EULIUM CRYPTO

The Eulium Project

A decentralized trustless solution to user owned
research, healthcare, and pharmaceutical

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This paper introduces a new model for funding, owning, and monetizing scientific research as it relates to Biotechnology, Pharmaceutical, Healthcare, Diagnostics, and Chemical development/research. Eulium provides a marketplace to fund research, irrespective of patient size or demographic considerations. The funding of research on Eulium through trustless staking provides **immediate** chain rewards for the investor, **transparent** funding of the project, and proportional **ownership** of the research.

The Eulium Project lowers the barrier of entry for researchers to begin providing value to the scientific and medical communities. Similarly, the crowd funding model and trustless architecture creates its own governance towards projects, scientists, groups, and collaborators. The results being a user owned, decentralized, self-governing, global research marketplace. A marketplace where pharmaceuticals pay dividends and rewards to the researchers and public according to their effectiveness, efficacy, and safety. A marketplace that funds honest and transparent research regardless of geographic location. A marketplace where scientific research maintains a chain of ownership, safeguarding ideas, promoting progress, encouraging productivity, and rewarding innovation and intuition.

- Eulium funds treatments as well as cures
- Eulium encourages collaboration and specialization
- Eulium is the past, present, and future of Science

Introduction

Pharmaceutical, Healthcare, and Scientific infrastructure is a maze of regulatory compliance, marketing propaganda, and secrets. Systems at their cores, are supposed to increase the horizons of knowledge, reduce human suffering, and enable longer, healthier lives. Instead, there are more incentives for making people sick, and treating symptoms, targeting larger patient sizes because of a greater return on investment (ROI), and suppressing research for cures because a lifelong treatment is more profitable (Noordraven et al., 2018).

To solve these problems, we need to disrupt the existing funding model, decentralize the information, and open research to the public. Similar to how during the 11th century, knowledge was locked away inside churches, and to get an education required the individual to become an ecclesiastic or cleric of the church (Barrow, 2015; *Medieval Education and the Role of the Church | Encyclopedia.Com*, n.d.); today's scholars and scientists are required to attend 12+ years of education, then join one of few prestigious research universities or companies where you are told what you can & cannot research. That research is then locked away inside a broom cupboard or archives basement until determined useful in the strategic profitability and monopolization of a market. The centralization of knowledge, research, and ability to perform research, creates oppression of different views and perspectives. Opposing ideas and concepts are a necessity for innovation, yet they are suppressed and removed from consideration because they represent a threat to the central authorities profit margins (Little, 2014).

What we need is a global marketplace, open to anyone, so that new organizations and scientists can join, extending access of science to underserved communities. Such a platform would encourage research for cures as well as temporary treatments because the investments will come directly from the affected public and their loved ones. The global marketplace will grow organically, taking direct referrals from the scientists performing the research to their friends, family, and colleagues. Furthermore, instead of donating $8 billion annually to a glorified marketing campaign, the $8 billion can be staked, and re-staked year-over-year, month-over-month, week-over-week.

This results in a compounded investment that represents $8 billion the first year, $16 billion the second, and $24 billion the third. This compounding effect creates implicit pressures to the community for results as opposed to the un-governed research foundations that are rewarded based on marketing incentives.
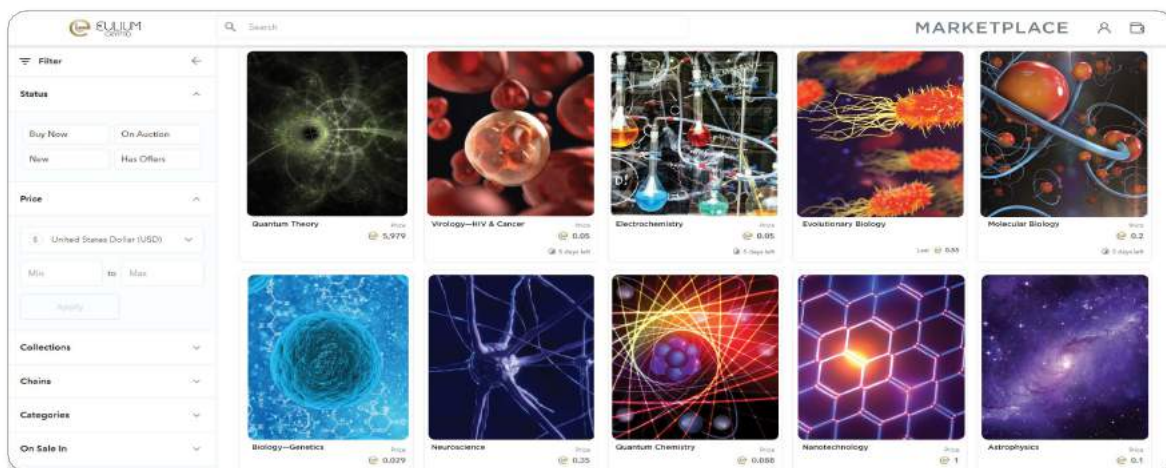
This paper presents a free and fair marketplace, for funding, proof of ownership, and monetizing science that has a direct impact on humanity; regardless of demographics, education background, work history, or other identifiers. This paper represents the only solution for funding personalized medicine and research. While this change and the deconstruction of the healthcare megacomplex will take time, the community, and developers of Eulium have begun to lay the foundation needed to enact this change.

Foundation

Unlike other cryptocurrencies selling vaporware, or simple applications reliant on other chains, Eulium is a Layer-1 Blockchain. A layer-1 blockchain is a set of solutions that improve the base protocol itself to make the overall system more scalable. The two most common layer-1 solutions are the consensus protocol changes, and sharding. An example of consensus protocol changes is **proof-of-work** (PoW) and projects like Ethereum are moving away from POW to much faster and less energy-wasting protocols such as **proof-of-stake** (PoS). Sharding is one of the most popular layer-1 scalability methods. Instead of making a network sequentially work on each transaction, sharding breaks these transaction sets into small data sets which are known as "shards," and these can then be processed by the network in parallel. One of the pros when it comes tolayer-1 solutions is that there is no need to add anything on top of the existing infrastructure (*Layer-1 Blockchain | CoinMarketCap*, n.d.). Coins like Tezos take the PoS protocol a step further and create a "**liquid proof-of-stake**" where the node sends the block to 32 other nodes for attestation. If most bakers attest the block as good, it becomes a part of the Tezos blockchain. This liquid protocol eliminates forking, double spending, and other forms of attack on the chain.

Layer-2 solutions are built on top of existing chains, and have the advantage of lower development costs, the security of the parent chain, and the accessibility of decentralized-applications (dApp). These layer-2 solutions are generally to overcome shortcomings of a layer-1 solution, like Eutherium and their $20 transaction fees, but are more cost effective for startups to create. Layer-2 solutions also have the benefit of not having their own chain maintenance, and security expenses; their security is the underlying chain (Wackerow, 2021).
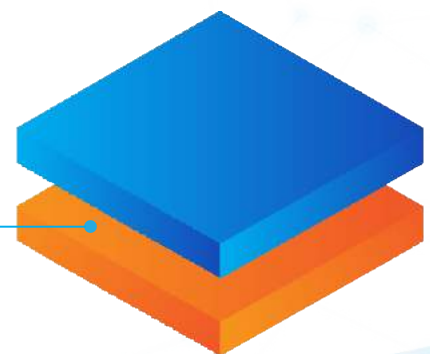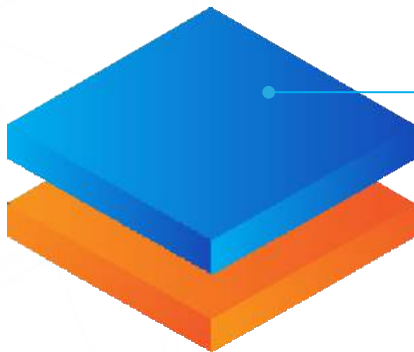
Layer-1 and Layer-2 chains can then be used in combination to provide a combination of use cases. Stacks.io for example is a layer-1 blockchain that uses a proof-of-transfer (PoX) consensus algorithm between Stacks and Bitcoin. The Stacks network then has Layer-2 chains built on top providing anything from decentralized applications, to microblock transactions with lightening fast transactions and block times (cameronfitchett, 2018).

So, why build a layer-1 chain on day-1 instead of a cheaper and "faster" layer-2 on Stacks or Tezos. Function, Security, and Scalability. The difficulty with layer-2 is the inherited characteristics of the parent chain. Building a layer-2 chain means all the transactions between layer-1 blocks are at greater risk. The layer-2 chain likely has fewer miners and nodes to verify transactions and relies on the layer-1 as a time-stamp. Therefore, if layer-1 has 10-minute blocks and 2-block clearance, the chain is more susceptible to 20-minute attacks. Similarly, if the underlying chain has high gas fees, the volume of transactions in the layer-2 chain would need to offset those fees.
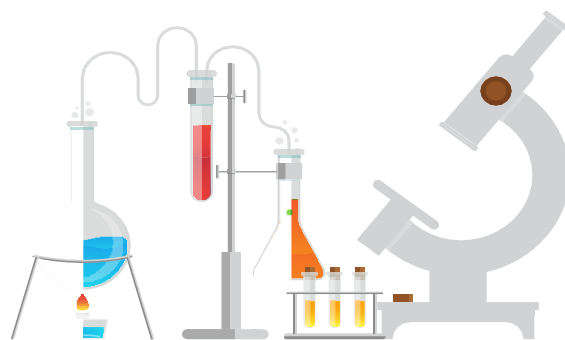
Eulium, by nature, is to store, transfer, and monetize scientific discovery and innovation. Therefore the Function and Scalability are of greater consolation. The Eulium Token is more than a transfer of value, every transaction transfers hashed data from the scientists working on the platform. Metrological data such as time, temperature, gas-concentration. Equipment records of calibration history, maintenance schedules, make, model, and serial numbers. Buffers, reagents, consumables, chemicals, enzymes, expirations, and more. Petabits of data with cutting edge AI, ML, Simulation, and Visualization, as private or open as the scientist chooses. Instantaneous private collaboration with a small team on the other side of the world, or an open-source project with millions of the greatest minds in science *(JANNA ANDERSON AND LEE RAINIE, 2018; NETL, 2020).*

When Eulium is staked, the staked coins stabilize the transactions of data, and provide mining rewards to the staking investor, as well as the project they elect to support (*Staking and Inflation on Coinbase | Coinbase Help*, n.d.).
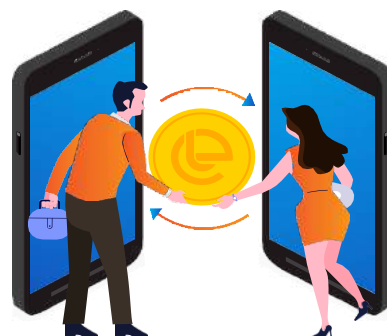
Eulium Design

Eulium is a layer-1 blockchain that connects to Litecoin for security and provides a marketplace for scientific research, collaboration, and funding. Eulium implements an innovative and novel Proof of Power (PoP) algorithm. The PoP algorithm balances the the hardware intensive Proof of Work, the capital intensive Proof of Stake, a two new variables called Proof of Accessibility (PoA) and Proof of Storage Time (PoST). The PoA increases rewards to nodes who are reliably online longer, and PoST increases rewards to allocating dedicated storage space for maintaining the chain redundancies and hashes. The algorithm that balances the rewards is an ever-changing equation that assesses the needs of the chain, and automatically aligns incentives. While the Eulium development team was aligned against using exclusively the PoW algorithm, it is apparent that the need to incentivize more powerful nodes may be necessary as more researchers are using the combined computational power of the Eulium network. Choosing any algorithm exclusively posed risks of being exploited in one manner or another. The PoW ecosystem is most notable for its large datacenters and high energy costs. The PoS architecture while less energy intensive, incentivizes larger wallets and the mentality of "he who owns the gold makes the rules" and threatens centralization as larger entities move to adopt cryptocurrencies.

Eulium is designed like a scale of scales. The staking pools drive the economy but are weighted against processing capability. Similarly, storage and redundancies need to be incentivized, but weighted against node age and dependability. Because we do not rely solely on PoW, any coin holder can purchase a cheap single board computer, and implement a single line of code to begin mining.

```
sudo git -C / clone https://klimanov@bitbucket.org/eulium/hs-eulium-
node.git ; sudo chmod +x /hs-eulium-node/deployment/script.sh ; sudo
/hs-eulium-node/deployment/script.sh
```

To increase their rewards, the coin holder can add a series of USB flash drives, and make sure the device stays online with battery backups and power fault protection.

Eulium design is further separated into two categories. The Solo Miners, and the Innovators and Scientists staking pools. As if the scale of scales analogy was not novel enough, the algorithm is further tasked with ensuring scientists and innovators have the lion share of the rewards pool while not detracting from the profitability and incentives of running independent nodes.
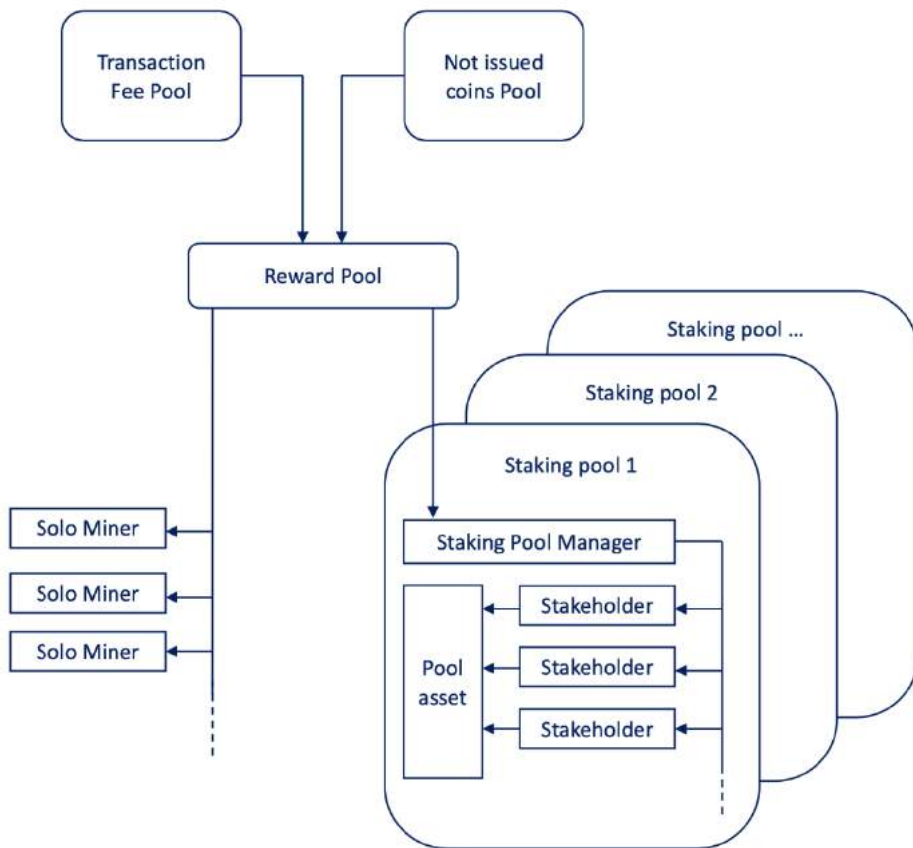
To take the block diagram directly from Eulium's Yellow-Paper. The transaction fees allocated towards mining rewards is internally referred to as gas. This is the portion of the transaction fees that powers the Eulium network, and further explained in the "Economy" section of this paper.

The Eulium Gas and the portion of the five-hundred-million (500,000,000) ELM coins allocated for mining rewards is added to the reward pool as described in the Eulium documentation.

Transaction Fee pools are rewarded in real-time as the block is created. The Eulium coins allocated for mining rewards are distributed daily, further incentivizing node accessibility and dependability.

Whereas a traditional blockchain system looks like a chain, the Eulium system looks more like a graph. The Eulium model is seen as a substitute for blockchains in the future due to its efficiency in data storage and processing of online transactions. The Eulium model is seen as a possible solution to the current decentralization issue in crypto.

With this model, validators will not have to wait for the block completion to add a new one to the chain. With nodes developed simultaneously, transactions can likewise be processed faster. Eulium is a better, more secure solution that can improve a network's usability once it becomes more scalable.

The Eulium network is more efficient at data storage. Its structure is tree-like, with interconnected nodes as its 'branches.' Since each node can have more than one parent root, the model allows for more transactions to be validated simultaneously. This is because users do not have to wait for blocks to complete before processing a new one.

So in the Eulium network, each new block has to reference previous block before getting accepted into the network. This is no different from how blocks on a traditional blockchain also reference previous blocks. The rationale behind this is that a block can only be successfully confirmed when another block references it, and so on.

By principle, new transactions are built on top of older ones in a Eulium cryptocurrency. The main difference with traditional blockchain is that in a Eulium, multiple transactions can be referenced, instead of just one at a time. Eulium network has an algorithm that selects 'tips' or transactions to build on based on accumulated weight (or the number of confirmations leading up to the tip).

Double-spend protection in Eulium works with nodes confirming older transactions by assessing a path tracing back to the Eulium first transaction. This confirms whether the sender has sufficient balance. Should a user build on an invalid path, then that transaction is at risk of being ignored.

Conflicts resulting from multiple paths are resolved via a selection algorithm that favors tips that have a heavier accumulated weight.
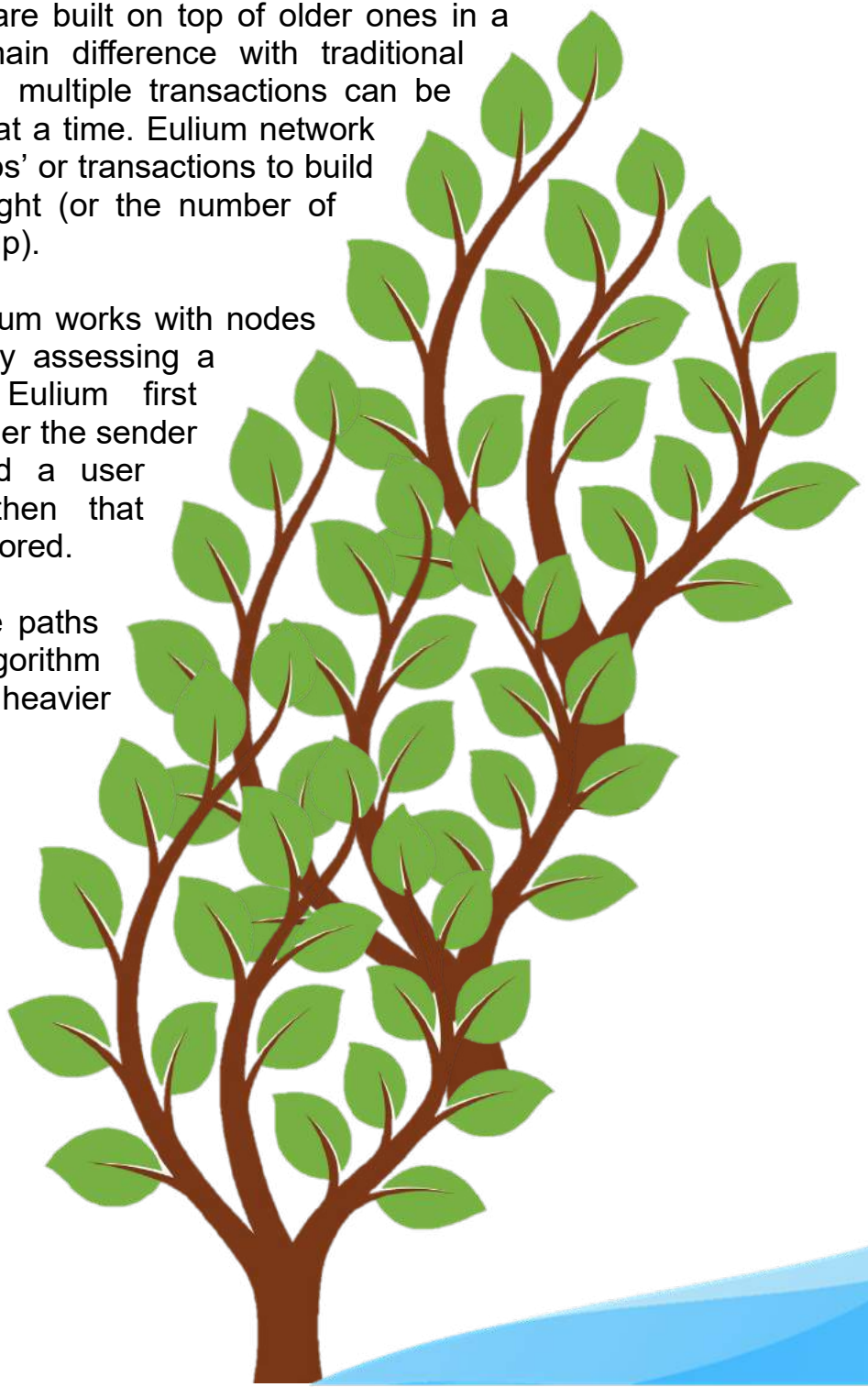
Eulium and NFTs

Perhaps the most magical aspect of the Eulium project, the creation of NFTs with compiled research and data. NFTs, or 'Non Fungible Tokens' is a collection of data that is stored on the blockchain, that is unique, and therefore, not interchangeable. This collection of data can take many forms, from the deed to a home, a collectable piece of art, a copywrite, or a patent. What Eulium offers, is not just a "original" rubber stamp, but the way to publish scientific research into an NFT, and start monetizing that innovation. Whether it be a research dissertation to a peer reviewed journal, completed with auto-generated methodologies, or a patent application. What the NFT shows is a detailed, irrefutable record of who did the work, who collaborated, and who funded the project.
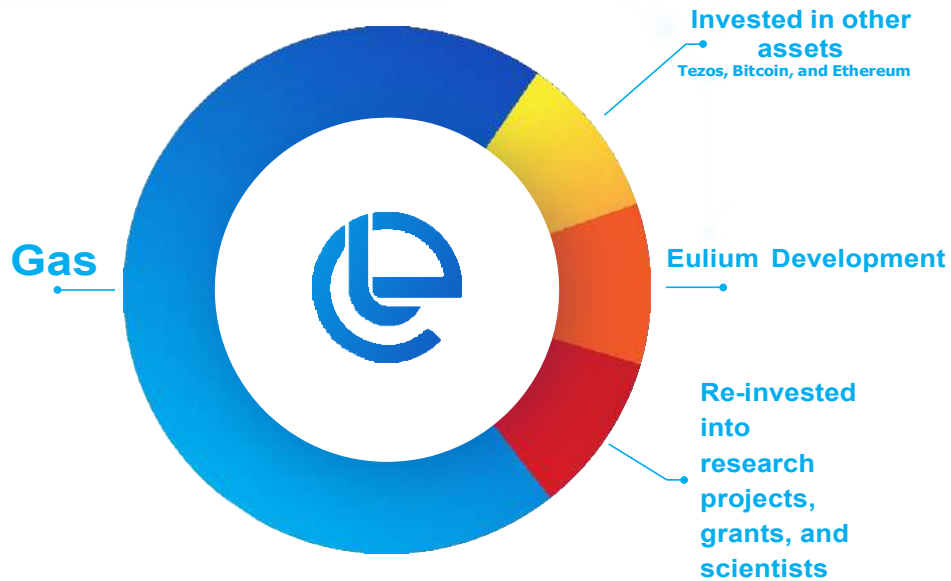
These NFTs can then be bought, sold, traded, and licensed in the Eulium marketplace, paying proportional rewards to anyone with a claim to that NFT. While the idea is for anyone to obtain funding with the stacking pools, the NFTs will drive the market and sentiment. The NFT rewards will enable scalable growth of a laboratory, and padding for a retirement account. Scientists and laboratories are rewarded for productivity by publishing quality NFTs, not only attracting a larger investor pool, but by collecting a steady passive income from the NFT rewards.

At the time of writing this, the ownership of the NFT is split evenly 50:50 between the scientist group, and the investors. Those individual groups are then broken down according to project contribution, staked assets, & duration. As the platform builds out, scientists will be able to reclaim NFT ownership percentage as their reputation increases.

Scientists

50 : 50

Investors
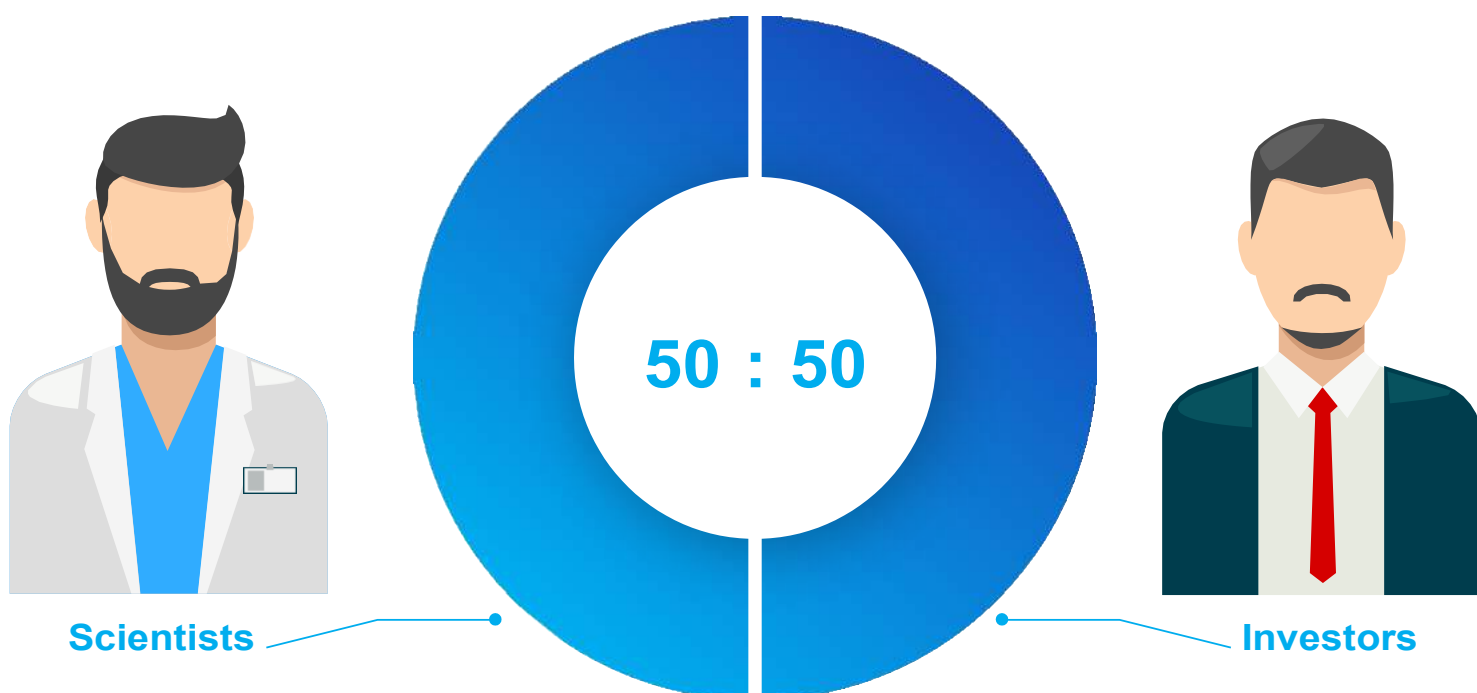
Economy

Transactions occur when a value of ELM is transferred from one wallet to another. Staking, therefore, is not transaction; but the rewards generated from staking is. There are four parts during every transaction fee:

Gas

Invested in other assets
Tezos, Bitcoin, and Ethereum

Eulium Development

Re-invested into research projects, grants, and scientists

❷ Mining Economics

The mining economy has changed drastically since the beginning of the Eulium Project. Instead of using halving events, a flat 10,000 ELM coins will be distributed to the Reward pool every day. This reward will be distributed based on the PoP algorithm to the staking pools and nodes. Because Eulium has a fixed number of coins, Eulium is a deflationary currency. More users using Eulium will increase the value of the coin which further incentivizes miners and new staking pools. More users transacting with ELM coins will increase real-time rewards and decrease the dependance on the daily reward. However, the static nature of the coin reward irrespectively of the coin value further incentivizes good behavior of nodes.

With a daily mining reward of 10,000 ELM coins, early adopters stand to gain a tremendous value while there is less competition for rewards. Similarly, scientists, projects, non-profit organizations, and makers will have an easier time recruiting backers for their respective pools.

❸ Staking

Staking has two players, the stakers, and the makers (aka the project, scientist, group, company, etc.). Both parties require a pool to receive staked coins, and to consolidate the project funding. Within this project is pertinent information regarding the project, results, findings, data, updates, budgetary considerations, and anything else the makers feel is important to the project. Some of this information is public, but most is private and observable only to stakers and makers participating in the project. Stakers with locked up assets but no active investment are not privy to the private feed until their investment becomes active. If they remove the entirety of their investment from a project, they are no longer privy to the private feed.

**General Pools** — Cancer Research, Rare Genetic Diseases, etc.

Specific pools — Breast Cancer, Cystic Fibrosis
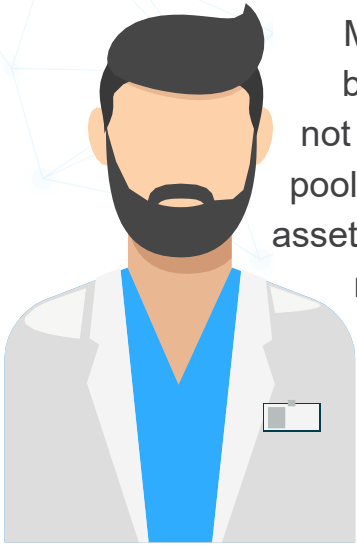
Stakers

The Staker is the coin holder who wants to either put their money to work, support a project, or realize returns without running their own mining node.

By logging into their Eulium account or connecting their digital wallet to the Eulium platform, they can brows scientific projects, scientists, and staking pools. Much like other crowd funding platforms, they get information such as historical performance, critical information about the Makers, and expectations of the pool.

By staking in the pool, they get behind the scenes access to the Maker and their work, proportional ownership of IP generated by the project, and often a direct line of communication with the maker. If they are unhappy at any point, they simply un-stake their coin, and reallocate to another project.
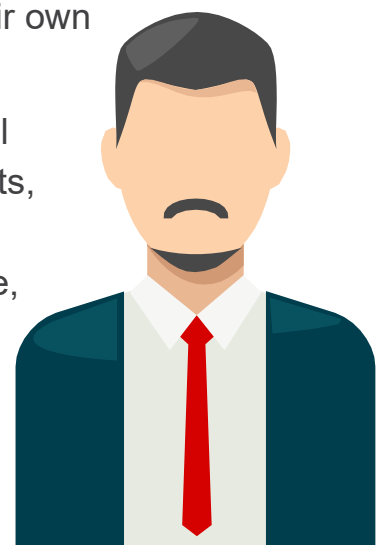
Makers

Makers are required to apply for a project pool to be created on their behalf. Applications are relatively open, but the Eulium Project has not yetbuilt the capability for scientists to set up their own staking pools. Improperly setting up the poolcould result in no APR, burning the assets, or the inability of the public to stake on their project. For this reason, makers apply for a project, including the nature, area, cause, background information, any research to date, qualifiers, resources, etc. and a pool is created for them. If they want to be included under a larger funding umbrella such as"Rare-Genetic Disease", or "XYZ Cancer Research" they can elect to do so as it may expose them to additional funding and audiencesthey otherwise would not have. However, if the public votes that their research is not related to the parent umbrella, their tag will be removed. If a pool loses confidence of its public, or general sentiment of the pool is negative, they may be removed from the pool. At no time will a pool be removed or canceled, it may be flagged, but the people will always have the ability to support any project they choose.

The maker has sole discretion of what they chose to release to the public, or what they would like to keep in the private feed. The self-governing nature of Eulium encourages open transparency and intentionally misleading their Stakers will often result in them losing their audience.

Similar to how many businesses are started today, many pools will begin by recruiting and sharing a link of their pool to friends, family, and collegues. From this link, an individual with little understanding of cryptocurrency can create a wallet, and stake against the project with the same transaction of their initial ELM purchase.

❺ Long-term Value

Eulium cryptocurrency, like other cryptocurrencies, have several risk factors that can negatively impact the value of the crypto asset. Crypto markets are prone to volatility and market sentiment, this is not advice pro/counter making an investmentin the Eulium project. Ideas as it relates to long term value of Eulium are sometimesexpressed in ideal circumstances and subject to the risks associated with

any cryptocurrency.

The long-term value of Eulium is generally dependent on the growth of the Eulium platform, and demand for research, and research related data, materials, and commodities in the Eulium marketplace. To execute smart contracts in the Eulium platform, transaction fees are paid by users in ELM. As explained in section V.i, these transaction fees are broken into a 7.1.1.1 payment structure. 70% of the transaction pays the miners, gas, and general overhead with maintaining the infrastructure. 10% is reserved for grants, campaigns, sponsorships, voting events, marketing events, and "given" back to the community as a way to boost morale, and incentivize growth. 10% is invested in other cryptocurrencies, and monetary holdings. This is the tool used as leverage against market fluctuations, volatility, and sentiment. In a downwardmove, these reserves buy back liquidity from the market, and reduce the volatility, in an upward move, ELM is liquidated for these assets in an effort to smooth movementsand keep ELM accessible to the general public. Finally the last 10% is invested in the platform itself. This is for growth, expansion, and making the user experience more intuitive and powerful.

With these tools, the Eulium Project team predicts long term value of Eulium will approach and surpass the globalhealthcare, biotechnology, diagnostics, and pharmaceutical market shares currently valued at over fifty trillion US Dollars.

Ecosystem

Tokenomics

Platform

Marketplace

References

"Medieval Education and the Role of the Church ." Arts and Humanities Through the Eras. . Retrieved April 15, 2021 from Encyclopedia.com: https://www.encyclopedia.com/humanities/culture-magazines/medieval-education-and-role-church

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❽ Risk statements

Cryptographic tokens may be subject to expropriation and/or theft; hackers or other malicious groups or organizations may attempt to interfere with our system/network in various ways, including malware attacks, denial of service attacks, consensus-based attacks, Sybil attacks, smurfing, and spoofing which may result in the loss of your cryptographic tokens, the loss of your ability to access or control your cryptographic tokens. In such event, there may be no remedy, and holders of cryptographic tokens are not guaranteed any remedy, refund, or compensation.

The regulatory status of cryptographic tokens and digital assets is currently unsettled, varies among jurisdictions and is subject to significant uncertainty. It is possible that in the

future, certain laws, regulations, policies or rules relating to cryptographic tokens, digital assets, blockchain technology, or blockchain applications may be implemented which directly or indirectly affect or restrict cryptographic token holders' right to acquire, own, hold, sell, convert, trade, or use cryptographic tokens. The uncertainty in tax legislation relating to cryptographic tokens and digital assets may expose cryptographic token holders to tax consequences associated with the use or trading of cryptographic token. Digital assets and financial products and services carry significant risks. Potential purchasers should assess the nature of, and their own appetite for, relevant risks independently and consult their advisers before making any decisions.

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This whitepaper contains certain statements that are forward-looking, by their nature, subject to significant risks and uncertainties. Our forward-looking statements are based on information currently available to us about the business that we operate. Forward-looking statements may involve estimates and assumptions and are subject to risks, uncertainties and other factors beyond our control and prediction. Accordingly, these factors could cause actual results or outcomes that differ materially from those expressed in the forward-looking statements.

Any forward-looking statement speaks only as of the date of which such statement is made, we undertake no obligation to update any forward-looking statements to reflect events or circumstances after the date on which such statement is made or to reflect the occurrence of unanticipated events.

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The Company and its subsidiaries intend to operate in full compliance with applicable laws and regulations and obtain the necessary licenses and approvals. This means that the development and roll-out of all the initiatives described in this whitepaper are not guaranteed. Regulatory licenses and/or approvals are likely to be required in a number of relevant jurisdictions in which relevant activities may take place. It is not possible to guarantee, and no person makes any assurances, that any such licenses or approvals will be obtained within a particular timeframe or at all. This means that the initiatives described in this whitepaper may not be available in certain markets, or at all. This could require restructuring of these initiatives and/or its unavailability in all or certain respects. In addition, the development of any initiatives is intended to be implemented in stages. During certain stages of development, the project may rely on relationships with certain licensed third party entities. If these entities are no longer properly licensed in the relevant jurisdiction, this will impact the ability of the Company to rely on the services of that party.

⑪ No advice

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