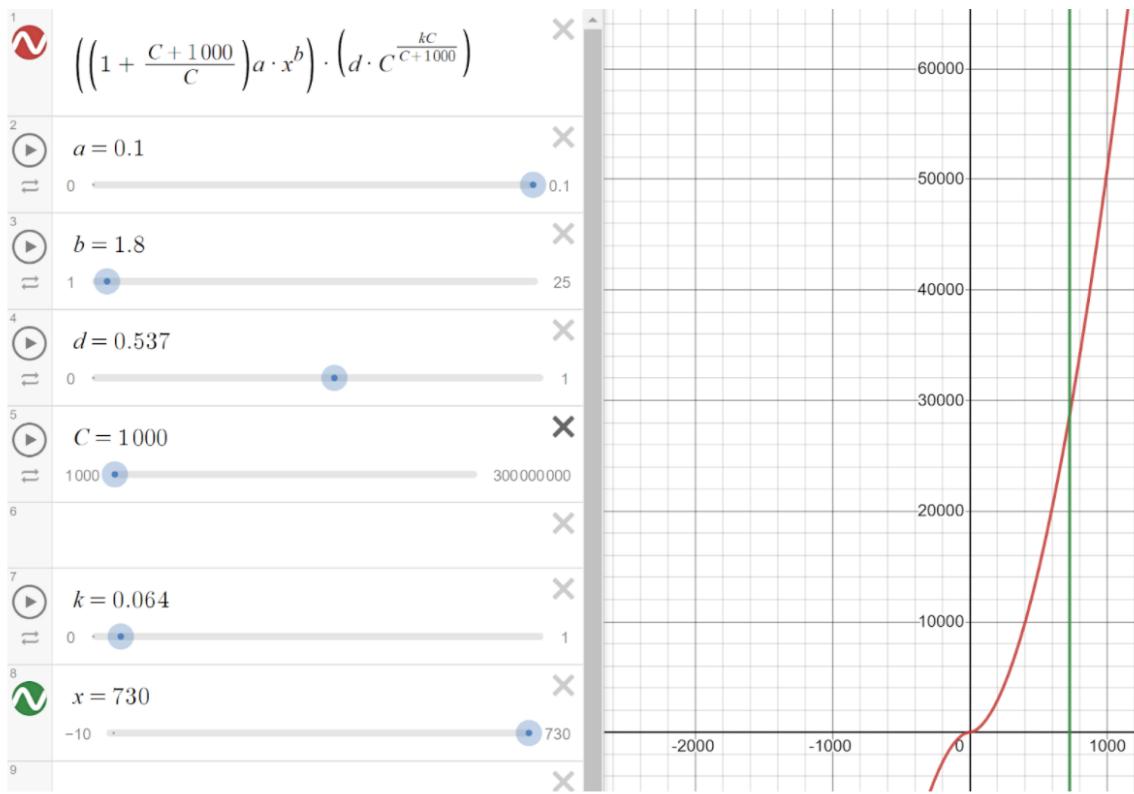
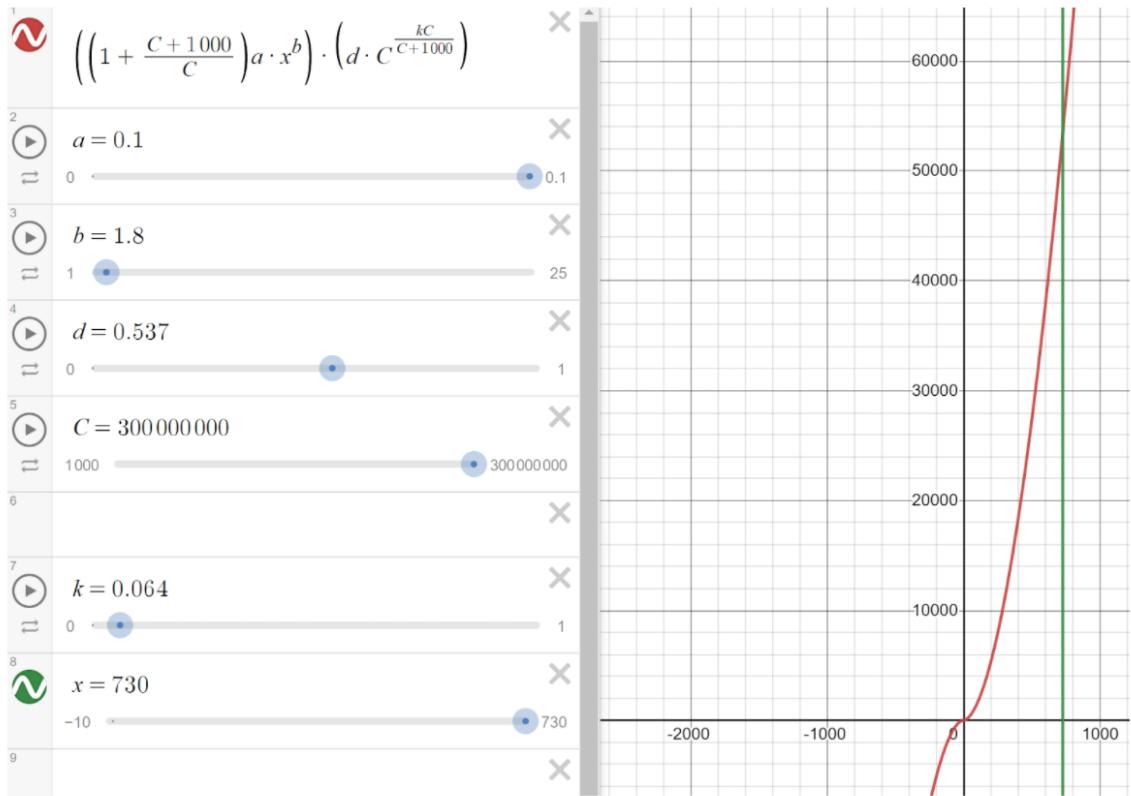
1000 stake points:

28.6k points

Indefinite integral

(to be calculated from 0 to 730)

$$\int \left(\left(1 + \frac{C+1000}{C} \right) a x^b \right) \left(d C^{\frac{kC}{C+1000}} \right) dx = \frac{2 a (C+500) d x^{b+1} C^{\frac{(Ck)}{(C+1000)-1}}}{b+1} + \text{constant}$$



Finally, the Dynamical & Fluid DAO Governance for an Everlasting Protocol:

7.9 Tokens easter eggs

You can burn an X% of the total INITIAL \$VERSE supply to gain X% voting power on the DAO board.

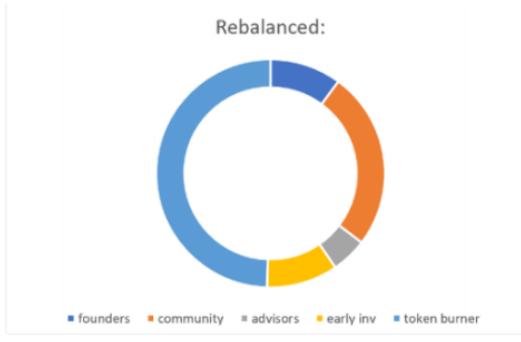
EG: The governance tokens are⁶:

- 20% Founders
- 50% Community
- 10% Advisors
- 20% Early investors (1st seed round)



I buy and burn 98% of all the *INITIAL* \$VERSE supply:
(The voting power is re-normalized using 100 + 98 as the common denominator)

- 10.1% Founders
- 25.25% Community*
- 5.05% Advisors
- 10.1% Early investors
- 49.49% Me who just burnt 98% of ALL VERSE initial supply.



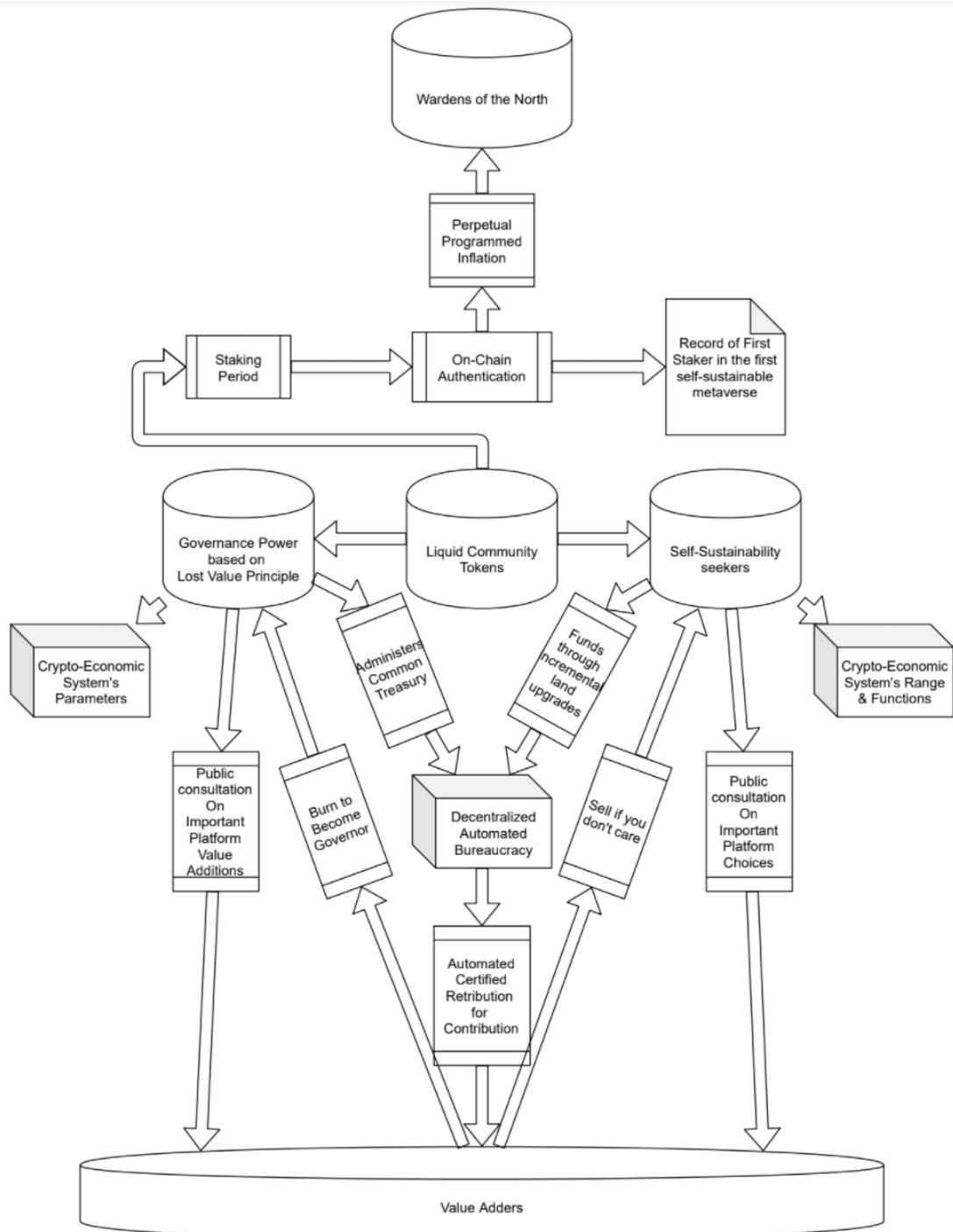
⁶In our initially envisioned iteration

Basically, the ONLY way to obtain Governance Tokens (that govern the DAO Treasury) is to Burn X% of the INITIAL Community Token Supply.

This is the best way to NULLIFY Attack Vectors on the Neutrality of the Protocol.

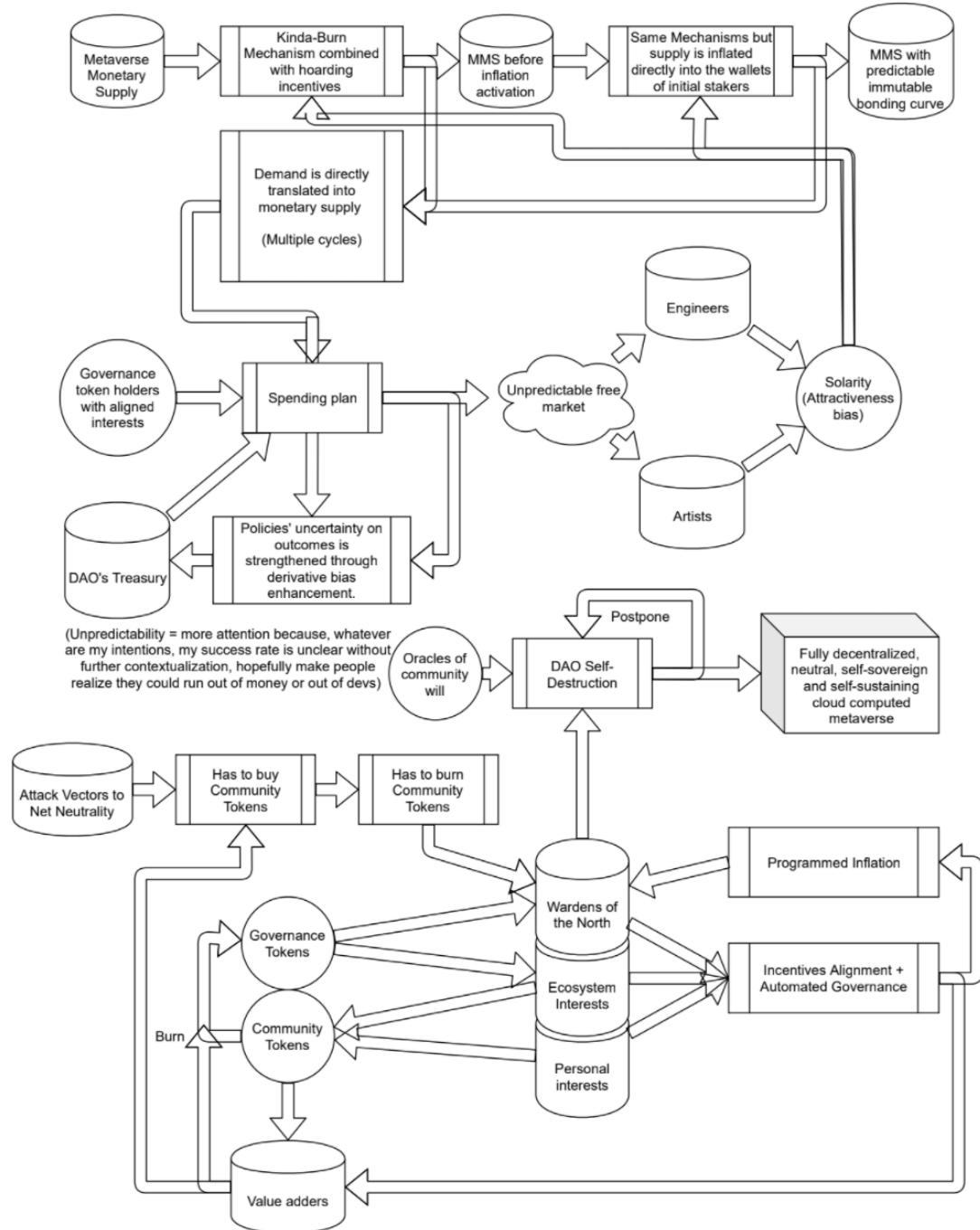
Crypto-Economic System Overview:

Here the main Components of Solarity's Crypto-Economic System are presented together.



System's Evolutions Overview:

This is an overview on the Full Life-Time of Solarity's Crypto-Economic System.



Wardens of the North: DAO Members that truly want a Free, Neutral, Independent, Decentralized & Self-Sustainable Metaverse.

(To put it in Game of Thrones Terms, Big Tech is the Night's King)

Ecosystems Interests: DAO Members that don't really care that much about a Decentralized Metaverse but realize that Solarity could really boost the Ecosystem's Development.

Self-Sustainability Seekers: DAO Members that don't really care that much about the Solana Ecosystem's Development but Seek Business Profitability.

Attack Vectors to Neutrality: Wannabe DAO Members that want to Sabotage the creation of the first Free, Neutral, Independent, Decentralized & Self-Sustainable Metaverse.

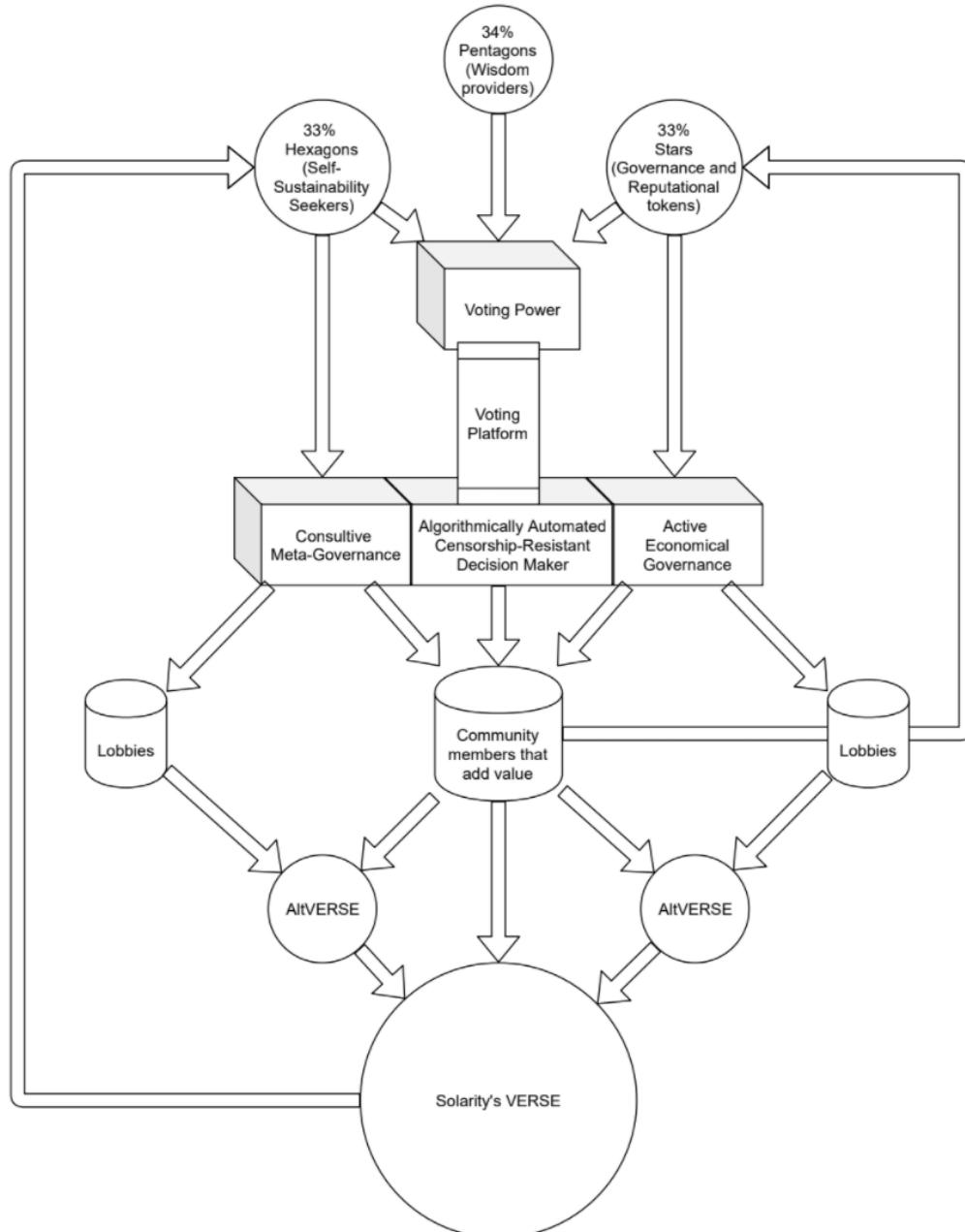
They have to Burn the Community Token to take control of the DAO.

This way they're enriching the rest of the Community in an attempt to take over the world and this makes Solarity Pretty Resistant to such Attack Vectors.

Acknowledgement of possible Attack Vectors to Neutrality:

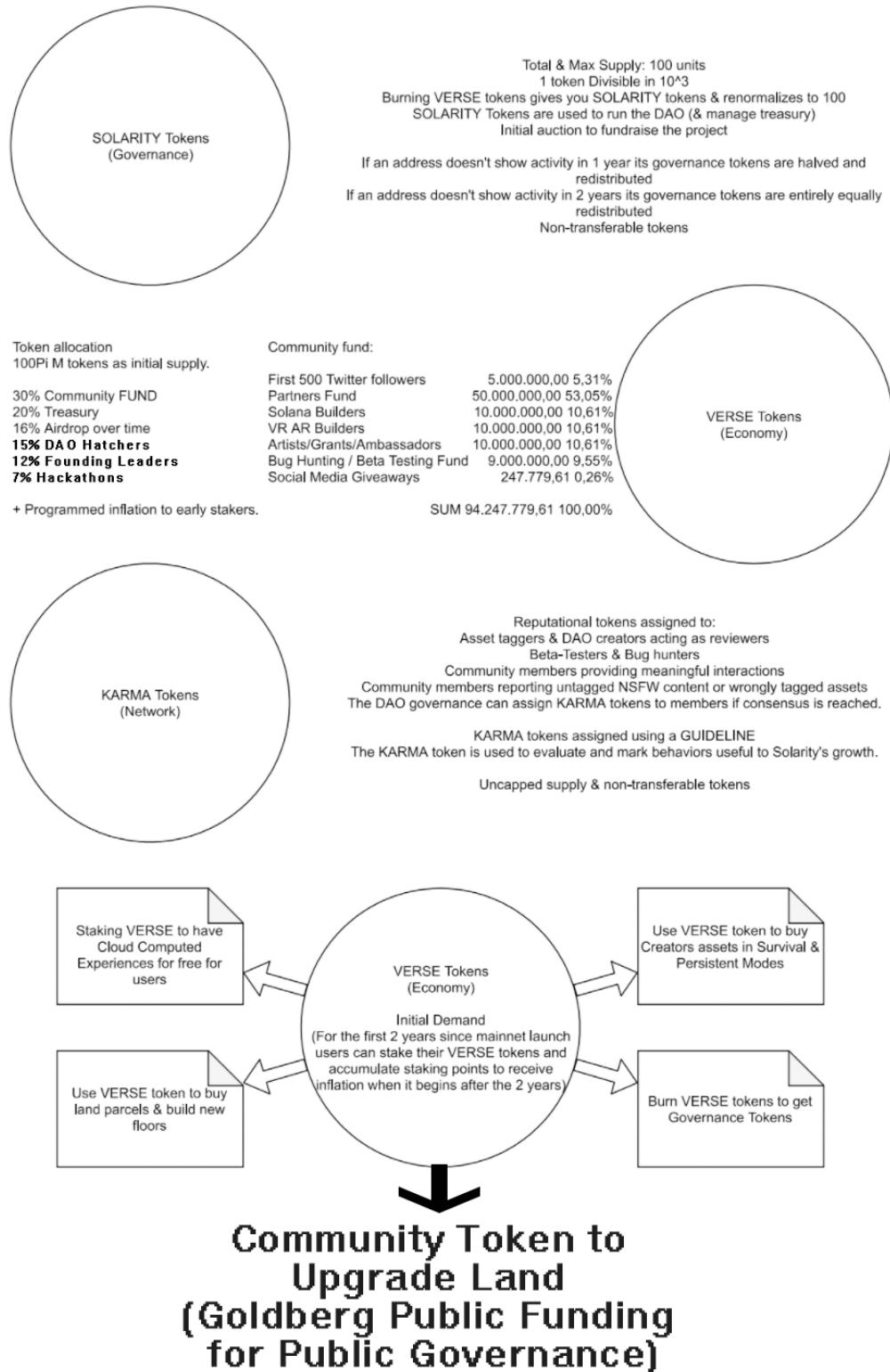
There could be some Infiltrations of Attack Vectors to Neutrality in the first Governance Tokens Auction. However at this stage any Really Hostile Actors would rather start their own platform instead of trying to control something that doesn't exist yet.

These minor Infiltrations could lead to internal Lobbies that could be linked to altVERSEs (Non-Solarity Virtual Worlds), however since everything will be OpenSource and Audited, they're efforts will likely also benefit Solarity.



Tokens Interaction in the Crypto-Economic System:

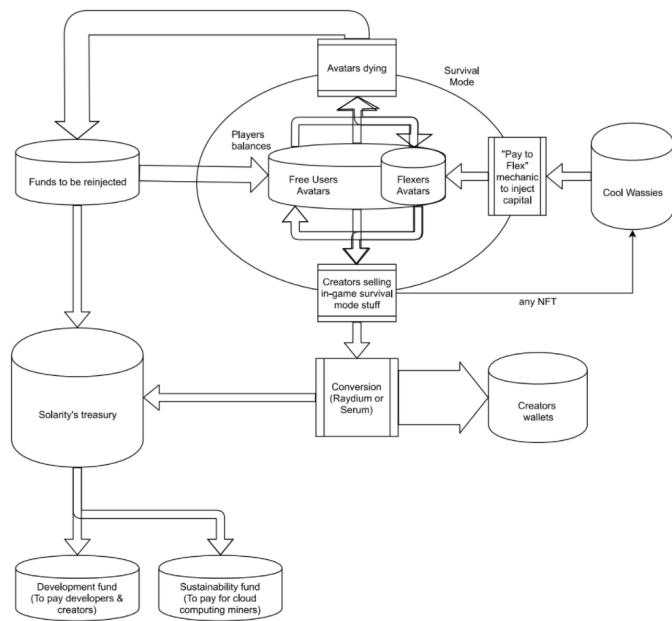
These are the Tokens Interactions Summarized. (The Reputational Token System is discussed in the Technical Paper)



Solarity's DAPP Economics:

Survival Mode Economics:

The Survival Mode is just a Permissioned Virtual World like Fortnite / GTA Online.



Survival Mode is an Adiabatic Economic System that only releases Economic Value through Creators (Buying NFTs from Survival Mode).

Adiabatic is a term borrowed from Thermodynamics, it means that the Economic Value can't get out of the System unless through NFTs acquisitions.

There are 2 main Valves in this Economic System: Creators, to let Economic Value Flow Out, and "Cool Wassies", to let Economic Value Flow In.

"Cool Wassies" is a term to identify Users that Inject Additional Economic Value into the Economic System.

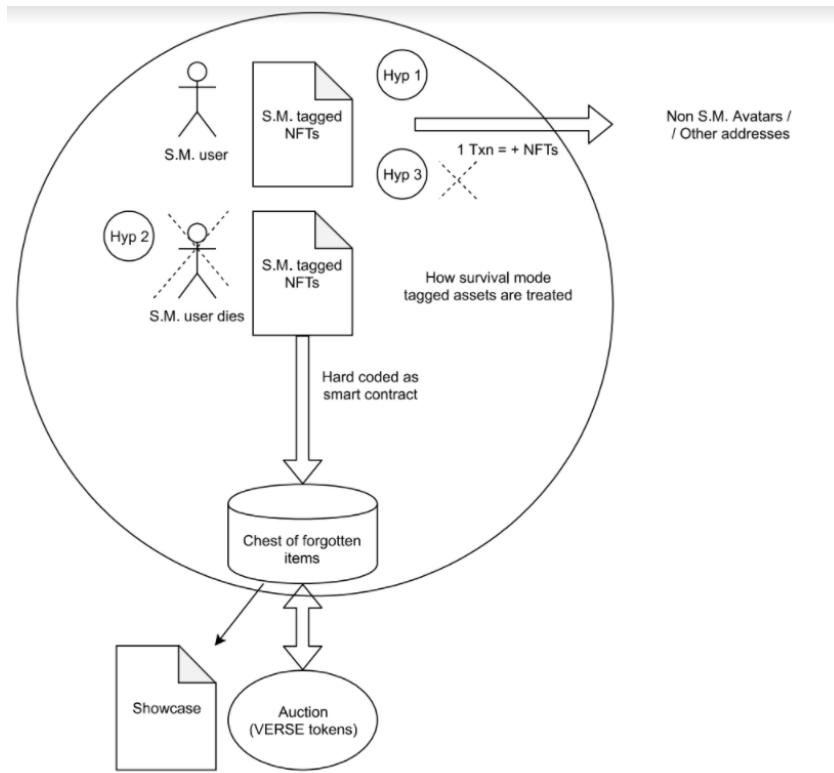
The coolest feature for Solarity's Survival Mode is the Auto-Refueler:

Characters in Survival Mode (as the name suggests) have to survive, if they die, their Tokens are Collected Automatically (Survival Mode is a Permissioned Economy) inside the Auto-Refueler. The Auto-Refueler is just a Smart Contract that Re-Inject Economic Value inside the System, gathered from Characters Dying.

This is done to Disincentivize Murder (If Users could get the Murdered Character's Inventory, it would Incentivize Murder) and to add Dynamism to the Survival Mode.

This Combined with Smart Contracts Templates for Users allows to have an Experience Comparable to GTA Online, the Gold Standard of Survival Metaverses, where Users can create DAOs to organize themselves and create Entertaining Narratives.

Survival Mode Mechanisms:



The Survival Mode Mechanisms are quite simple to explain:

- 1) Any VERSE tokens owned by a Character is Transferred to the Auto-Refueler when the Character Dies.
- 2) Characters can transfer their NFTs to other Solana Addresses but they can't transfer VERSE tokens.
- 3) Any NFT owned by a Character is Transferred to the "Chest of Forgotten Items" when the Character Dies. (The proceeds of the NFTs Sales go to the Solarity DAO's Treasury)

This feature is Super Cool because it enables Creators to have NFTs that "Behave" Differently when they're in Survival Mode, when they're NOT in Survival Mode AND when the Character Owning the NFT Dies.

(Example: A non-working Lightsaber that works only after the death of the holder)

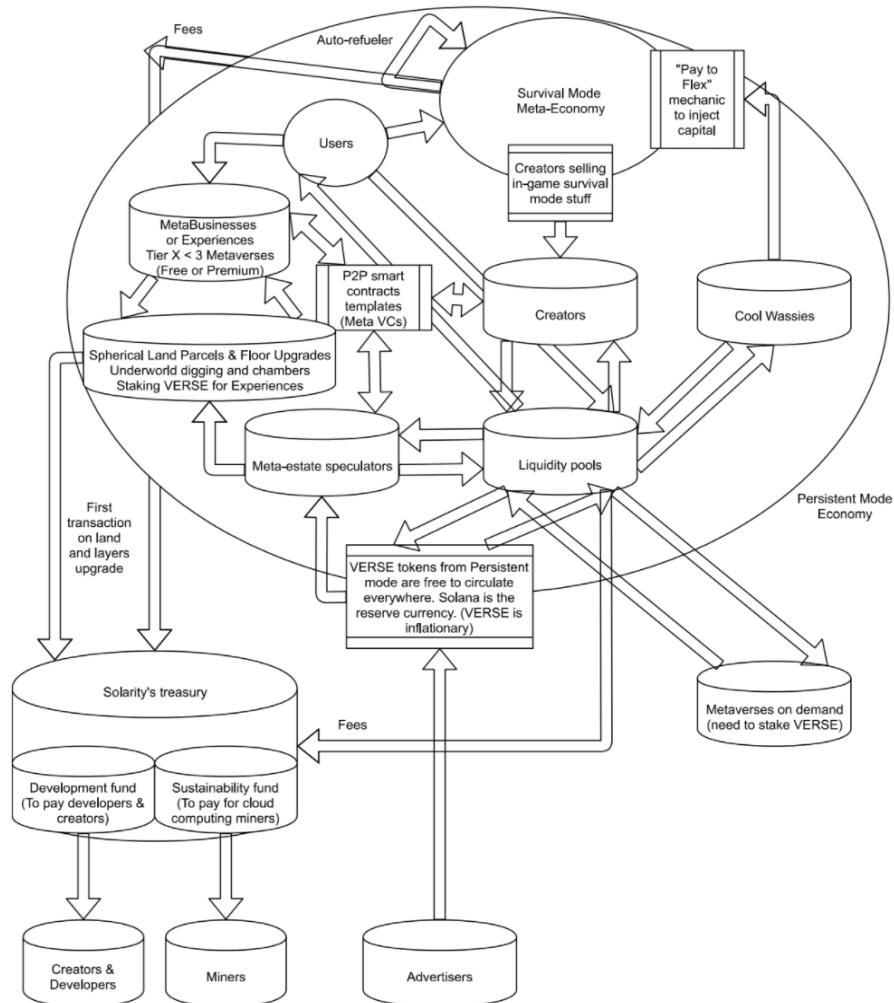
Persistent Mode Economics:

The Persistent Mode is just a Permissionless Virtual World like Roblox(not really) / Decentraland.

The graph below shows a Macro-Economic Overview of the Permissionless Virtual World.

The notable movements of Economic Value are:

- 1) Solarity DAO Sponsoring Creators & Developers.
- 2) Solarity DAO Treasury Automatically Refueling the Survival Mode Economy.
- 3) Cool Wassies interacting with Creators indirectly (Any Game Asset (MegaNFTs) in Survival Mode) & with Creators directly (Any kind of NFT in Persistent Mode).
- 4) Creators & Users interacting with both Survival & Persistent Modes through the Liquidity pool.
- 5) Meta-Estate Speculators & Ecosystem Fundings through Goldberg Funding.
- 6) MetaBusinesses (DAOs, probably Goldberg Voting Systems) interacting with both Land NFTs Owners and Creators to have VR experiences leveraging the computation network.
- 7) Advertisers that wanted to interact with Solarity would need to have VERSE Tokens.



Liquidity Pools: the “Hearth” of the Community Economy, a place where Sellers & Buyers meet to arrange Community Tokens Transactions

Cool Wassies: Users that Inject Economic Value inside the Survival Mode Economy and that likely support Solarity’s Virtual World Development in any other way.

Creators: Users that add Information Value to the System (Art & Various VR Experiences)

Meta-Estate Speculators: Users that speculate on Virtual Land.

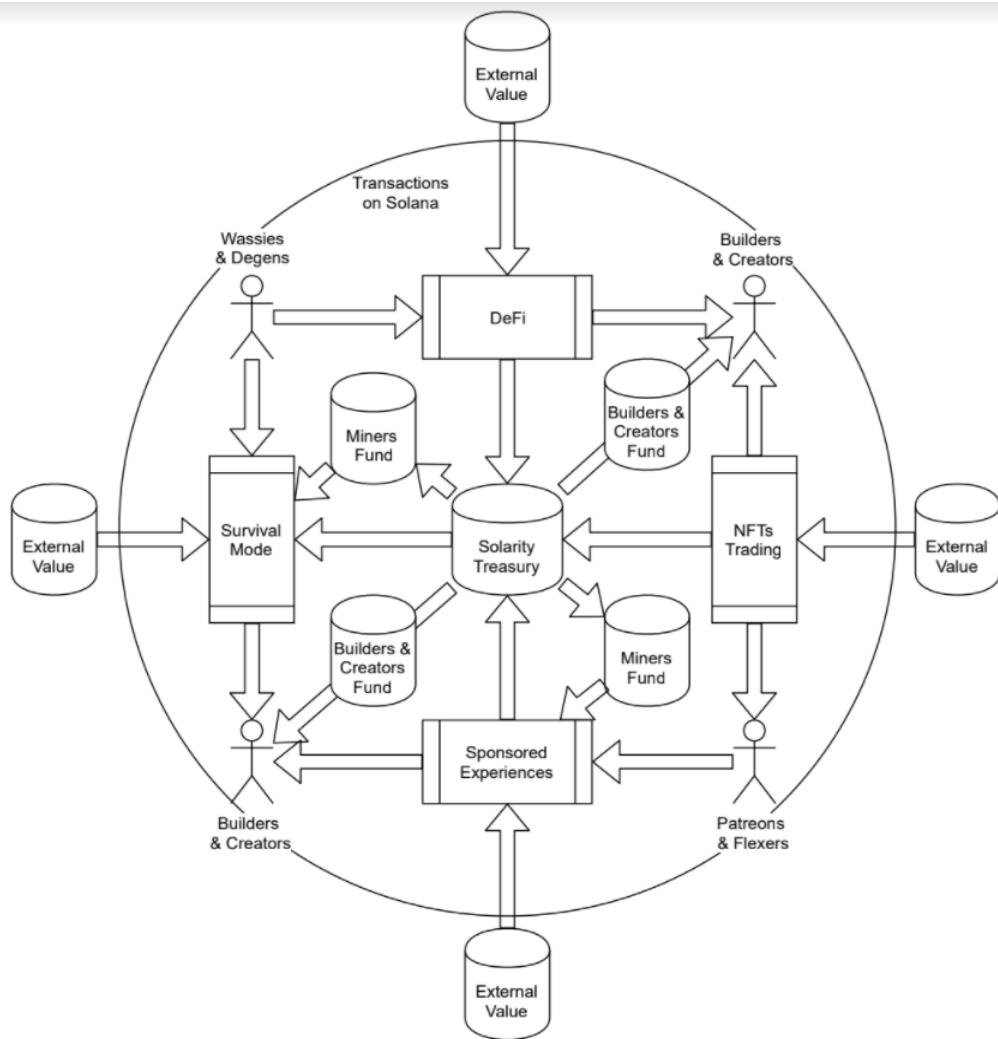
Metaverses On Demand: Enabled in the Late stage of the Project, when the Computation Network and the Solarity Engine are Consumers Ready.

Advertisers: Users that sponsor creators directly or indirectly (Using Solarity).

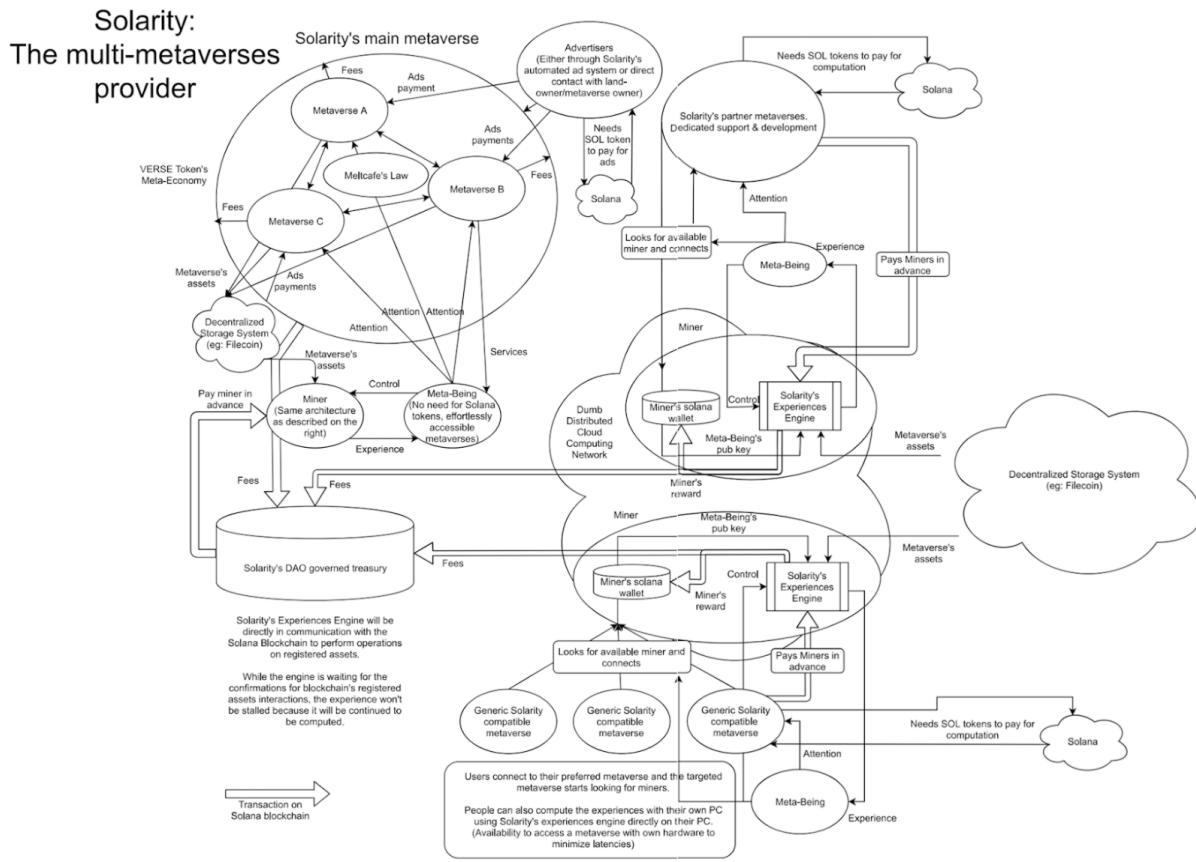
Developers: Users that add Information Value to the System (Building Blocks of Code for the Metaverse)

Miners: Enabled in the Late stage of the Project, when the Computation Network and the Solarity Engine are Consumers Ready.

Practical System Overview:



This is a Super-Simplified Overview of Solarity's System's Overview.
Solarity will be able to capture external Economic Value due to the Incredible Level of Over-Engineering of the Virtual World's Crypto-Economic System.



This is an overview of the Entire Galaxy of DAO-VERSEs.

DAO-VERSEs Living on Solarity will experience a Huge & Amplified Metcalfe's Law and they'll be able to Compound their User-Bases & Tools.

DAO-VERSEs Living Outside of Solarity will be able to leverage on Solarity's MetaNetwork Assets & on the Peak Performance Game Engine for any kind of Entertainment Production and they'll be able to have NFATs to have full control over their Intellectual Property from Production to Reproduction.

Third Parties that want to Leverage Solarity's Engine and Computation Network will be able to do that and they'll be able to directly interact with Miners.

(Solarity will take a small fee to pay for the Self-Sustainability of the DAO)

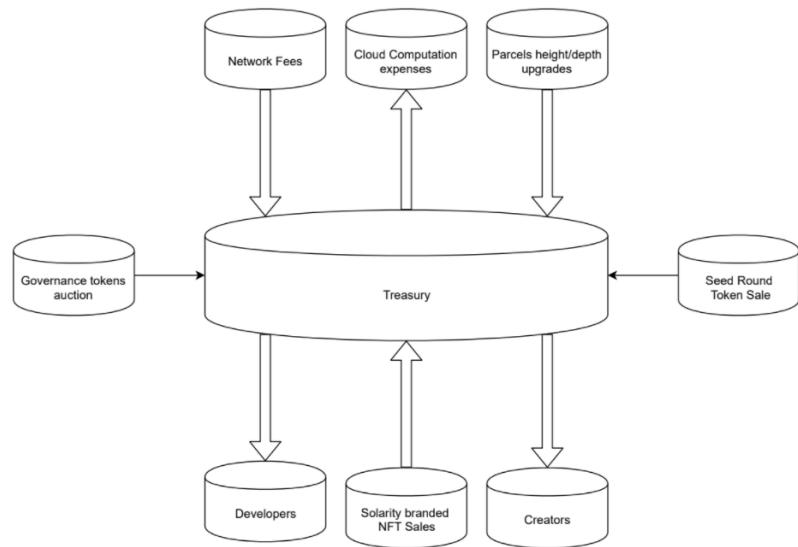
This Zoomed Out Vision should further clarify the need for a Structured Mesh of Atomic Decentralized Independent Economic Entities.

It's Vital to have the ability to track DAOs Balances to Collect Self-Sustainability fees.

In Exchange for the Fees paid, DAOs Operating on Solarity will have a RTX-3090 Ultra Quality Cloud Computed VR Metaverse Experience for free for their Users/Customers, automatically paid by the DAO.

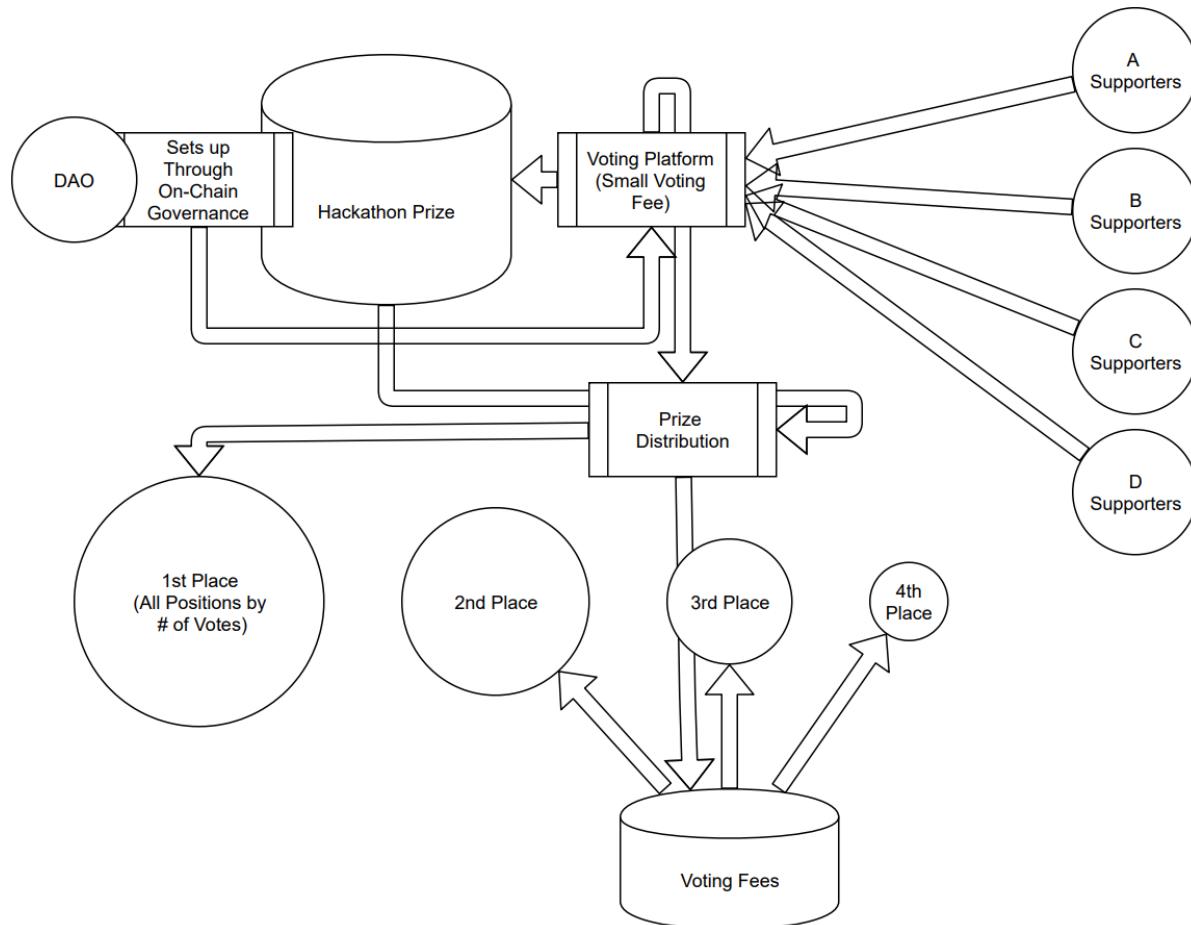
Sustainability Approach:

This is the Net-Balance of Economic Value Flowing In and Out of the DAO's Treasury.



(The Treasury is initially filled with Solarity's Sub-Sectors Land NFTs Sales and with the funds from the Governance Tokens Auction)

Growing Organically: (Automated Decentralized Contests with Decentralized Participants)



- 1) The DAO agrees on an “Hackathon” Prize and on some Voting Criteria
- 2) The Voting begins. It costs a small fee to vote (1 vote for address) to both discourage spamming but in the meantime making it cheap for the community to participate in the Governance.
- 3) When the Voting Period ends, the Most Voted PosiVERSE is rewarded with the Hackathon Prize while the 2nd, 3rd and 4th Most Voted PosiVERSEs are rewarded with the Voting Fees.

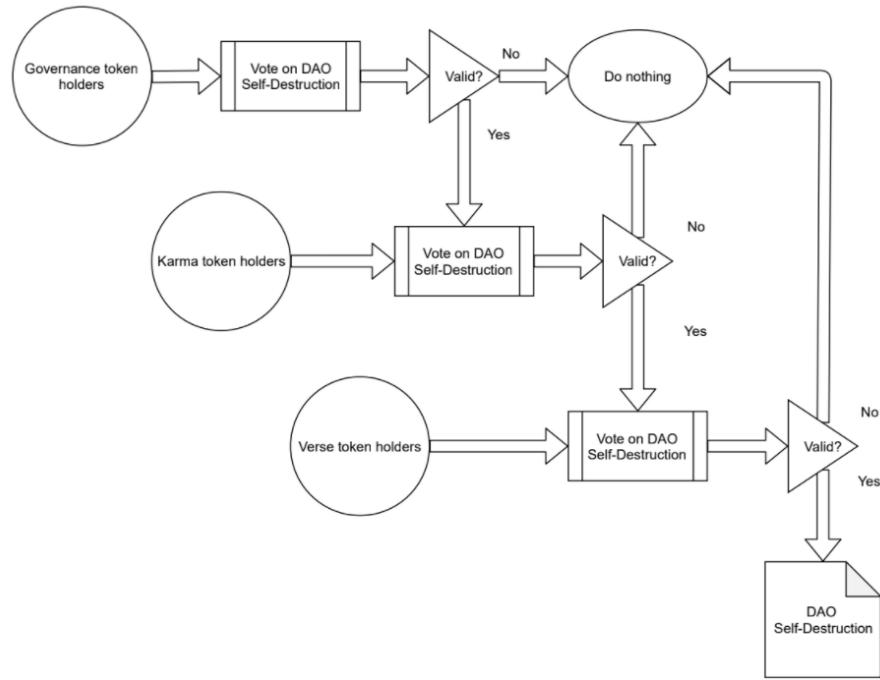
This is an easy way of Saving the Commons: Voting For Funding & Funding Through Voting while maintaining a Provably Fair Competitive and Transparent Environment.

(If someone has huge interests in the success of any of the Participants, it will have to gather a lot of votes. The price paid for these votes will be redistributed to the other winners.

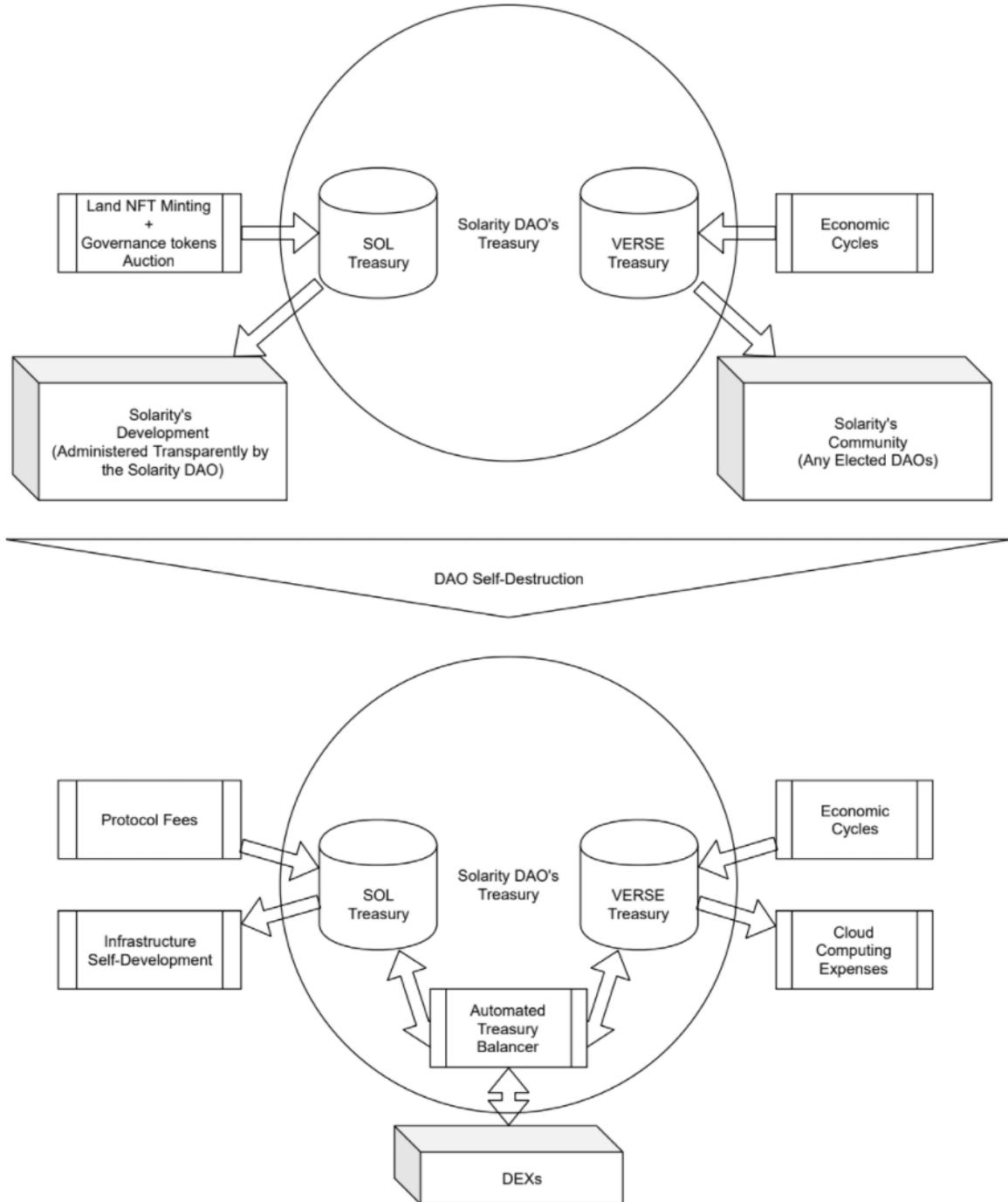
The system is based on the assumption of an honest environment and its success depends on the honesty of such an environment but any hypothetically dishonest player would have to pretend to be honest for an initial period to be able to gain personal advantages later in time.

During this initial period, the system would have produced Additional Intellectual Property for the Collective Humanity to own. Therefore making it a potentially successful system.

DAO Self-Destruction: (Fully Automation of the Protocol)



It's vital for a Perpetual Metaverse to plan the Self-Destruction of its DAO in order to become a truly Neutral Platform.



When the DAO is Self-Destructed, all of the Excess Revenue (after ensuring Funds for Self-Sustainability for longer than a day) will go to Community Token Holders and to Reputational Token Holders

(This part is better explained in the technical paper)

Super-Scalable Metaverse Governance Machine Learning:



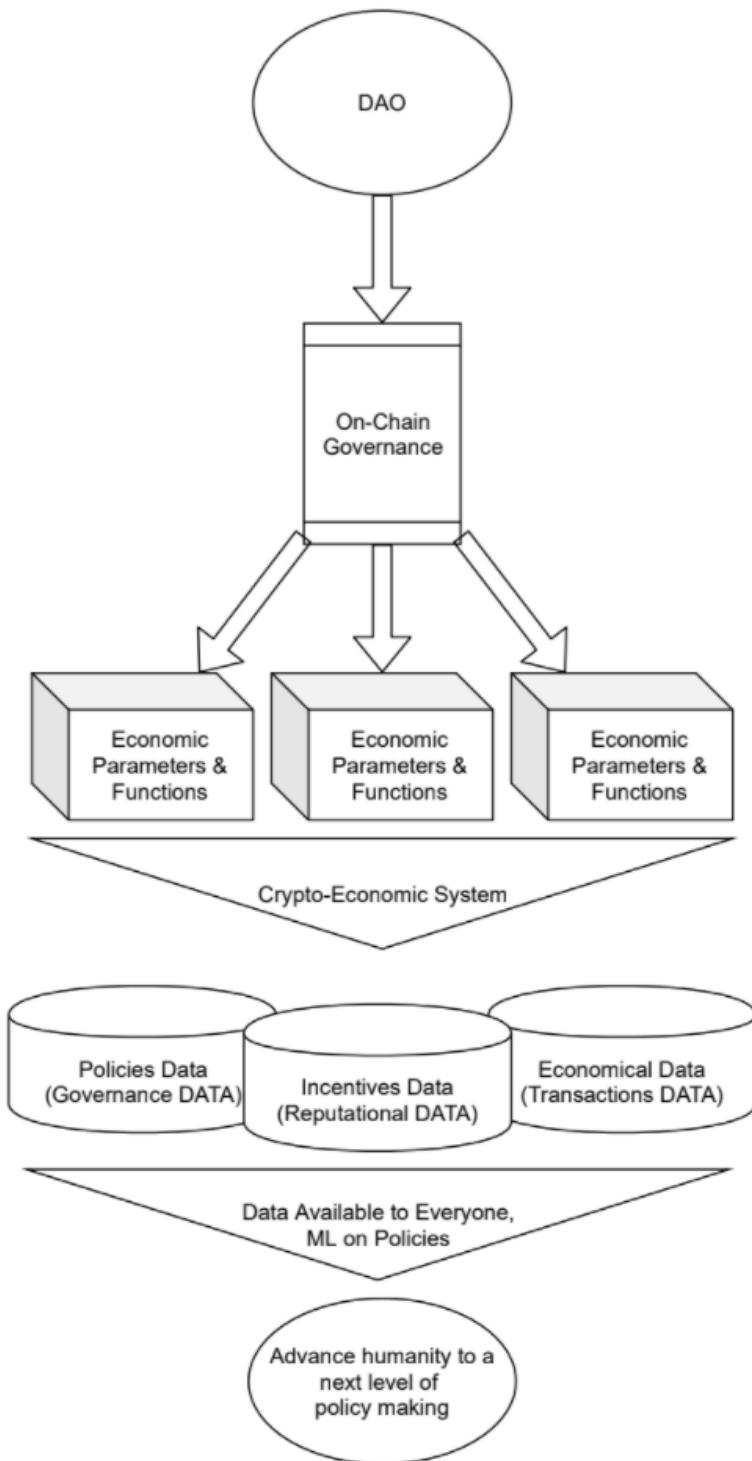
Since the Crypto-Economic System is made up of Polynomial Functions, it will be incredibly easy to perform Machine Learning on the Economic Data (Transactions) and Policies Data (Coefficients of the Functions).

Doing this, we'll develop a tool to have AI-Assisted Governance to Optimize the MetaEconomy's performances.

(AI will be also useful to optimize the Computational Market for Miners Retributions)

Thanks to the Design Choices, we'll have Ready to be Analyzed Data from potentially infinite Virtual Worlds and they'll all use the same standards.

This means Lots of Clean Data (Like really a lot) and that means Machine Learning done Right.

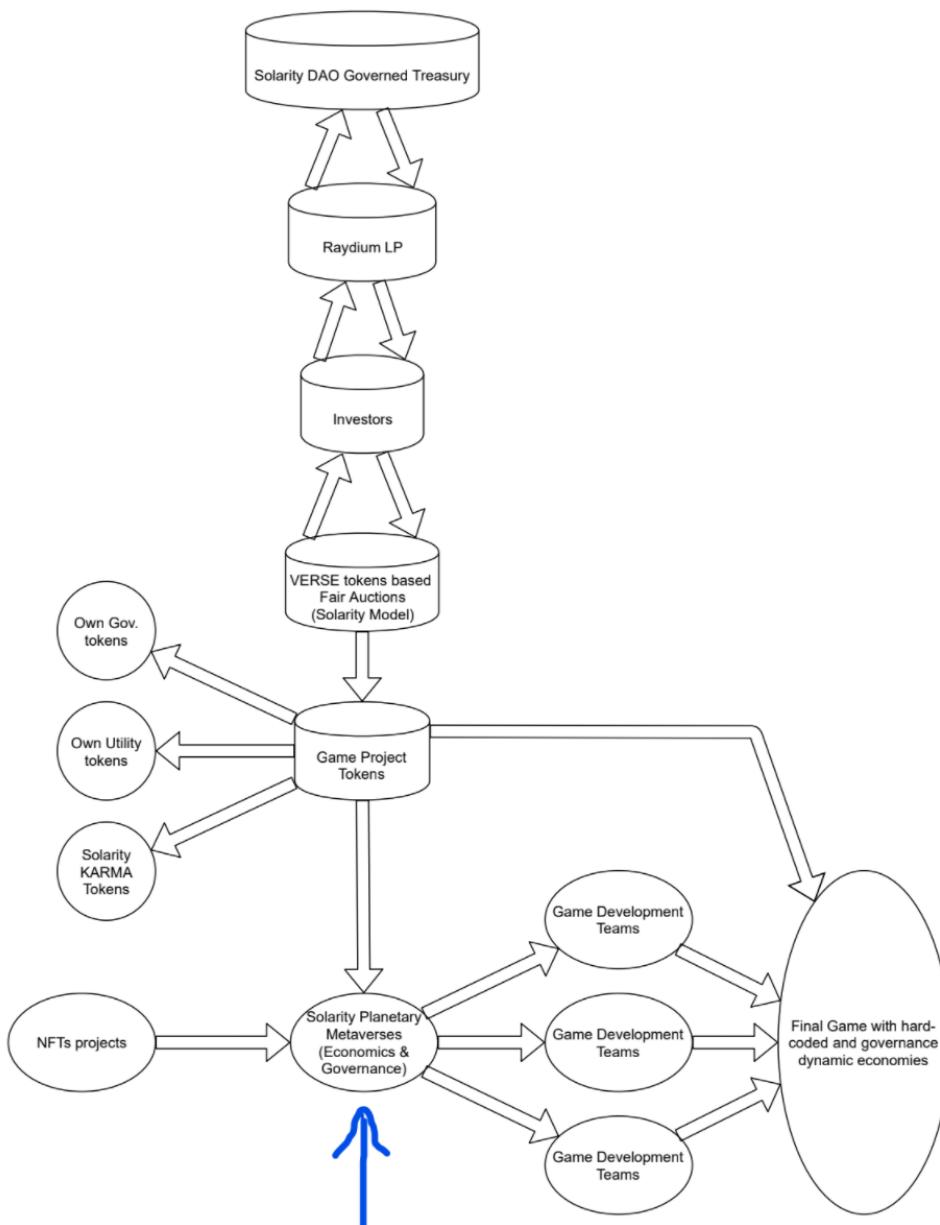


Use-case as a Launchpad for Token-based Planetary Metaverses of NFT Projects: (Assets compounded between the Galaxy)

In order to accelerate the population of this Galaxy of Virtual Nations we'll make it scalable to have Launches for NFTs Projects using the Solarity Solution.

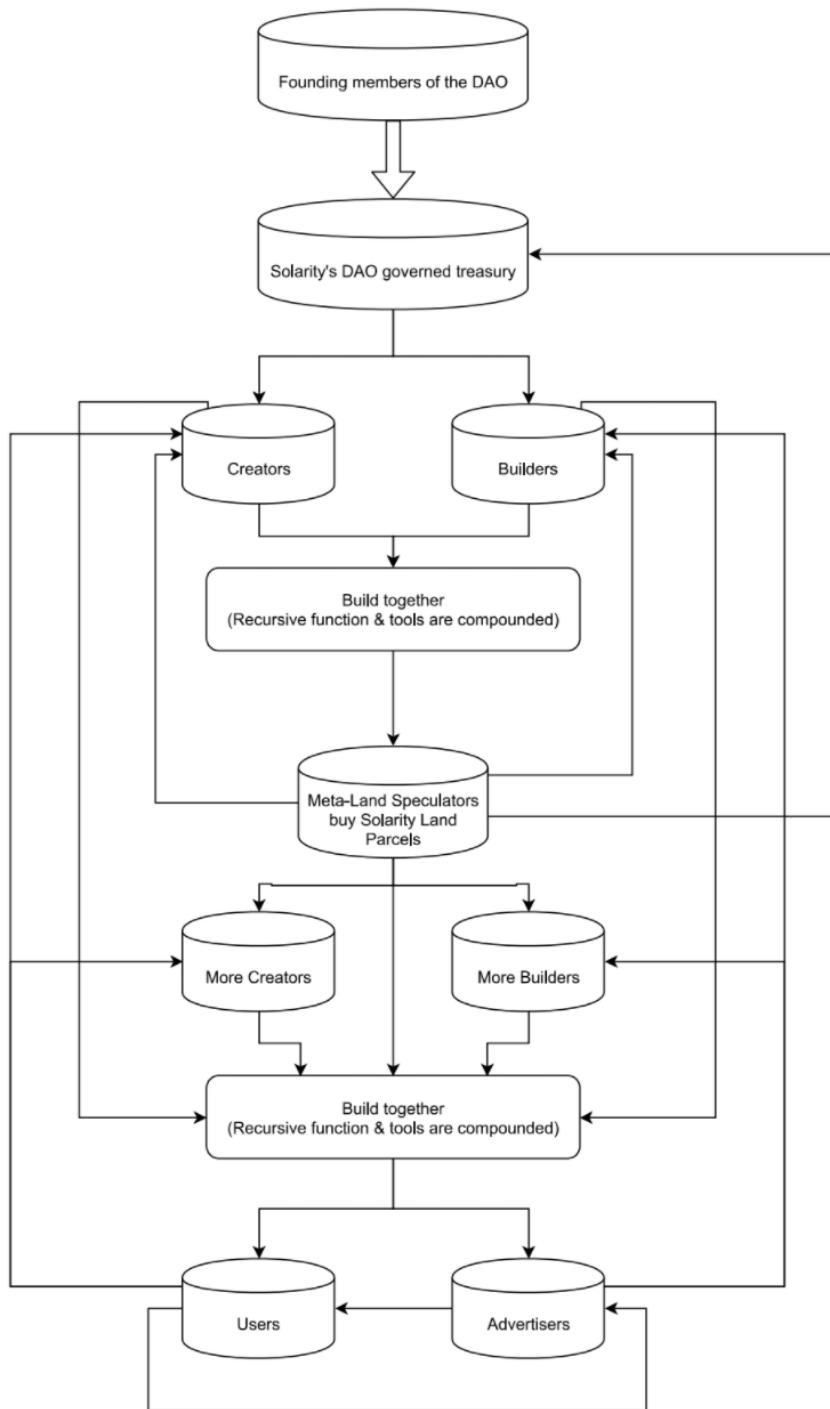
Every NFT Project that Launches its Planetary Metaverse Burning our Community Token will be able to use any Solarity's Sponsored Asset Collection

(eg: The “Britannica” Project that will be disclosed in the Technical Paper)



Sustainability explained:

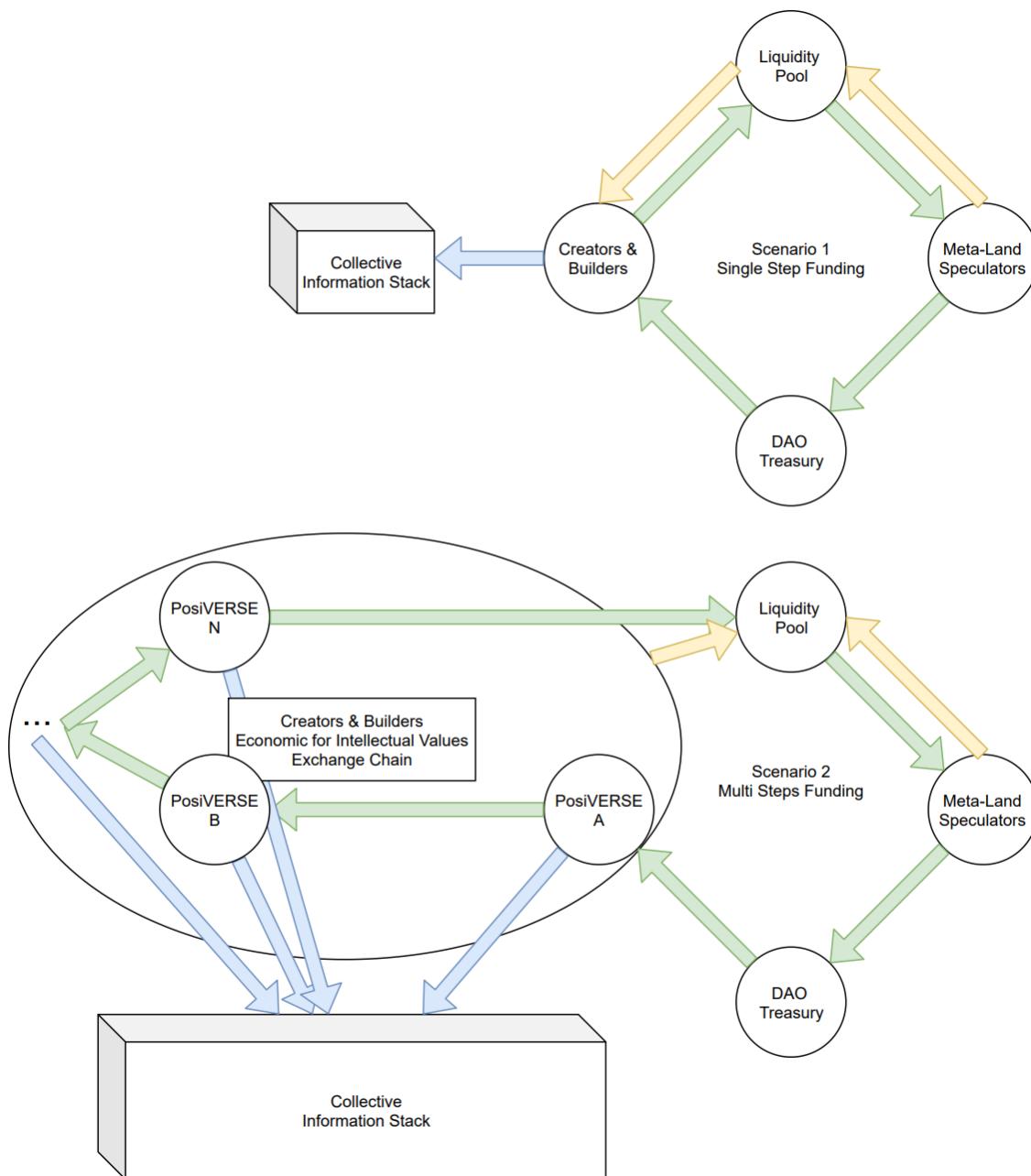
Now it should be easy to understand this Graph having in mind Solarity's Economic Cycles.



Goldberg Funding Overview:

Yellow = SOL Token

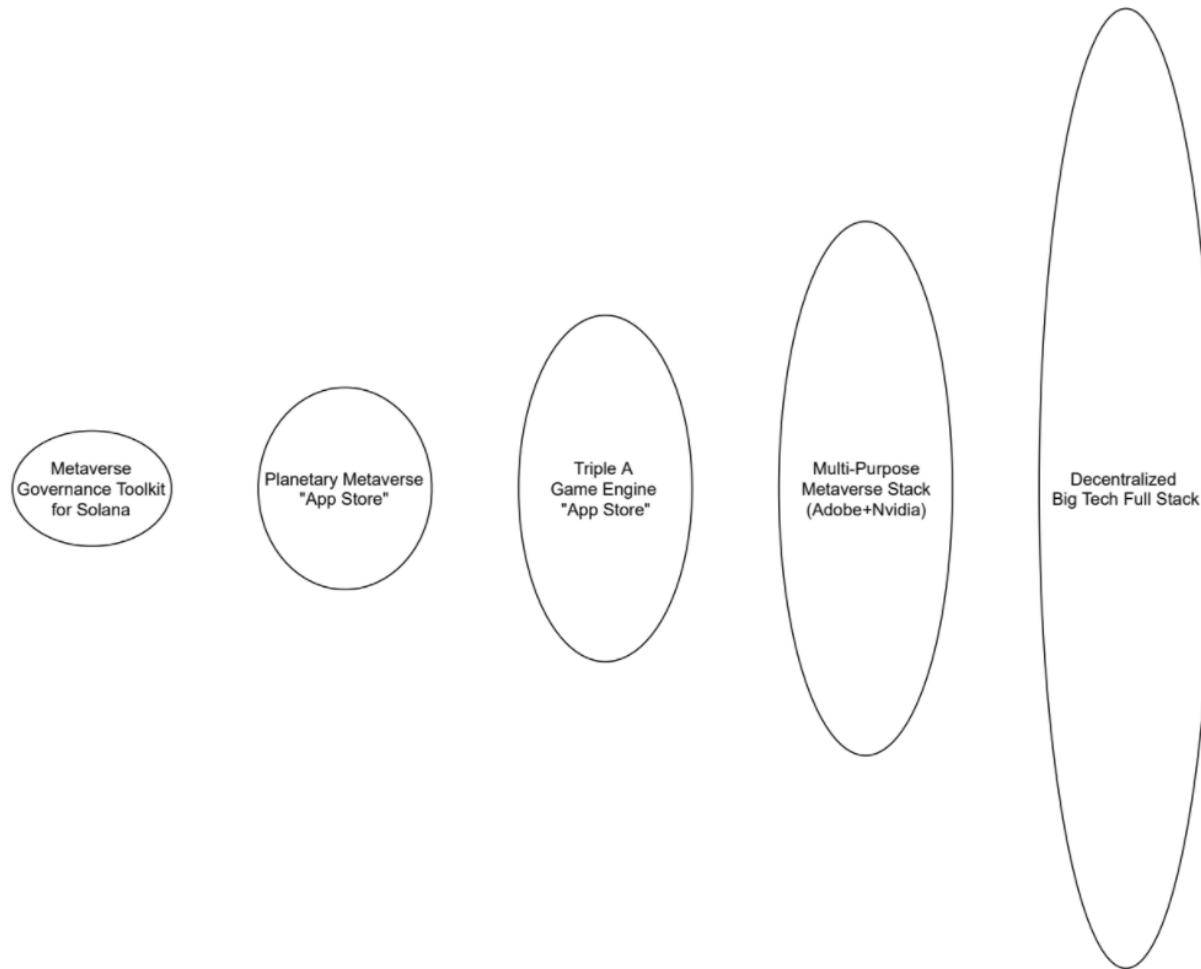
Green = Solarity Community Token



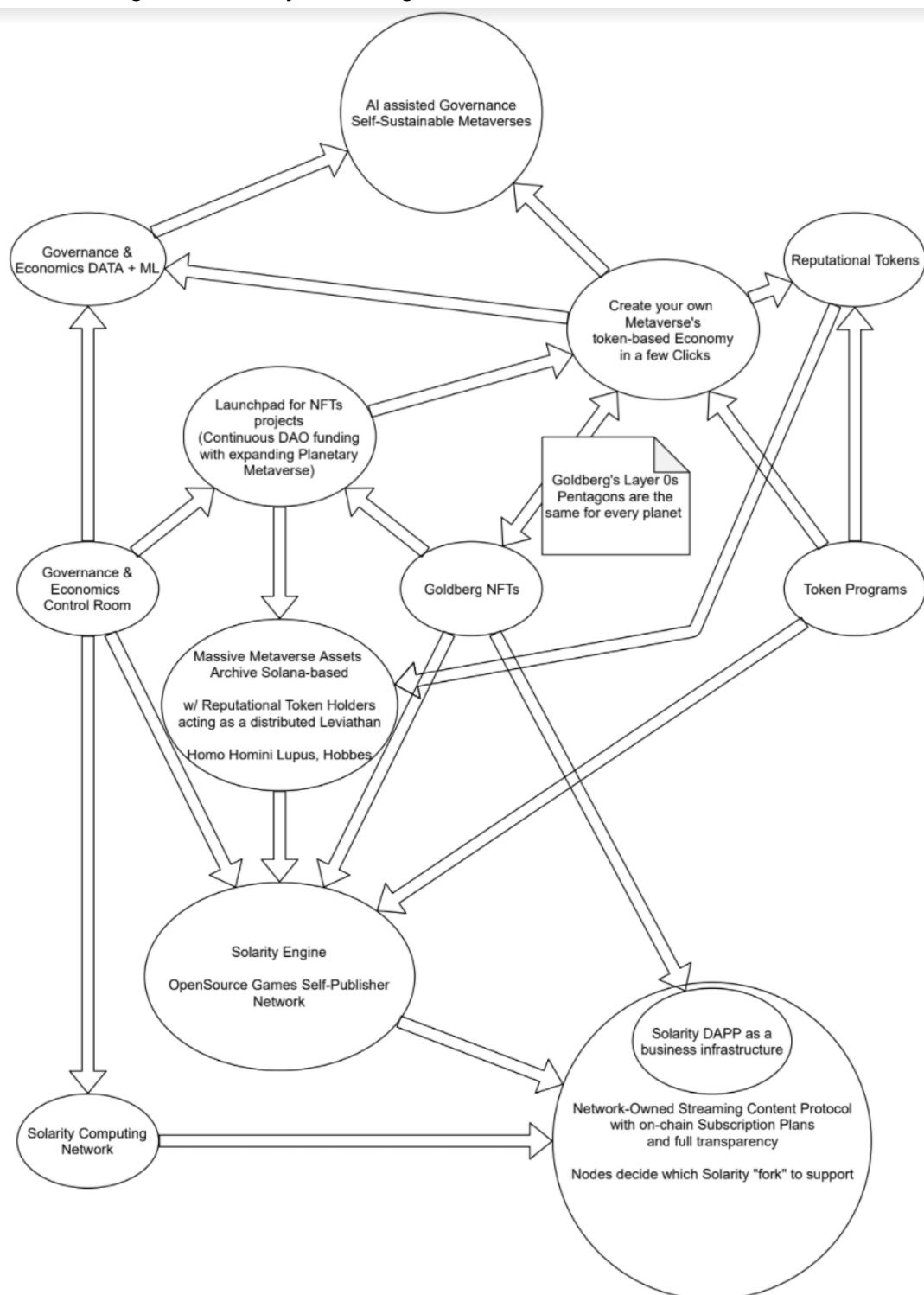
Sustainability put to use:

Slowly but surely we'll build a Peak Performance OpenSource Alternative to Big Tech.

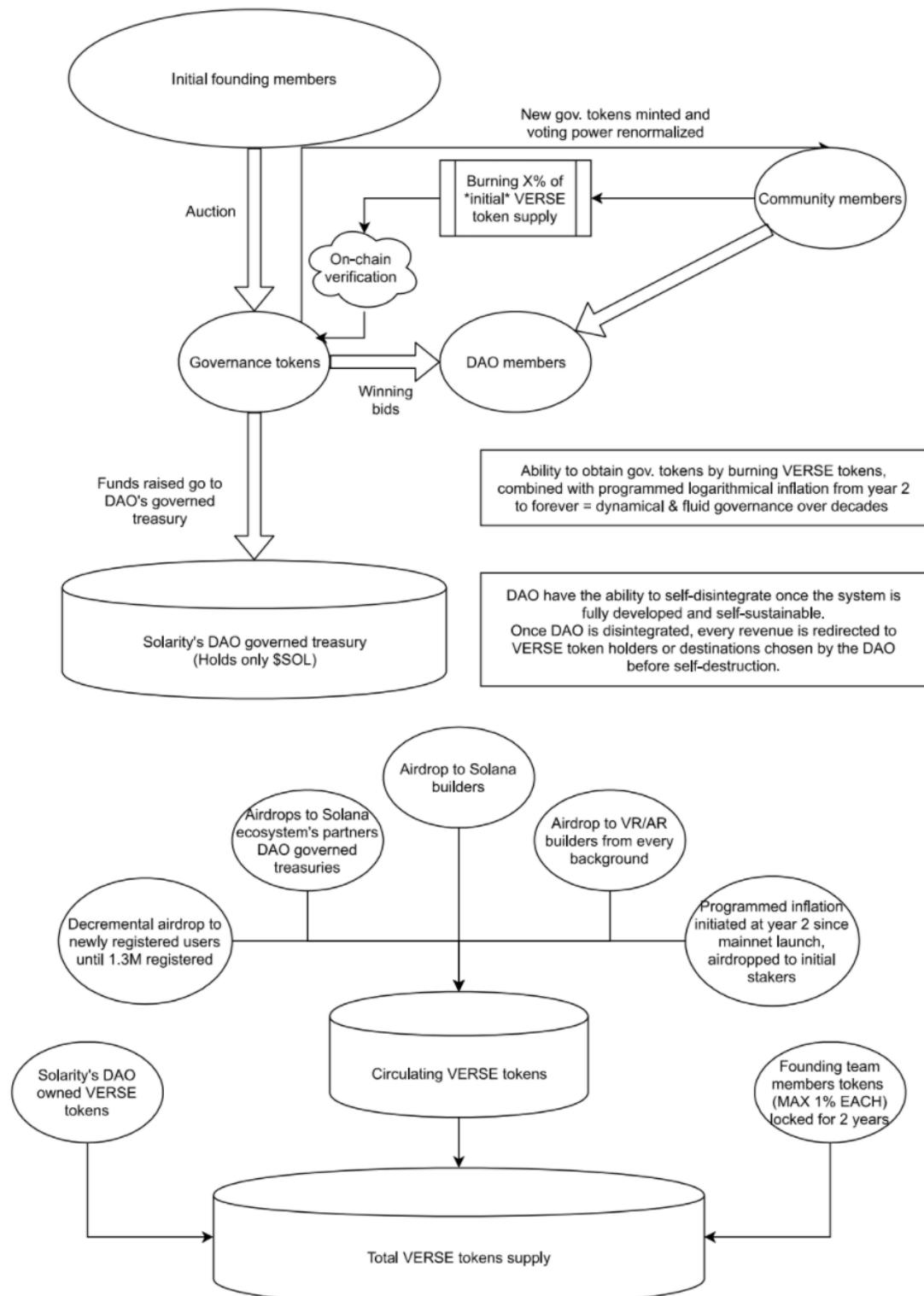
To achieve this mission, Solarity will need the entire Galaxy of DAO-VERSEs that will be built using Goldberg Polyhedron based Crypto-Economic Systems.



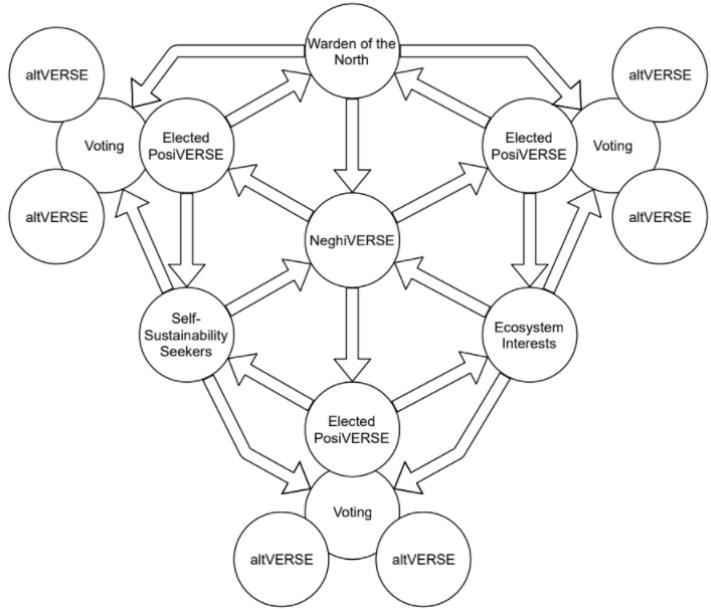
This is a Long Term Solarity DAO's Agenda.



Protocol Governance: Community Composition:

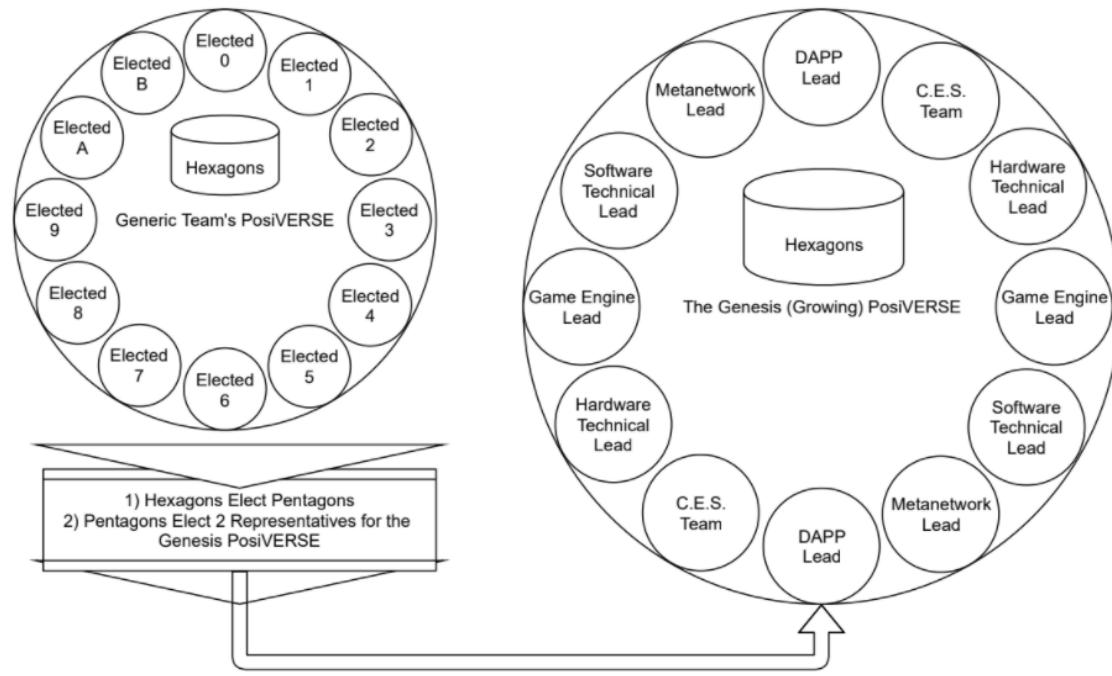


PosiVERSEs Periodical Elections:



Each Pentagon “Area of Influence” of Solarity (the colored tiles below that have a Pentagon at their center) will be able to Elect a Pentagon Warden, a DAO that will be funded with the upgrades on the Hexagon Land. (Hopefully this doesn’t get too political)

Retroactive Funding for Public Goods Contributions:



1) Pentagons of the Genesis PosiVERSE assign Land to addresses that contributed the most in the development of Solarity.

2) As the development goes on, Land is eventually saturated and the Representatives (Pentagons) have to vote on the expansion of the Genesis PosiVERSE

3) Having a non-transferable NFT (Land Membership) from the Genesis PosiVERSE will be the highest medal of honor inside Solarity.

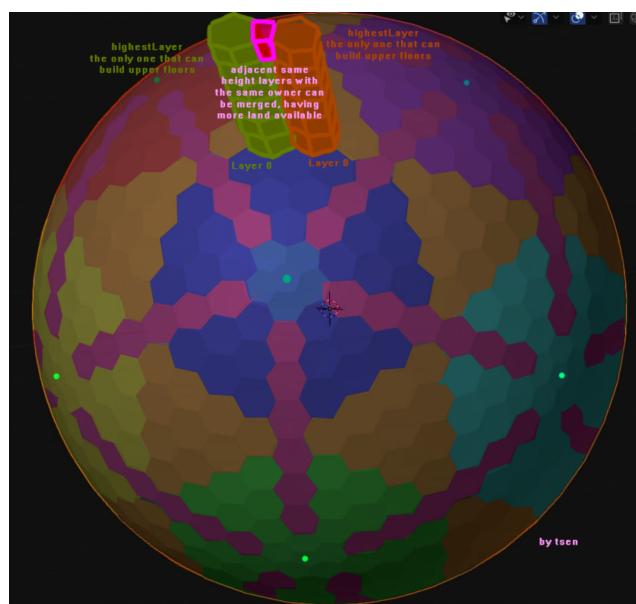
Why?: To have an easy way to reward the most brilliant people of our community.
(Through Goldberg Funding in Solarity's Sub-Sectors)

As Solarity will be the first NeghiVERSE, the DAO tied to Solarity's Sub-Sectors on Solarity's Surface that is funded through the Land Upgrades in that Area of Influence, will be **the Genesis PosiVERSE** (Alternatively the Genesis DAO).

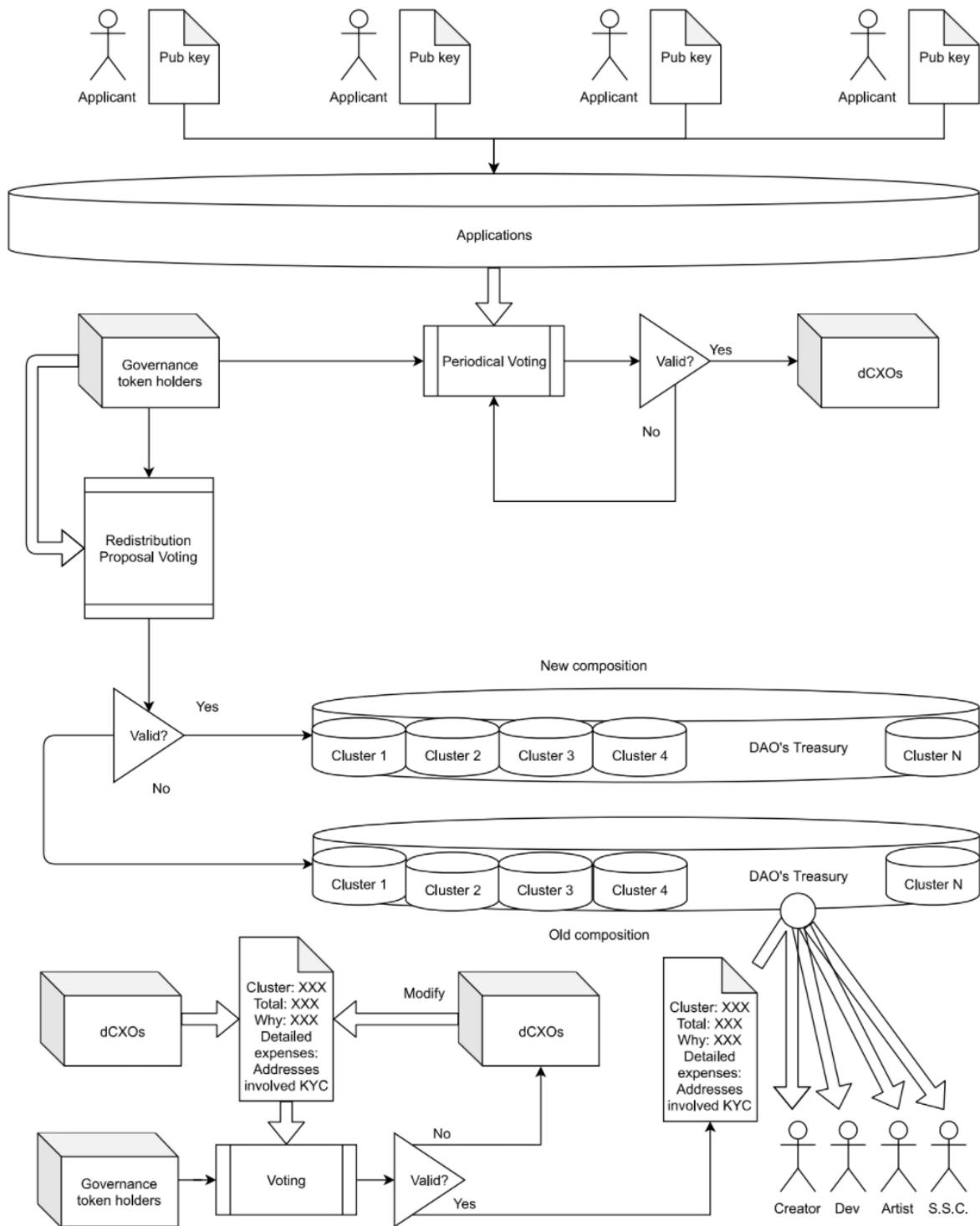
The Genesis DAO is a DAO in which members can only be added by Periodically Elected Representatives of the 6 MegaTeams (DAOs).

The Land Ownership of the Genesis DAO is non-transferable.

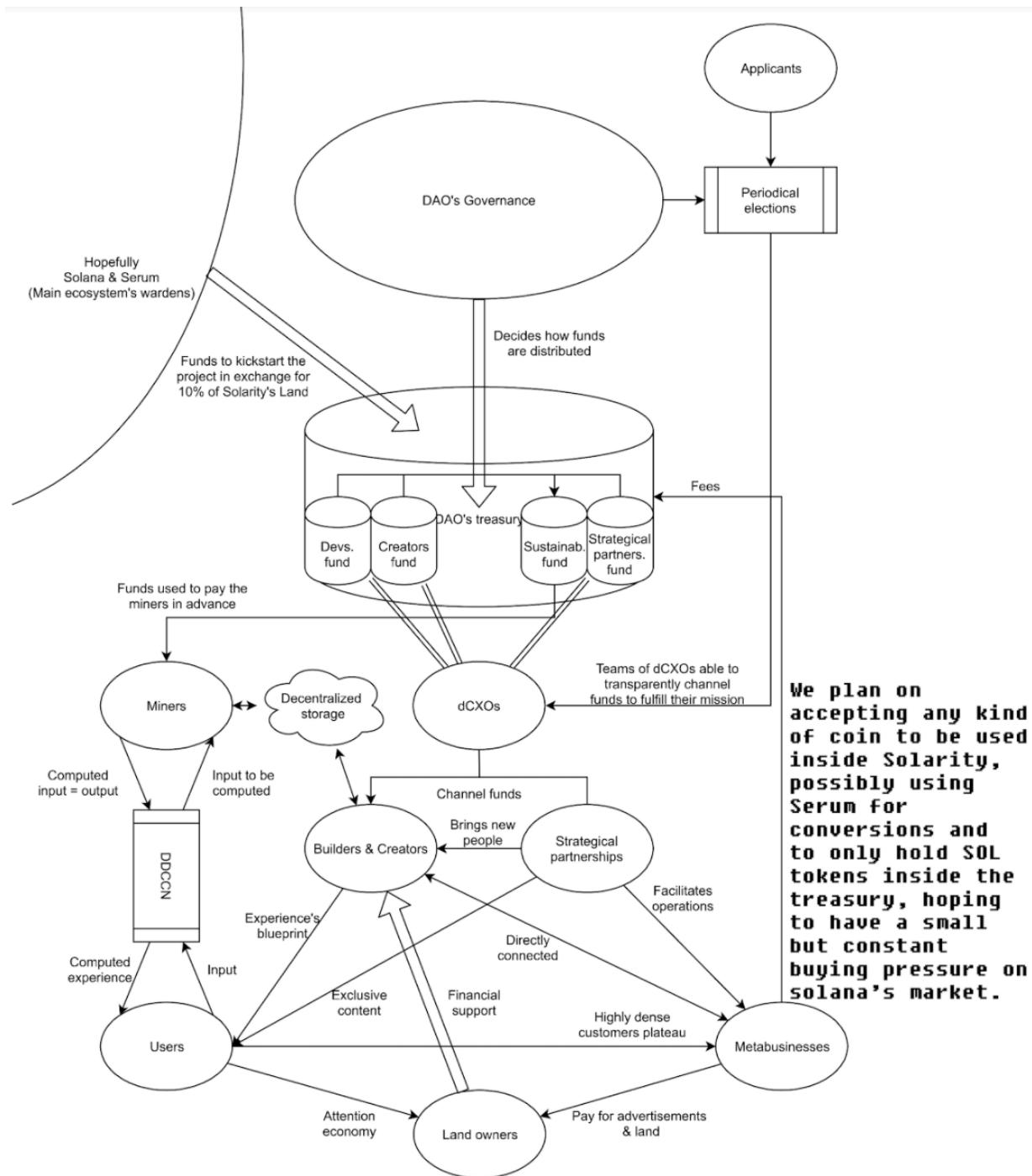
The Founding Leaders (2 per Team) will stay in charge until MainNet Launch, after which Elections will take place and the Teams' DAOs will elect their new Leaders (They can be the same).



Treasury Governance Detailed:

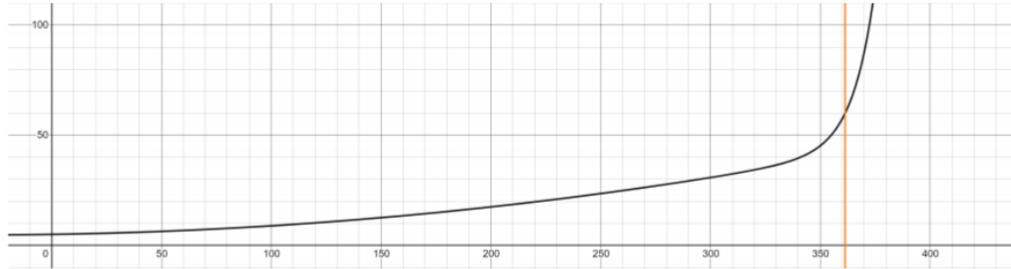


Treasury Governance Overview:



Operations Funding Function:

operations funding function used to pay for developers at an optimal incentive rate



The operations funding function:

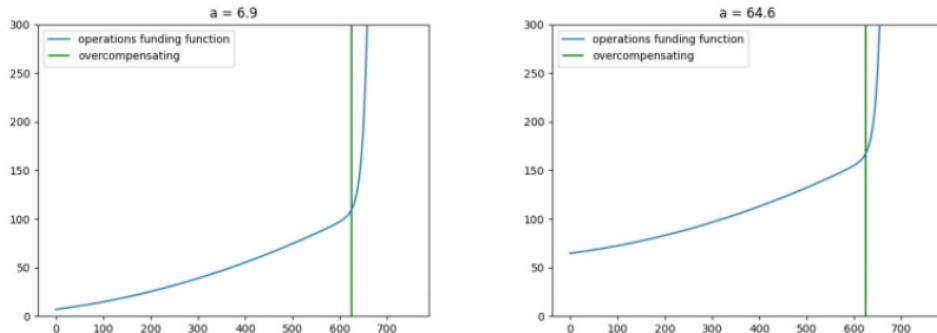
$$f(x) = a + \frac{b}{c}x + \frac{h}{(cd)^2}x^2 + e^{\frac{x}{d-c}}$$
$$f'(x) = \frac{bc + \frac{2hx}{d^2}}{c^2} + \frac{e^{-c+\frac{x}{d}} \log e}{d}$$

Parameters Explanation:

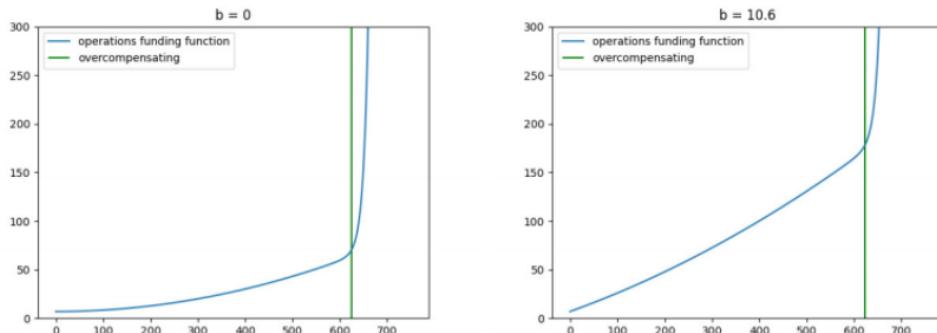
- $0 \leq a \leq 100$: initial rewards share parameter
- $0 \leq b \leq \infty$: base incentive parameter
- $0 \leq c \leq \infty$: trigger reward, minimum success parameter
- $1 \leq d \leq \infty$: delay parameter
- $0 \leq h \leq \infty$: incremental incentive parameter

This graphs show the behaviour of the function when a parameter changes and the rest of the parameters are constant

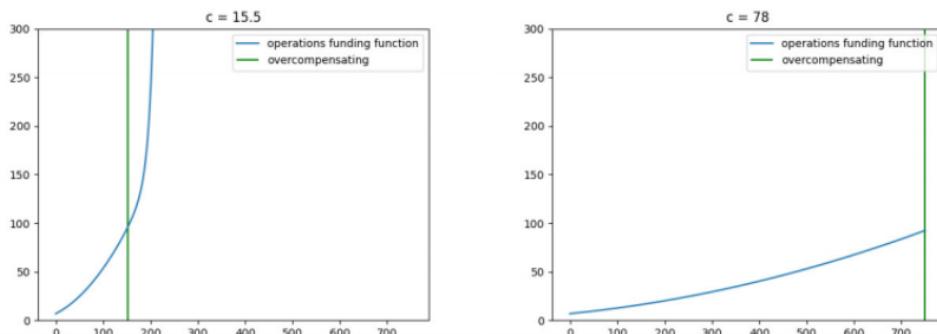
a behaviour:



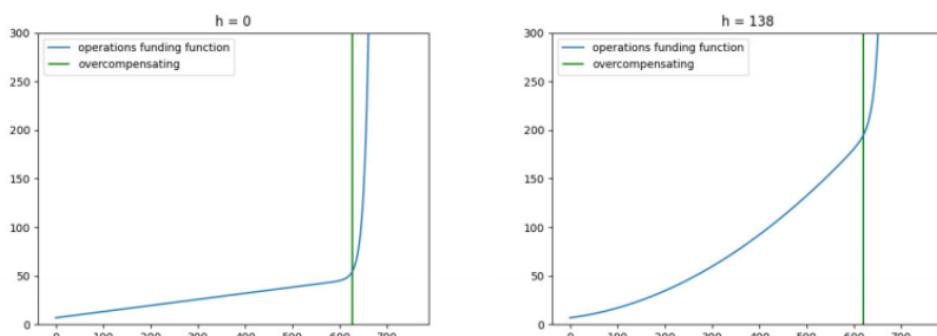
b behaviour:



c behaviour:



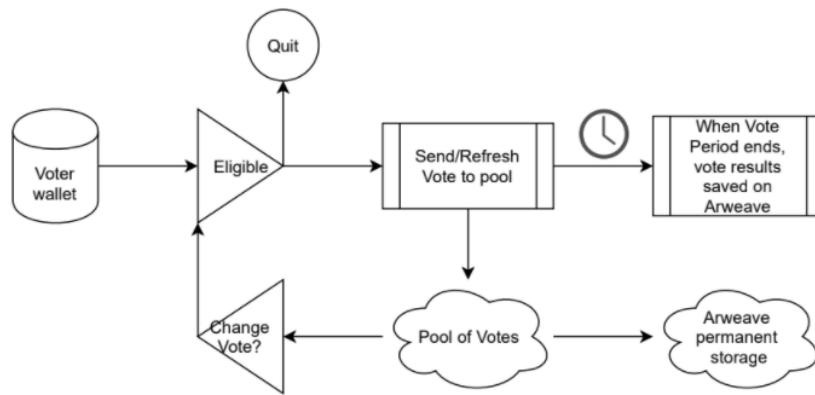
h behaviour:



Crypto-Economic System Governance:

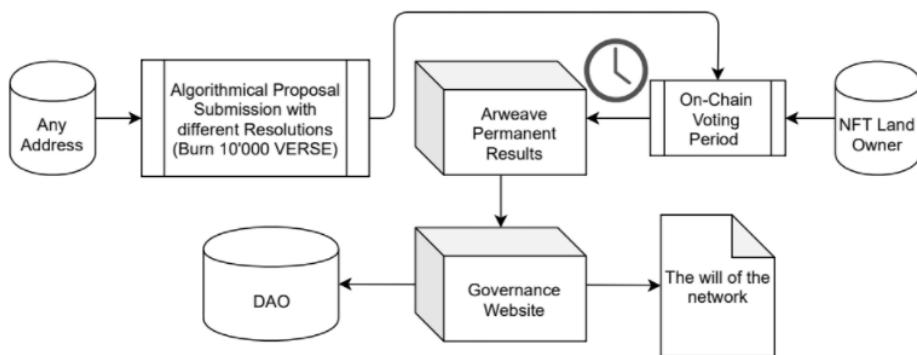
There will be different Layers of Governance, each for an intended purpose.

General Overview



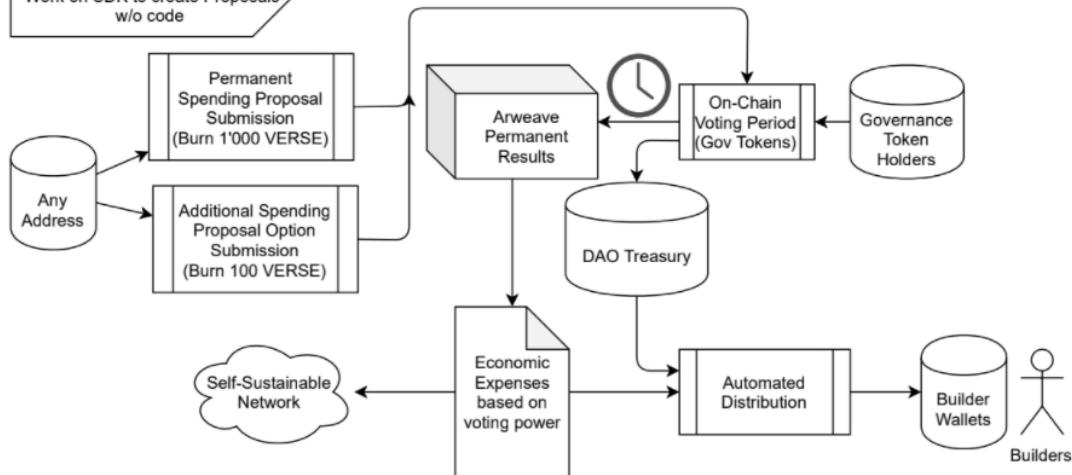
Platform Software Governance Overview

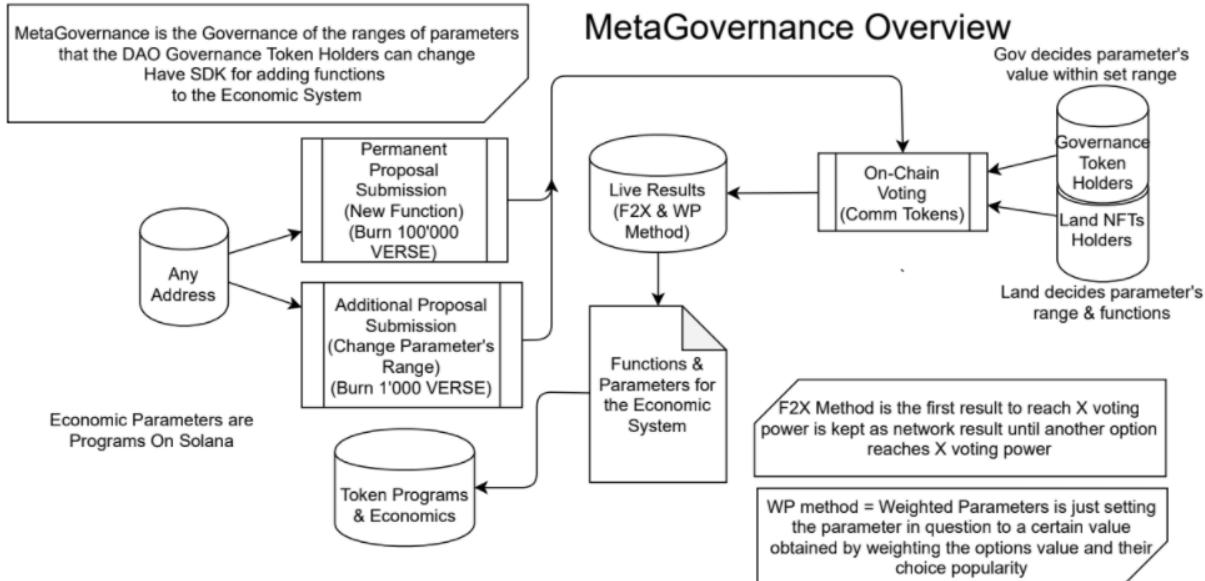
(can change pretty much everything if a constitutional quorum and win% are reached)



Dynamic Treasury Governance Overview

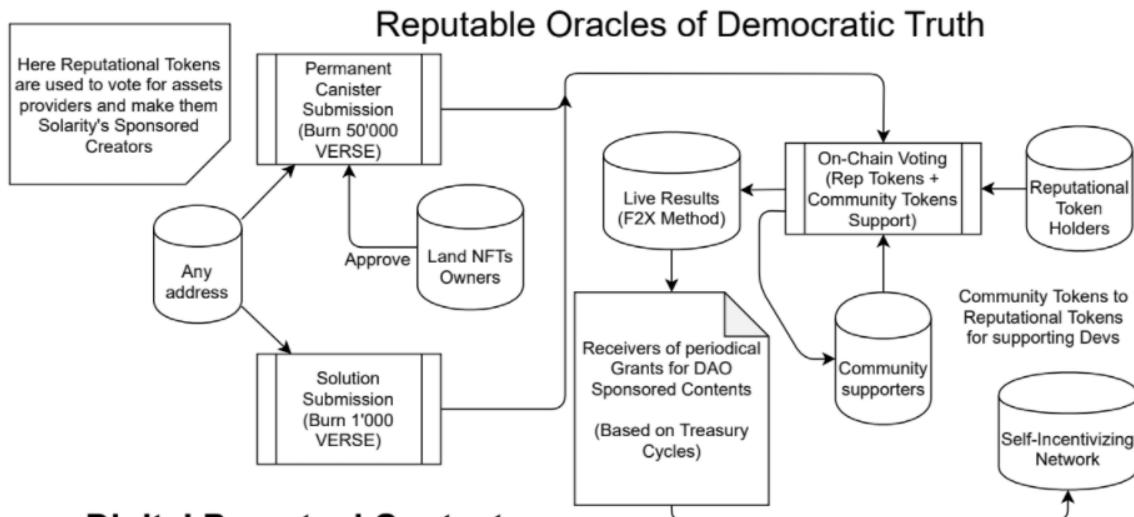
Proposals are Programs on Solana.
Work on SDK to create Proposals w/o code





Independent Resolutions

Proposal makers can have different options that are independent from each other (Govern a different parameter just like UpperBound or LowerBound)



Digital Perpetual Contests

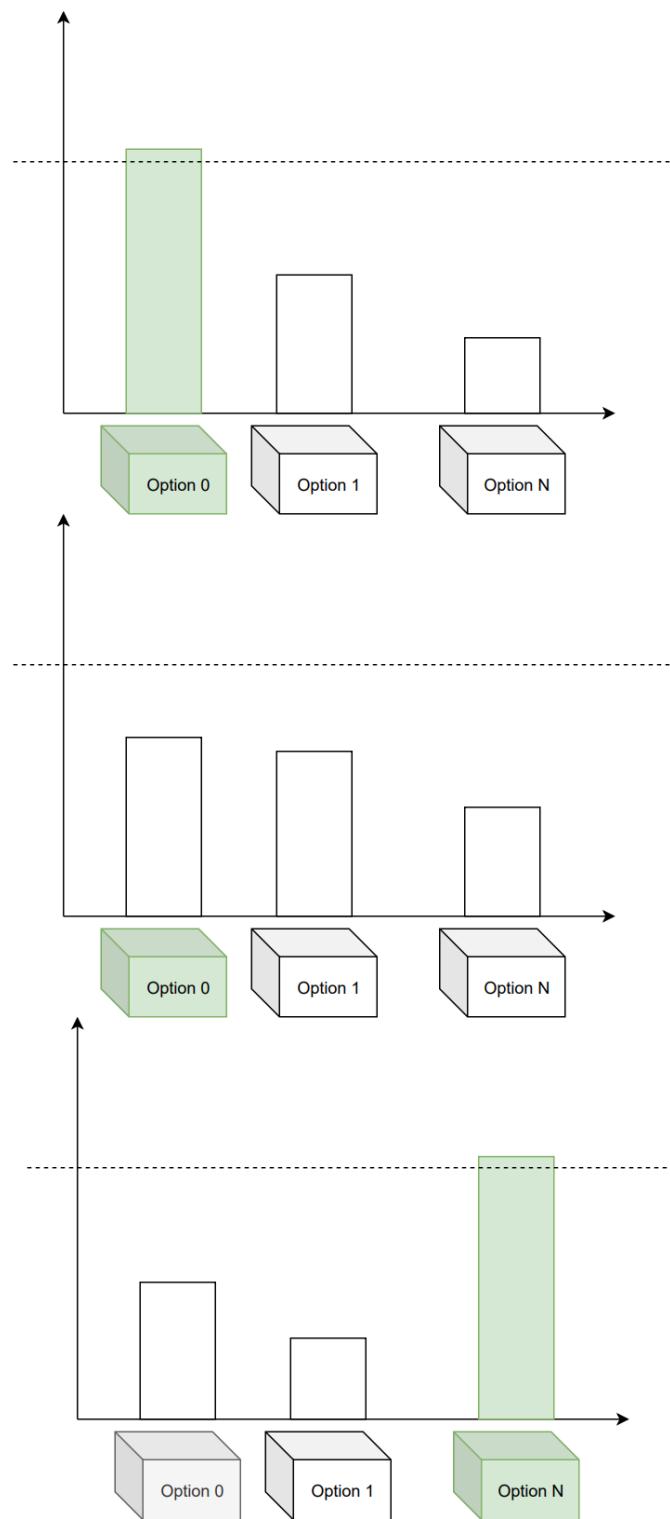
(Reputational Tokens are used to further Incentivize Good-Behavior (Value Adding Behavior) and they are discussed in the Technical Paper)

F2X (First To X, X > 50%) Method:

- 1) "Staking" begins.
- 2) First Option to reach X% Votes is set as "Current" Selection.
- 3) If another Option reaches X% Votes is set as the new "Current" Selection.

WP (Weighted Parameters) Method:

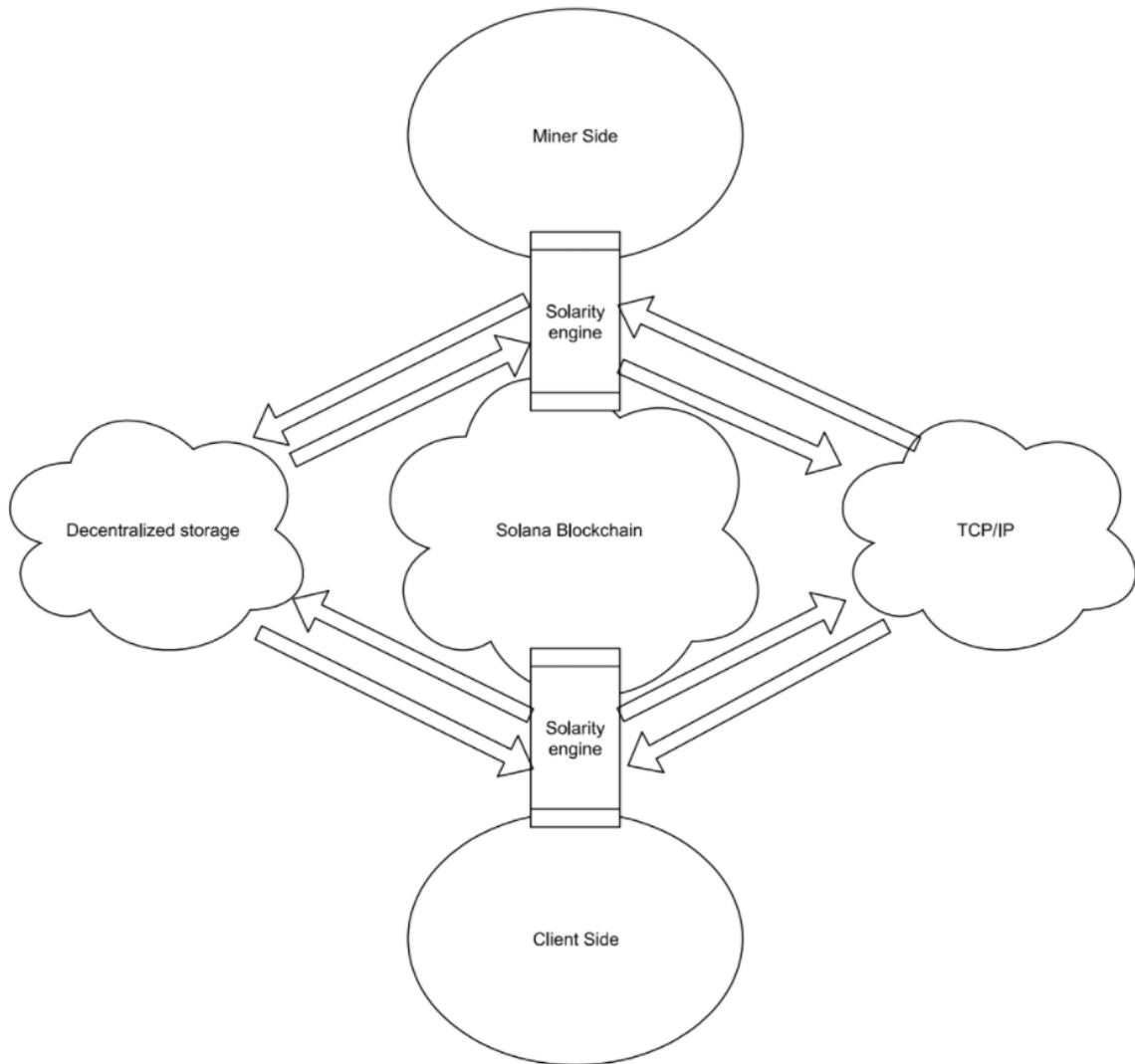
- 1) "Staking" begins.
- 2) Output Result is Weighted Sum of Voted Parameters.



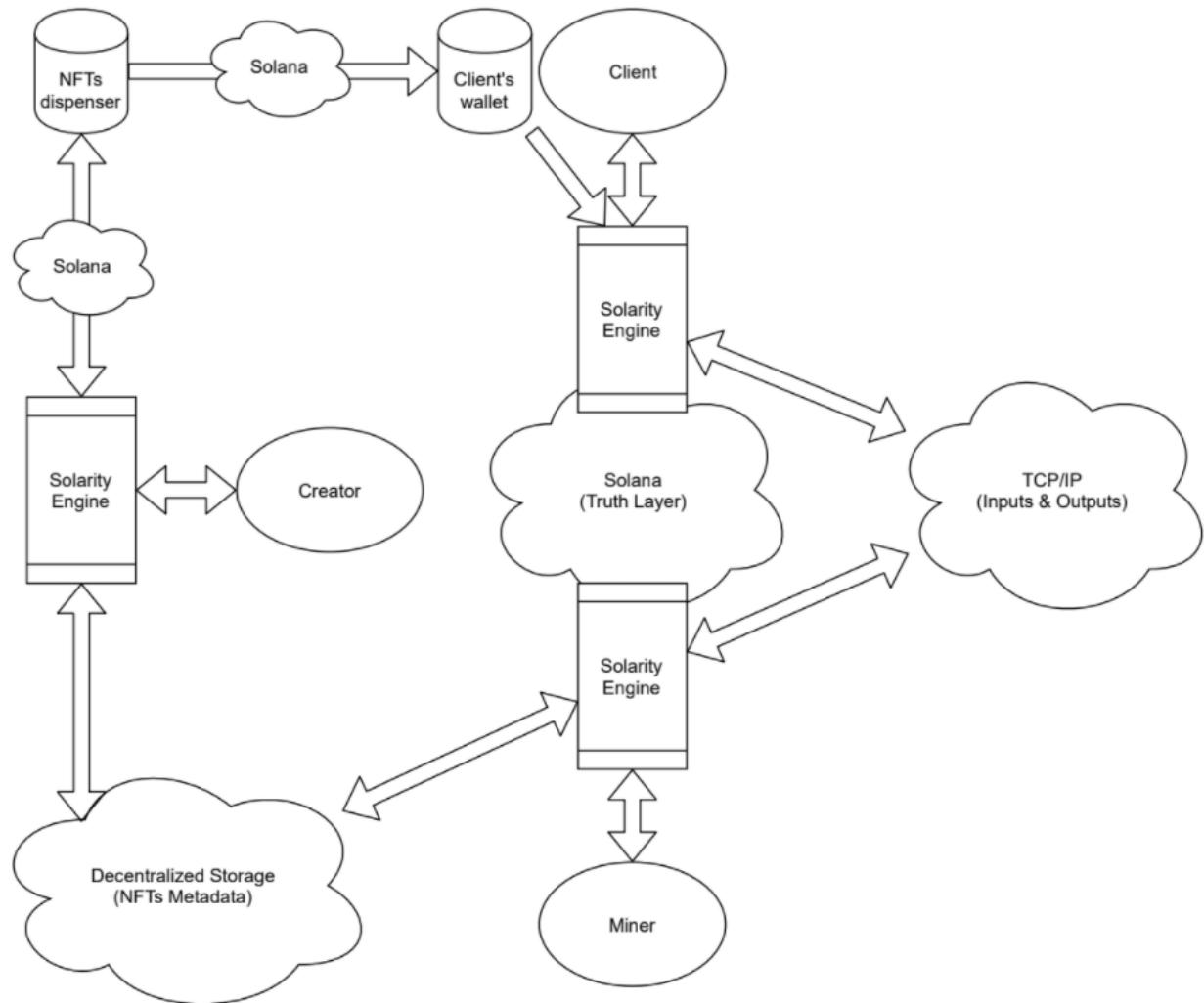
Solarity Experiences Engine (based on Godot):

The Solarity Experiences Engine is what enables everything Solarity is about.

A universal solution to scale VR Entertainment and to bring accessibility to the open metaverse to everyone, being the open metaverse the censorship-resistant network that protects the integrity of every human's thought and finally lets creators have no limit on creative freedom.



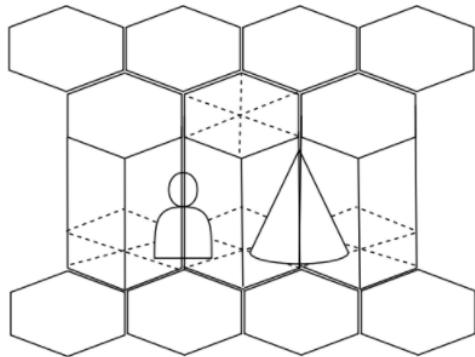
Possibilities Enabled (Blockchained Rendering):
NFT as Access Tokens (Like CDs ownership). “NFATs”



(Technicalities discussed in the Technical Paper)

Hyper-Scalability:
(1 Engine ∞ Worlds)

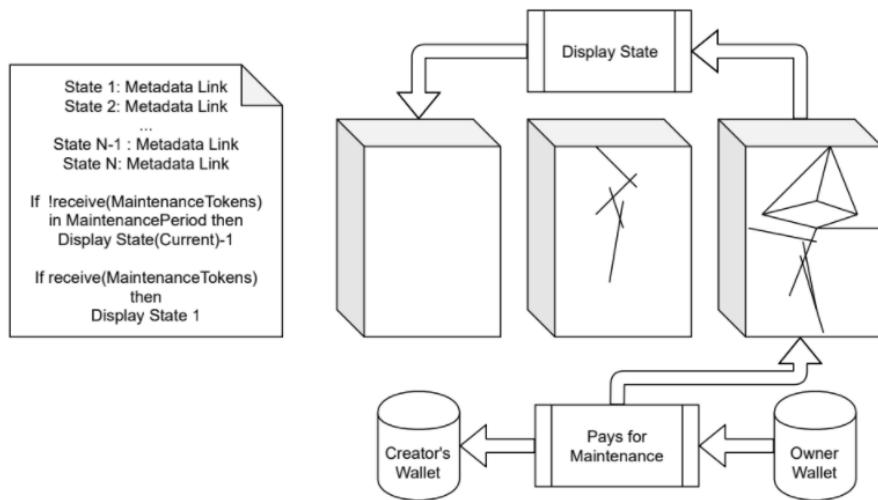
Simulate continuity in a discrete world



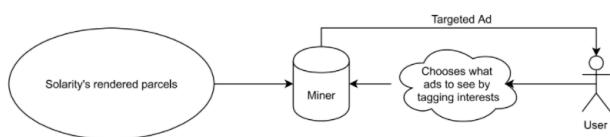
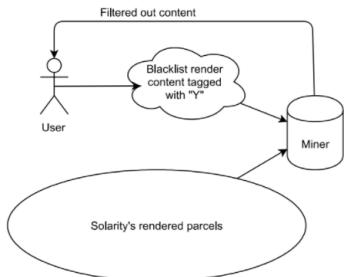
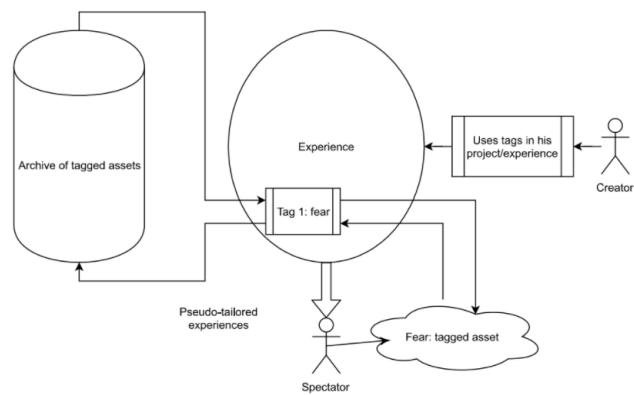
1 SDK (Hexagons Prism) and Infinite Worlds Indefinitely Expandable, are you not entertained?

Blockchained Rendering:

Narrow Blockchained Rendering (Monetization Tool for Creators in Solarity)



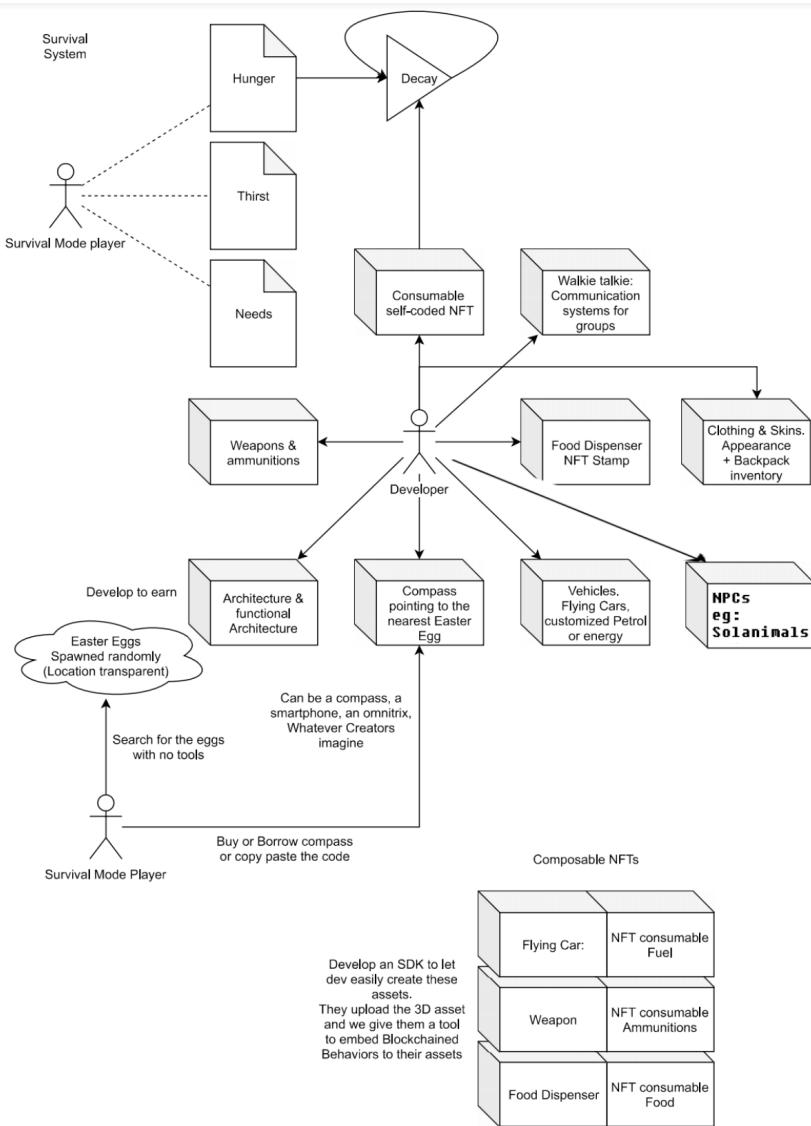
Broad Blockchained Rendering (Advertisers & Creators Tool for Solarity)



Users get paid VERSE tokens if they enable Solarity Analytics, a tool for advertisers to provide advertisements more efficiently

MegaNFTs to Revolutionize Gaming Forever:

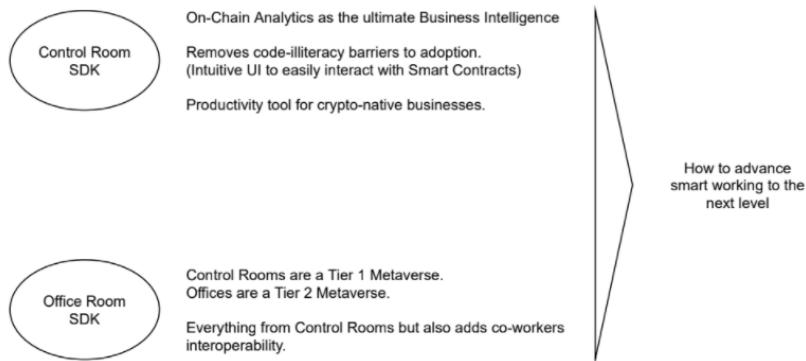
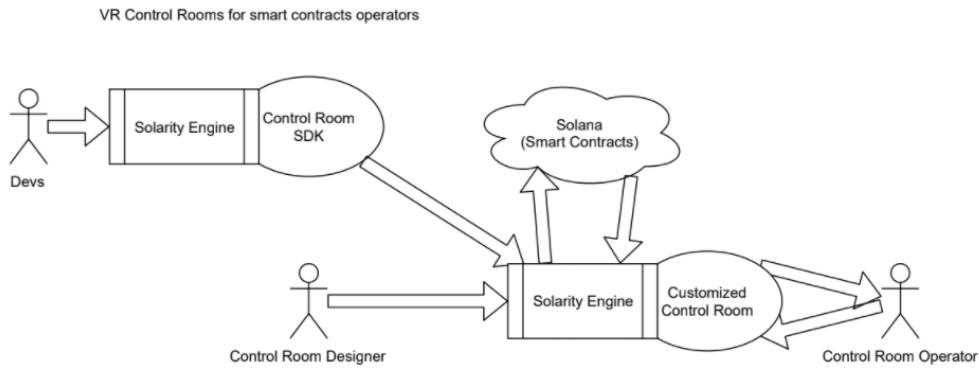
This is the key feature of Solarity's Survival Mode.



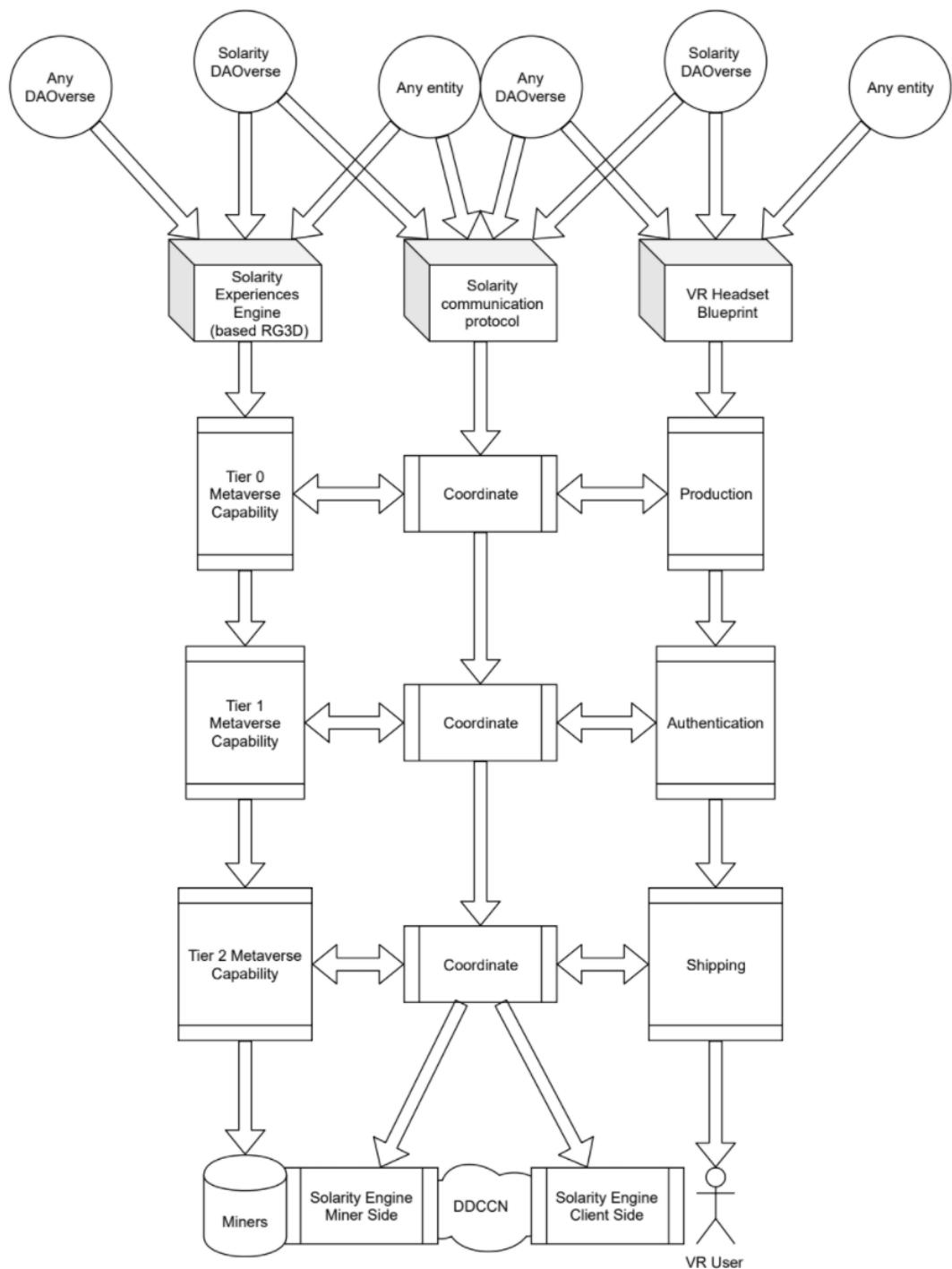
Having Blockchained Game Assets means that the DAO is able to interact with the Permissioned Game Mode in a Trustless way.
 This has literally infinite Use-Cases.
 (The Combination of two Turing Machines is a Turing Machine)

4 Tiers of Metaverses:

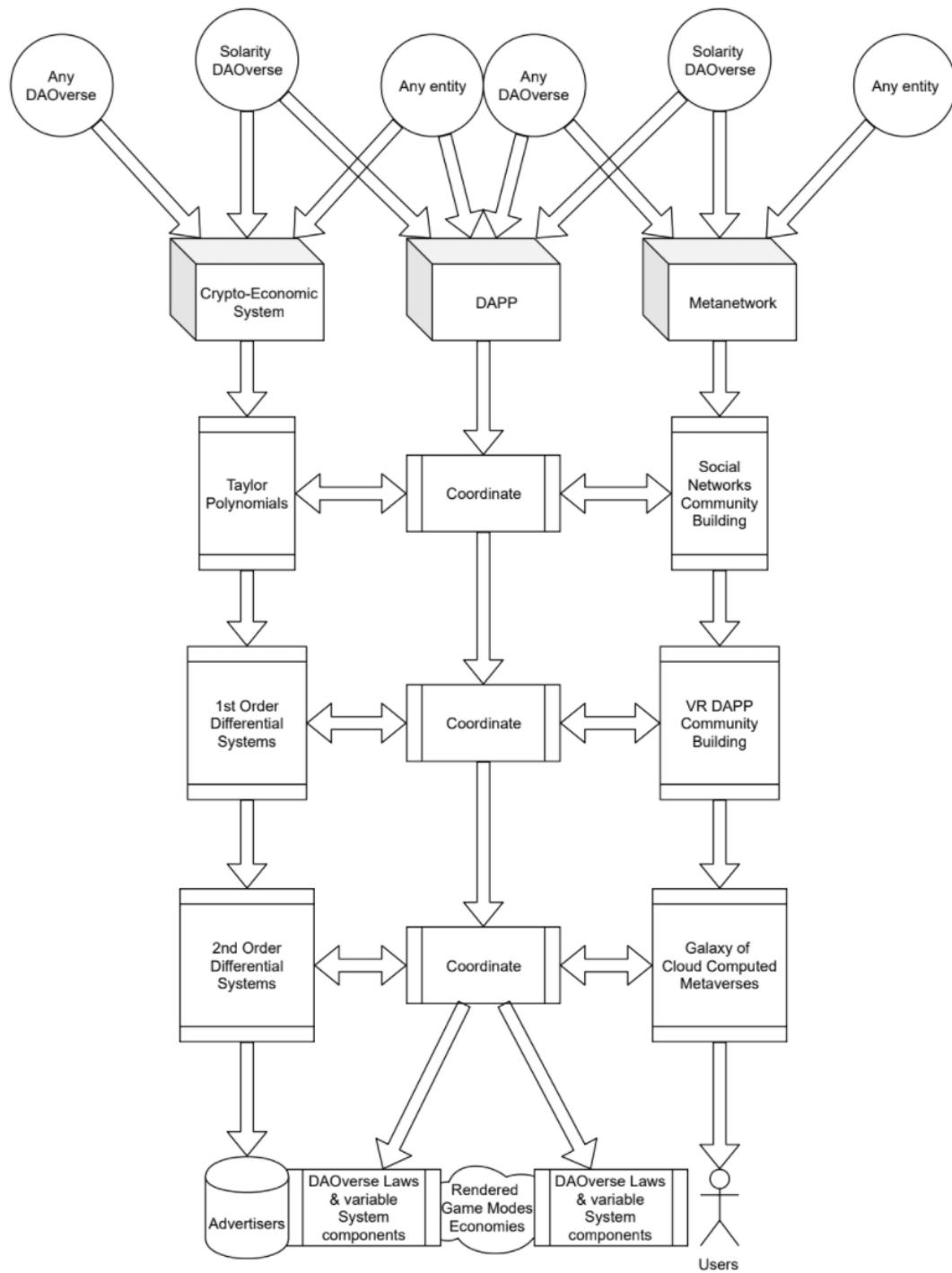
Utility for the Ecosystem (of Solarity's SDKs):



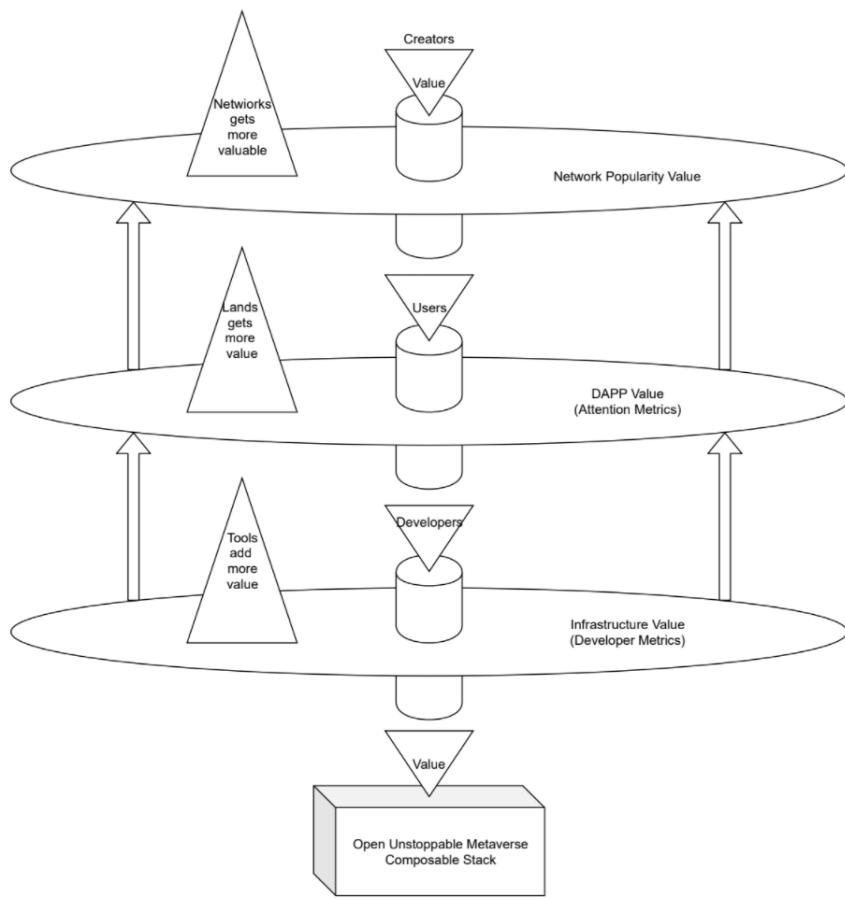
6 Teams to build the metaverse we always dreamed of: Noumena MegaTeam (Building the Infrastructure):



Phenomena MegaTeam (Building the Virtual World):



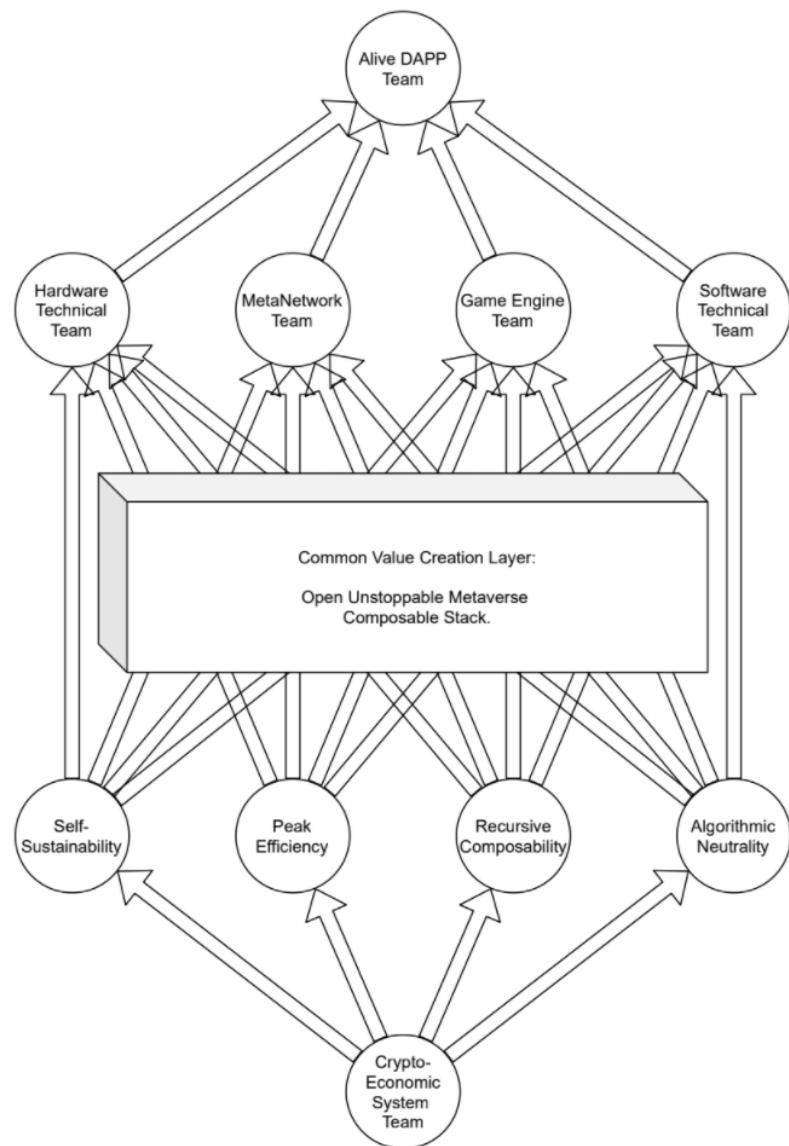
Now it's easy to understand this scheme from before:



- 0) The Solarity DAO will kickstart the Perpetual Engine
- 1) The Noumena MegaTeam will focus on building the Infrastructure Layer
- 2) The Phenomena MegaTeam will focus on building the DAPP Layer
- 3) Everyone on Solana will be able to use both the Infrastructure Layer and the DAPP Layer
- 4) The Network will get more valuable and the Perpetual Engine will reach a point in time in which the Platform is Self-Sustainable & Able to Pay for the VR Computation for Users because of the Conservation of Information (Infrastructural Tools are Forever).

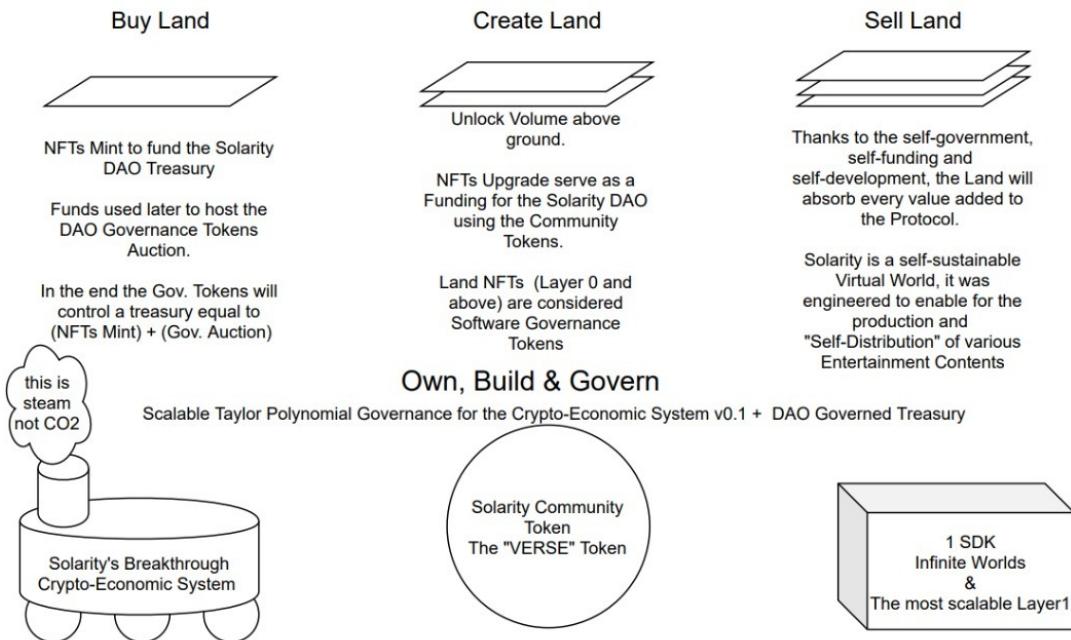
Due to the Innovative Goldberg Design to ensure Peak Efficiency and the Innovative DAO Self-Destruction Feature to ensure perpetual Network Neutrality any developers out there will be thrilled to know that we are decentralizing Big Tech in an Over-Engineered Old Fashion.

Thanks to Solarity's Crypto-Economic System they will see the path of least attrition too and together, joining the Resistance for an Open Metaverse at the Solarity DAO, we'll free humanity from intermediaries and we'll start the Digital Renaissance movement to Save Our Planet.



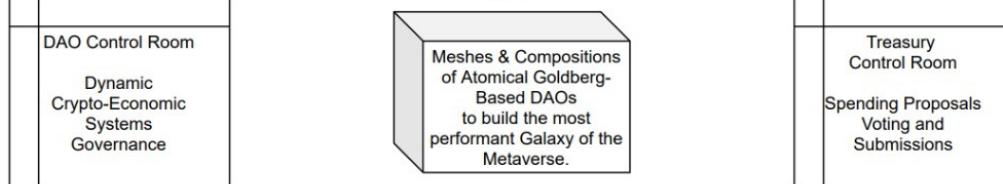
One pager Recap:

Solarity: the first "Alive" Virtual World



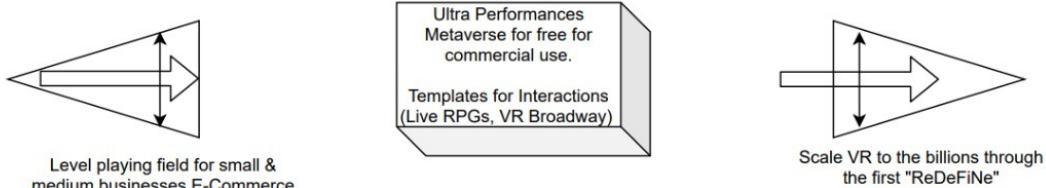
Infinite & Effortless Scalability

Only Two Classes of Identical Land Parcels, Pentagons & Hexagons. Perfect for a Modular Governance System & as the base of a Galaxy of Virtual Worlds



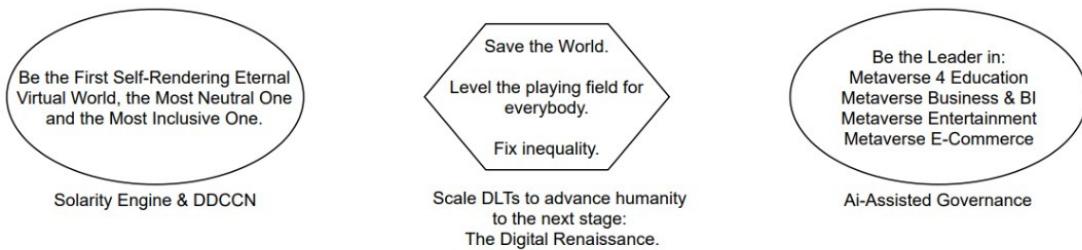
Digital Renaissance

Literally everything is an NFT, empower Creators with a Self-Rendering Platform & unleash true VR Power through Network's Capillarity & Scalability

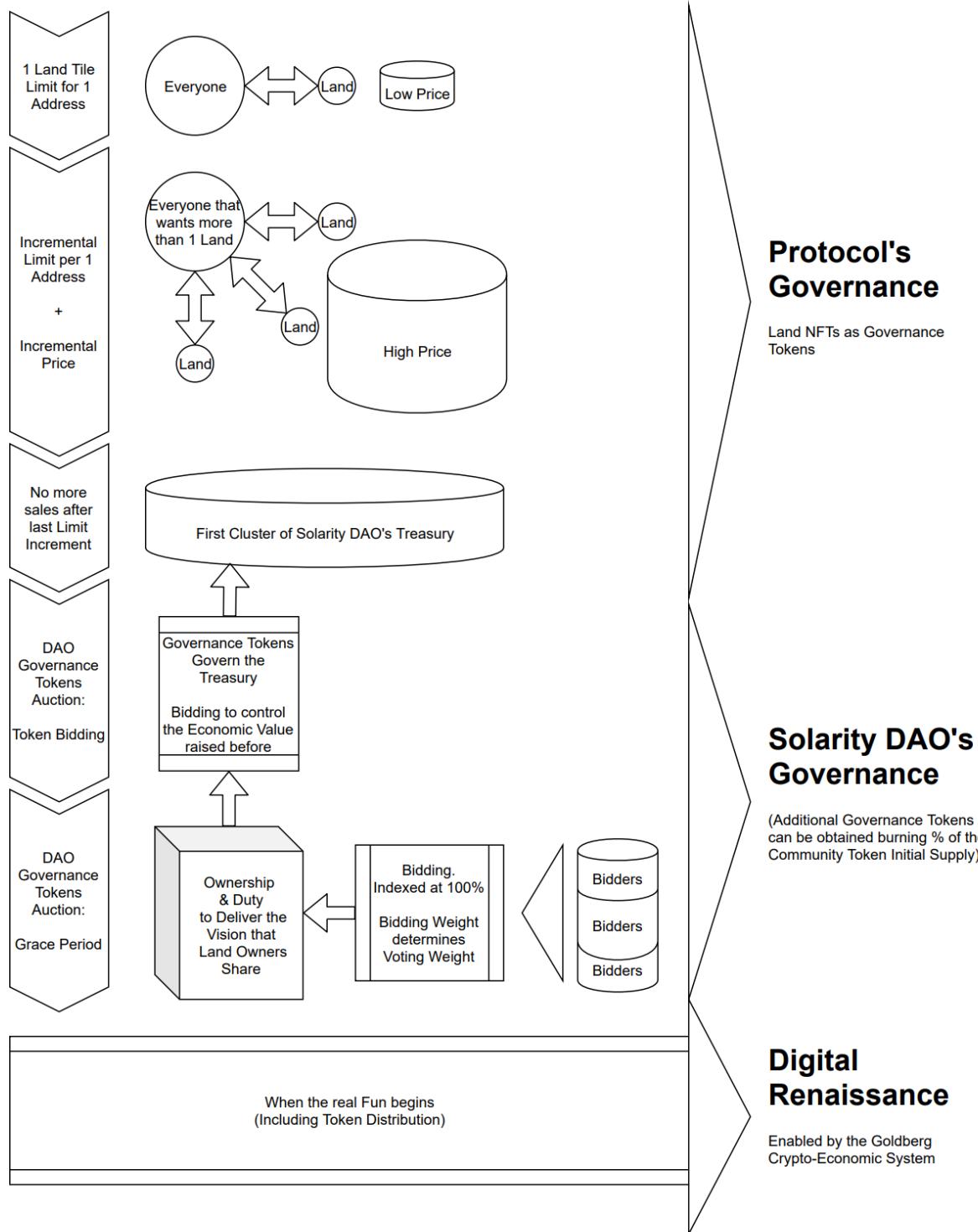


Metcalfe's Law

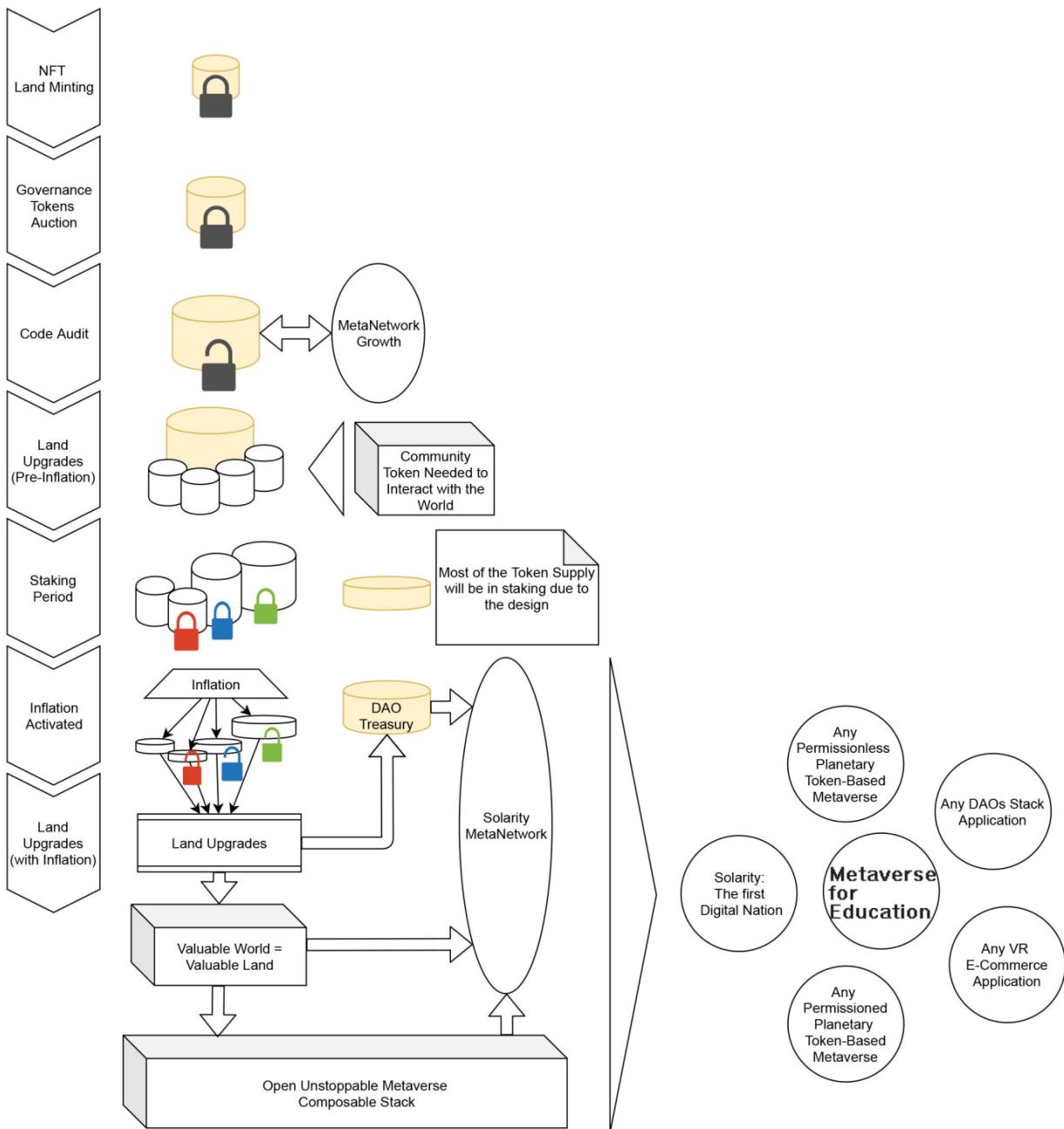
- Speed up the human development by providing an easy way to implement the latest technologies at the reach of everybody from any background



DAO Hatching Phase:



DAO Short Term Agenda:



DAO Long Term Agenda:

