

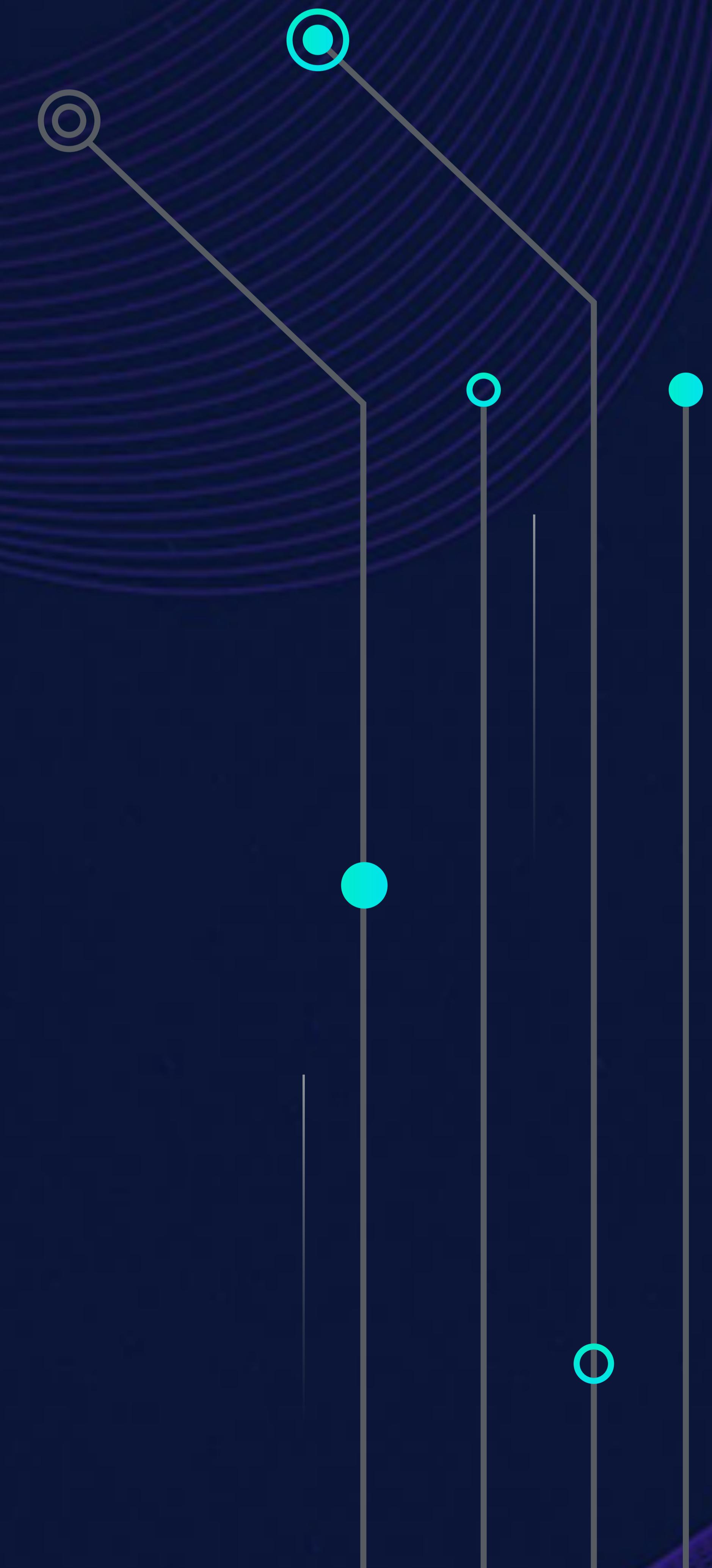


Aegis

# Aegis Network

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A Scalable Liquidity Bridge Between  
Fiat and DeFi Ecosystems





# DeFiner of DeFi 2.0

## ■ Chapter 1: Executive Summary

Current DeFi platforms such as Compound offer lending and borrowing services underpinned by the over-collateralization of crypto assets. However, one downside of this methodology is that capital extraction is inefficient, and users are unable to unlock the full value of their digital asset portfolio. In addition, many users have capital locked up in the traditional fiat financial markets (i.e. stocks, bonds and real estate), and this locked value remains separated from the decentralized financial ecosystem.

Aegis is a scalable DeFi platform that provides comprehensive lending and borrowing capabilities, especially its unique unsecured lending service based on credit information from trusted sources, empowering users to unlock the corresponding capital loans in the crypto ecosystem. Aegis therefore play the critical role of a capital bridge that gives users the ability leverage and move liquidity seamlessly between fiat and crypto ecosystems.

In addition to loan facilities, Aegis provides its users with a unique portfolio dashboard for trading and asset management which helps users to check their profitability and monitor their credit lines in real time. Aegis plans to offer users a range of innovative asset management products such as structured investment products (e.g. credit default swaps, dual currency instruments), synthetic commodities (e.g. gold, oil, copper), traditional financial markets derivatives (equities, bonds), real estate, indices and more, which they can trade immediately without leaving the Aegis platform.



A native utility token, AEGIS, is issued to power the Aegis Network. The AEGIS token has a multitude of functions, including and not limited to being used as:

- the gas unit for all transactions within the network
- the mode of payment for lending fees, asset issuance fees and trading fees
- voting rights for Aegis Network governance
- rewards for validators securing the Aegis Network

A native stablecoin, AUSD, is issued by the Aegis Network to act as the proof-of-equity and provide value stability of value for lending, trading and asset management activities for its users.

## Chapter 2: The Rapid Rise of DeFi, Powered by Lending and Derivatives

In layman terms, DeFi refers to decentralized financial infrastructure and products built on a blockchain network. DeFi is largely developed on the Ethereum network, which is controlled by a network of computers, rather than a centralized financial institution.

DeFi holds the potential to attract value over the financial services industry, primarily because of its global accessibility – no one can be denied of service. In this open and decentralized finance marketplace, parties can transact directly with each other without borders.

As of August 3, 2020, the total value locked (TVL) in DeFi has reached an all-time high of US\$4.25 Billion. MakerDAO, the DeFi platform that allows users to lock in collateral such as ETH and mint the DAI stablecoin as debt against the collaterals, is the current market leader with 30.6% dominance. The TVL in Maker alone has hit an all-time high of US\$1.3 Billion, as DeFi starts to gain momentum and recognition with institutional and retail investors.



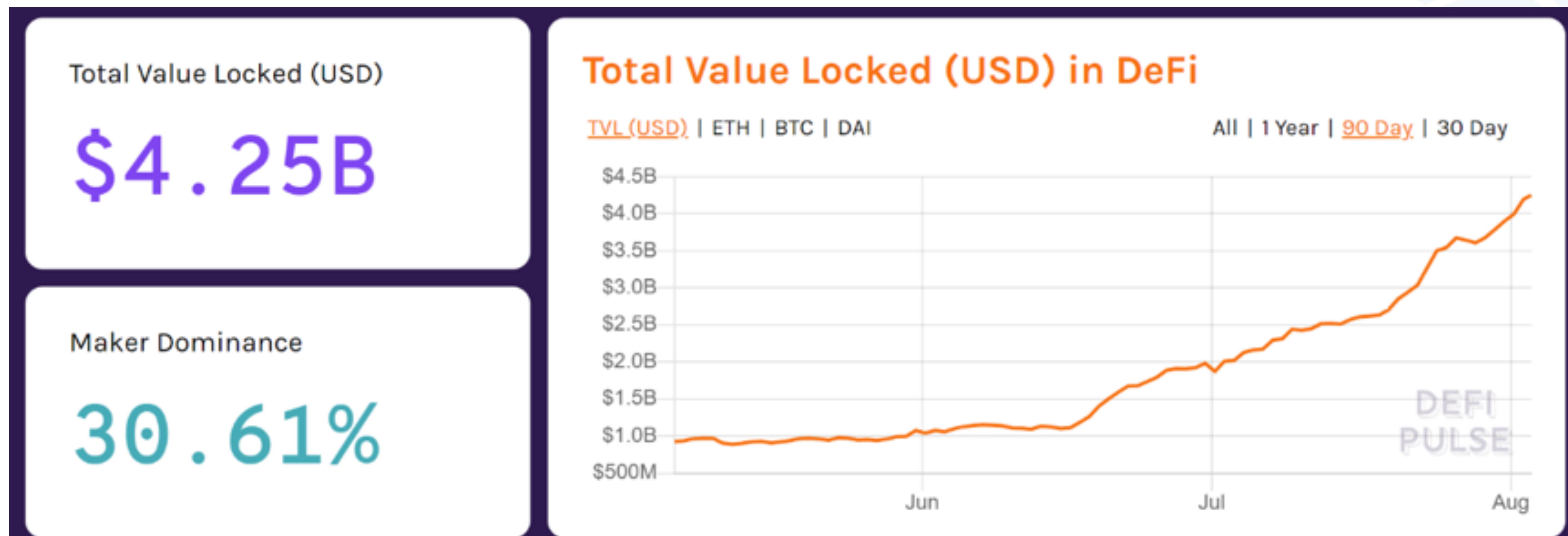


Diagram [1] DeFi TVL Trend

Despite such rapid growth, the DeFi landscape is still relatively nascent, with attractive market opportunities for which Aegis Network shall develop industry-leading solutions.

## ■ Chapter 3: Aegis's Core Components & Products

Aegis is a scalable DeFi platform that give users access to lending and unsecured borrowing services, based on their individual credit scores.

At the same time, Aegis will develop a suite of asset management products for its user base that allow them to participate in DeFi investing and asset trading all within the Aegie platform.

Core components of AEGIS include:

### I. Lending, Collateralized Borrowing and Unsecured Borrowing

#### Lending

When users supply liquidity to Aegis, they begin earning a variable interest income instantly. Interest accrues on every Ethereum block, and users can withdraw their principal plus interest anytime. The liquidity supplied to Aegis are held in the global liquidity pool, and lenders receive aTokens, which represent their asset ownership and can be redeemed for their underlying assets anytime. As interest accrues to the liquidity supplied by the user, the aTokens are redeemable at an ever-increasing exchange rate (relative to the underlying asset) that is based on the interest earned by the underlying assets.



## Collateralized Borrowing

In order to borrow from Aegis, users will need to first supply another type of crypto as collateral. This is provided using the same mint function used for supplying assets. Supplied collateral assets earn interest while in the protocol, but users cannot redeem or transfer collateral while it is securing an open borrowing position. The maximum amount users can borrow is limited by the collateral factors of the assets they have supplied. For example, if an user supplies 100 ETH as collateral, and the posted collateral factor for ETH is 75%, then the user can borrow at most 75 ETH worth of other assets at any given time.

## Unsecured Borrowing

In addition to collateralized borrowing, which functions similarly to other lending platforms like Compound and MakerDAO, Aegis provides the additional layer of unsecured borrowing for users based on personal credit, making it the pioneer to bridge traditional fiat and DeFi in a meaningful and practical way.

Users can identify themselves through established know-your-customers (KYC) procedures and submit their credit information to Aegis for credit line assessment. Those credit information will be on-boarded to Aegis Network via established oracle interfaces, such as ChainLink, in an encrypted and privacy protected manner, allowing for data immutability and security at the same time.

Aegis uses a proprietary AI-powered credit scoring algorithm to assess users' creditworthiness based on the data provided, and assign an "Aegis Score" to each user, which is similar to traditional risk profile assessments. The Aegis Score determines the maximum credit that a user is allowed to draw down from the liquidity pool. In the initial stage, the algorithm assigns a relatively more conservative Aegis Score on all users. However, as users' lending and trading activities take place on-chain within the Aegis Network, the machine learning algorithm takes into account their track record and updates their Aegis Scores on a regular, fair and transparent basis. This creates a "continual assessment" system where users with excellent Aegis Scores are rewarded through higher credit lines and lower interest rates.



To ensure that users do not default on their loans, Aegis Network is securing partnerships with numerous licensed financial institution partners, who shall ensure that robust KYC standards are met, and in the event of any defaults, are legally permitted to pursue loan claims on these users. All unsecured borrowing will be rolled out in stages alongside local licensed partners for each jurisdiction onboarded into Aegis Network.

Utilizing this innovative bridging mechanism, Aegis Network allow users to obtain higher crypto exposure with lower capital requirements compared to other existing DeFi solutions.

## Hybrid Borrowing

As a comprehensive lending platform, Aegis platform is able to cater to the needs of different loan customers given the diversity and scale of the potential clientele base. There could be three types of borrowing applicants:

- Type [1] – the secured loan applicants with required collaterals;
- Type [2] – the unsecured loan applicants solely based on creditworthiness;
- Type [3] – the loan applicants with a mixed appetite, which could be a hybrid of both the two loan approaches.

For Type [1] and [2], the aforementioned Collateralized Borrowing and Unsecured Borrowing shall be able to address their needs respectively, whereas for Type [3], a hybrid borrowing approached is also available by splitting the borrowing request into collateralized and unsecured portions. Please refer to diagram [2] below for the composite process

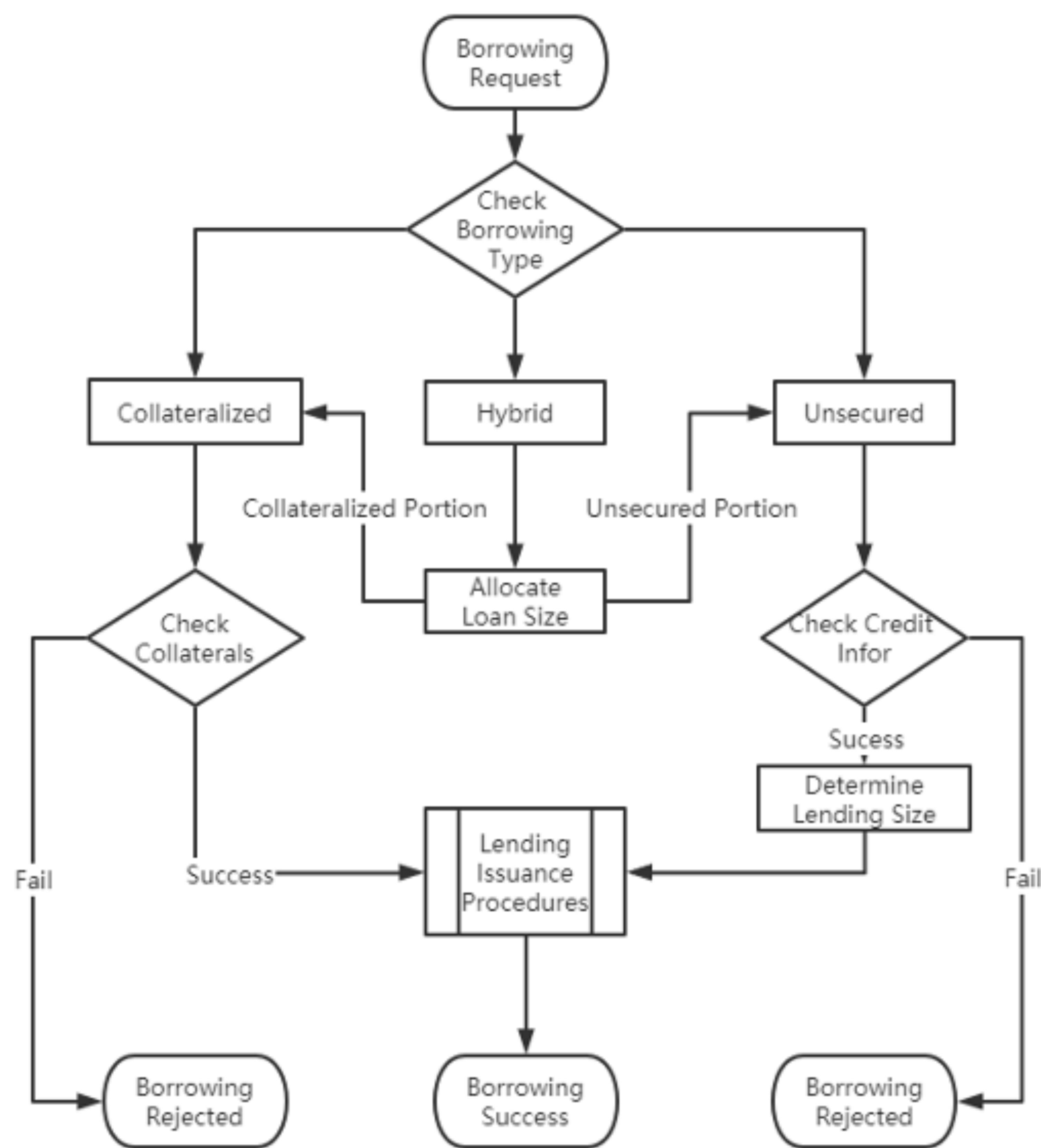


Diagram [2] Composite Borrowing Process



## **II. Derivatives Issuance and Trading Protocol**

On top of the lending/borrowing layer, Aegis Network allows users to directly trade a wide range of crypto assets and traditional financial market instruments with its native derivatives issuance and trading protocol. The products on the Aegis Trading Protocol include CDS, crypto derivatives, equities, corporate and government bonds, real estate, indices, and even commodities like gold, oil and sugar.

Aegis Network also plans to work directly with high quality asset issuers (such as municipality governments, REITS, etc.) to bring a wide range of exciting asset classes to Aegis' users. Using these underlying assets, Aegis Network may issue derivatives that allow users on our platform to participate in a diverse mix of risk/rewards opportunities that fit in with their risk tolerance profiles. All products issued on the Aegis Network platform shall be subjected to rigorous onboarding audit and security requirements.

## **III. Credit Default Swaps as Insurance for Unsecured Borrowing**

Aegis Network takes a firm position on risk management, to ensure that lenders in the network receives sufficient protection and recourse in case of any defaults. To achieve this, Aegis Network uses credit default swaps (CDS) against traditional licensed financial institution partners to hedge credit risks for its users. This CDS is sold to the licensed partners, who receives a premium payment for providing loan default insurance to Aegis.

In the event of an unsecured loan default, the licensed partner shall assume the outstanding liability, pay the value of the defaulted loan to Aegis, and pursue the defaulted loan on the user. CDS allows Aegis Network to pass on the risk of user defaults to its licensed partners, who have the legal means and channels to claim back these outstanding loans.



#### **IV. AUSD – Stability and Proof of Equity**

Aegis Network shall issue a native stablecoin – AUSD as to provide stability of value for the Aegis ecosystem and proof-of-equity for its lending services. Users mint AUSD by locking up their digital assets collateral into the Aegis network. With the AUSD, users are able to borrow mainstream crypto assets such as ETH and also mine AEGIS tokens.

In the early stages of Aegis's development, a preferable exchange rate shall be offered to optimize AUSD's liquidity, and AUSD can be directly swapped with AEGIS token within the platform.

#### **V. Asset Management Platform**

Through a user-friendly portfolio management dashboard, Aegis users undertake a questionnaire to determine their risk/rewards tolerance, and is subsequently assigned their individual risk tolerance profiles with Aegis Network. The risk tolerance profile helps to identify and recommend opportunities to users, while allowing users to retain their independence in decision making for their desired portfolio.

Through the asset management dashboard, user can also check and monitor the profitability of their lending and derivative assets positions on Aegis, and easily deploy and allocate capital in accordance to market changes.

#### **IV: A One-Stop Solution for the Fiat-to-DeFi Value Chain**

With the above three core components, Aegis Network is able to truly provide its users with a one-stop DeFi lending, trading and asset management solution that captures the end-to-end transaction and financial management value chain.



# ■ Chapter 4: Mathematical Models

## Powering Aegis Network

### I. A model for decentralized secured lending

In the traditional centralized lending market, the Borrowers and Lenders typically negotiate over the lending terms and conditions (T&Cs) such as interest rates, loan tenure, collateral involved, liquidation enforcement terms, etc. on a private basis. However, in the decentralized DeFi lending markets, such negotiations have to be established ex-ante by a set of programs, known as “smart contracts” operating on a P2P blockchain network. For such transactions to be executed, it endogenously requires an algorithm to determine and execute on the lending T&Cs.

The below model provides a solution to the decentralized collateralized lending paradigm. Assume that there is a Lender in the market who wishes to respond the lending request initiated by a Borrower with parameters denoted below:

- S: the lending size that the Borrower wishes to borrow;
- $P(\sigma)$ : the probability of successful repay by the Borrower,  $\sigma$  denotes the risk parameters;
- X: the rational expected return rate of the lending that the borrower wishes to generate;
- R: the gross interest rate in the lending activity;
- C: the collateral ratio that the borrower guarantees to pledge against the borrowed value;
- $F(e)$ : the friction cost incurred in the lending activity denoted as market event e, such as price slippage, transaction fees, etc. whereby:

$$F'(e), F''(e) > 0; S$$

Therefore, the Borrower's best efforts to maximize his interests can be resolved with the following optimization equation:

$$\max\{P(\sigma)(X - R) - [1 - P(\sigma)]C - F\} \cdot S \quad (1)$$



The above equation (1) can also be expressed from the Lender's maximum interests and the results have been validated to be identical. Let's simplify this problem by normalizing the lending size  $S$  to 1. The first order condition for the solution generates a mathematical relationship between the above parameters as:

$$g(\sigma, e) \equiv \frac{F'(e)}{P'(\sigma)} = (X - R + C) \quad (2)$$

Assume in an unbiased financial market, the minimum expectation for a rational Lender is to equalize their return to a risk-free return ratio denoted by  $\rho$ . Therefore we have:

$$P(\sigma)R + [1 - P(\sigma)]C\alpha = \rho \quad (3)$$

where  $\alpha \in (0,1)$  is the share of collateral value that is recoverable by the Lender if the Borrower defaults.

By resolving the above equations (2) and (3) combined, it is possible to obtain the solutions for the gross lending rate  $R$  and required collateral ratio  $C$  as follows:

$$R = \frac{\rho + [1 - P(\sigma)]\alpha[X - g(\sigma, e)]}{P(\sigma)(1 - \alpha) + \alpha} \quad (4)$$

$$C = \frac{\rho - P(\sigma)[X - g(\sigma, e)]}{P(\sigma)(1 - \alpha) + \alpha} \quad (5)$$

By resolving above problems, Aegis platform will be able to offer collateralized loans with the best-fit collateral requirement and loan rate in a dynamic and delicate approach, securing the interests of both lenders and borrowers.

## II. A model for decentralized unsecured lending based on creditworthiness

Aegis Network aims to combine the best of both DeFi and the traditional financial markets to create an enriched, equitable financial ecosystem. Compared to the secured lending where the contract is safeguarded by collateral, unsecured lending is issued against the creditworthiness of the borrowers, and is mostly contingent on the credit information provided by centralized credit agencies. Such information normally contains the credit score and credit limits of an individual, which can be utilized to issue unsecured loans on decentralized platforms.



At any time, assume that there are multiple loan applicants as denoted by sequence  $i=1,\dots,N$ , and the credit information for  $i$ -th applicant provided by credit agency comprises of two parts:

- Credit Score, denoted as  $S_i \in [S_{i,\min}, S_{i,\max}]$ , and;
- Credit Limit, denoted as  $L_i \in [L_{i,\min}, L_{i,\max}]$ .

A common practice for unsecured lending is to set a cut-off line, denoted by  $T$ , for the credit score to be eligible for loan issuance. The coefficient function for loan grant to applicant  $i$  can therefore be expressed as:

$$\theta(S_i) = \begin{cases} \frac{S_i - T}{S_{i,\max} - T}, & \text{where } S \geq T; \\ 0, & \text{otherwise.} \end{cases}$$

As long as  $\theta(S_i) > 0$ , the applicant will be eligible for a loan issuance. The next step is to determine the amount of loan to be allocated. Assume the instant lending pool size is capped at  $P$ , the available lending size for applicant  $i$  can be calculated on a pro-rata basis as:

$$\omega(L_i) = \frac{L_i}{\sum_{i=1}^N L_i} P$$

Assume the maximum amount of lending capital the platform allows per capita is  $C$ , and taking the above  $\theta(S)$  into joint consideration, the loan size to be issued to the  $i$ -th applicant can be expressed as:

$$\rho_i = \begin{cases} \theta(S_i)\omega(L_i), & \text{if } \omega(L_i) \leq C; \\ \theta(S_i)C, & \text{otherwise;} \end{cases}$$

With the above models, the platform is able to dynamically assess and assign the unsecured loans to loan applicants.

### III. Risk management model on the systematic level

As a lending platform, risk management lies at the core of the business. Given the high volatility of crypto assets as well as the inherent risks of lending, we suggest adoption of the classical VaR (Value-at-Risk) approach to continually monitor and assess the overall risk exposure of the platform, which is expressed as:

$$P(Loss_{\Delta t} \leq VaR) = \alpha$$



in which,  $\text{Loss} \Delta t$  is the maximum potential loss over a period of time denoted as  $\Delta t$ , and  $a$  is the confidence level of the event occurrence, which generally measures the risk appetite of a financial business. For example, most banks select 95% as the agreeable risk level whereby some other financial institutions might impose higher standard due to a lower risk appetite.

To carry out this risk management model in a lending business, the platform shall run back testing regularly based on historical data such as the volatility of crypto asset prices, the lending default rates, the risk assessments, etc., to ensure that the overall risk of the lending platform is within an acceptable range.

#### IV: A Model for Decentralized Credit Default Swaps

The basic idea of CDS pricing is that the present value of all CDS premium payments should equal the present value of the expected payoff from the CDS for the NPV to be 0 for both parties of the contract (resulting in each party being equally well off).

There are a few different pricing models for CDS, in which the Hull & White (H&W) Valuation Model has seen wide adoption. The CDS spread pricing using H&W model is given as below:

$$\text{CDS Spread} = \frac{\int_0^T [1 - \hat{R} - A(t)\hat{R}]q(t)v(t)dt}{\int_0^T q(t)[u(t) + e(t)]dt + \pi u(T)}$$

in which,

- $q(t)$  is the risk-free default probability density at time  $t$ ;
- $T$  is the maturity date of the CDS;
- $u(t)$  is the present value of payments at the rate of \$1 per year on payment dates between time 0 to time  $t$ ;
- $\omega$  is the total payment per year made by CDS buyer;
- $e(t)$  is the present value of an accrual payment at time  $t$ ;
- $\hat{R}$  is the expected recovery rate on the reference obligation in a risk-neutral world;
- $A(t)$  is the accrued interest on the reference obligation at time  $t$  as a percentage of notional value;
- $v(t)$  is the present value of \$1 received at time  $t$ ;

The above model will be further tailored with fine-tuned parameters to cater the characteristics of decentralized lending markets, and play a key role in risk management as well as principle preservation for the Aegis Network.



# Chapter 5: Aegis Token Economics

As the utility token powering the Aegis network, the AEGIS token drives ecosystem value through the following use cases:

## I. Gas and Transaction Fees

Lending, borrowing, trading and asset management activities may incur gas and transaction fees with Aegis Network. Users get a discount on these fees should they choose to pay them in AEGIS tokens.

## II. Staking and Network Validation Rewards

Aegis Network validators must stake a certain amount of AEGIS tokens as collateral to participate in the validation of on-chain transactions and validation of users' credit lines and quotas for unsecured loans.

## III. Collateral

AEGIS tokens may be used as collateral to borrow capital from the Aegis liquidity pool, and is subjected to the same collateralization models provided in the technical design.

## IV. Network Governance

AEGIS token holders within the community retain the rights to raise proposals and vote on these proposals. The proposals may include the change of staking rewards or updates on the blockchain, and are subject to majority vote requirements and minimum quorum requirements for network proposals. AEGIS tokens are required to be staked by proposal creators and voters.

## V. Deflationary Token Burn

A proportion of the gas and transaction fees incurred in the Aegis Network shall be used to buy back and burn AEGIS tokens from the open market, creating a deflationary mechanism that reduces the supply of AEGIS tokens.

The AEGIS token shall act as the medium of transactions, store of value and the incentive mechanism in the Aegis ecosystem. Token holders may choose to participant in governance or the validator network to receive rewards and contribute to the whole ecosystem.



# ■ Chapter 6: Aegis Network – Network Security and Governance Structure

There are broad, systematic risks present in the current DeFi landscape, which are unavoidable due to the nascent development of the technology. Notwithstanding this, the Aegis Foundation shall do its best to mitigate these risks for its users and minimize the impact, if any.

## I. Technical Issues with Smart Contracts

Smart contracts present one of the largest risks in DeFi. For example, smart contracts need to be monitored for memory safety because they are susceptible to buffer overflows and stack exhaustion. Race conditions and “front-running” are areas dependent on the contract itself, which also need to be closely monitored. Since the smart contracts rely on the outcomes of specific events and the timings associated with this event, within it, the smart contracts must be robust and capable of handling such scenarios to avoid tampering or exploits by bad actors.

## II. Identity Verification and Credit Assessments

As applicants are not required to present their credit scores prior to banking, there may be risks associated with identity verifications and credit defaults in the market. Identity verifications need to be robust, to ensure that the protocol is accepting users with good credit worthiness into the ecosystem. Conversely, it may result in loan defaults and identity fraud cases from bad actors in the

## III. General Business and Regulatory Risks

With the lack of intermediaries and third-party involvement, there brings a lack of standards in practice in place. The nature of a decentralized, P2P marketplace means that users have full control over their personal funds. At the same time, it also means that there are no centralized party to be held accountable in the event of any undesirable outcomes.



The general lack of crypto regulations due to the nascent state of the industry means that there may be changes in the political and business environment regarding crypto assets. To minimize these risks, Aegis Foundation is set up in Singapore, which is a leading global financial hub with a fair judicial system, progressive crypto legislation and political stability.

#### **IV. Adopting Best Practices for Sustainable Ecosystem Development**

As a blockchain protocol, the Aegis team is committed to decentralization and a censorship resistance platform. Aegis Network is built on the Ethereum blockchain, which allows users to have robust blockchain security and full control of their digital asset holdings.

Aegis is designed by experienced protocol infrastructure architects and business professionals who have contributed to the growth of the blockchain industry since the early days of Ethereum development. In addition to the team's deep experience, Aegis will ensure that the network is secure through code and smart contract audits with globally leading blockchain audit firms. Users can expect Aegis Network to be built with the highest level of financial security.

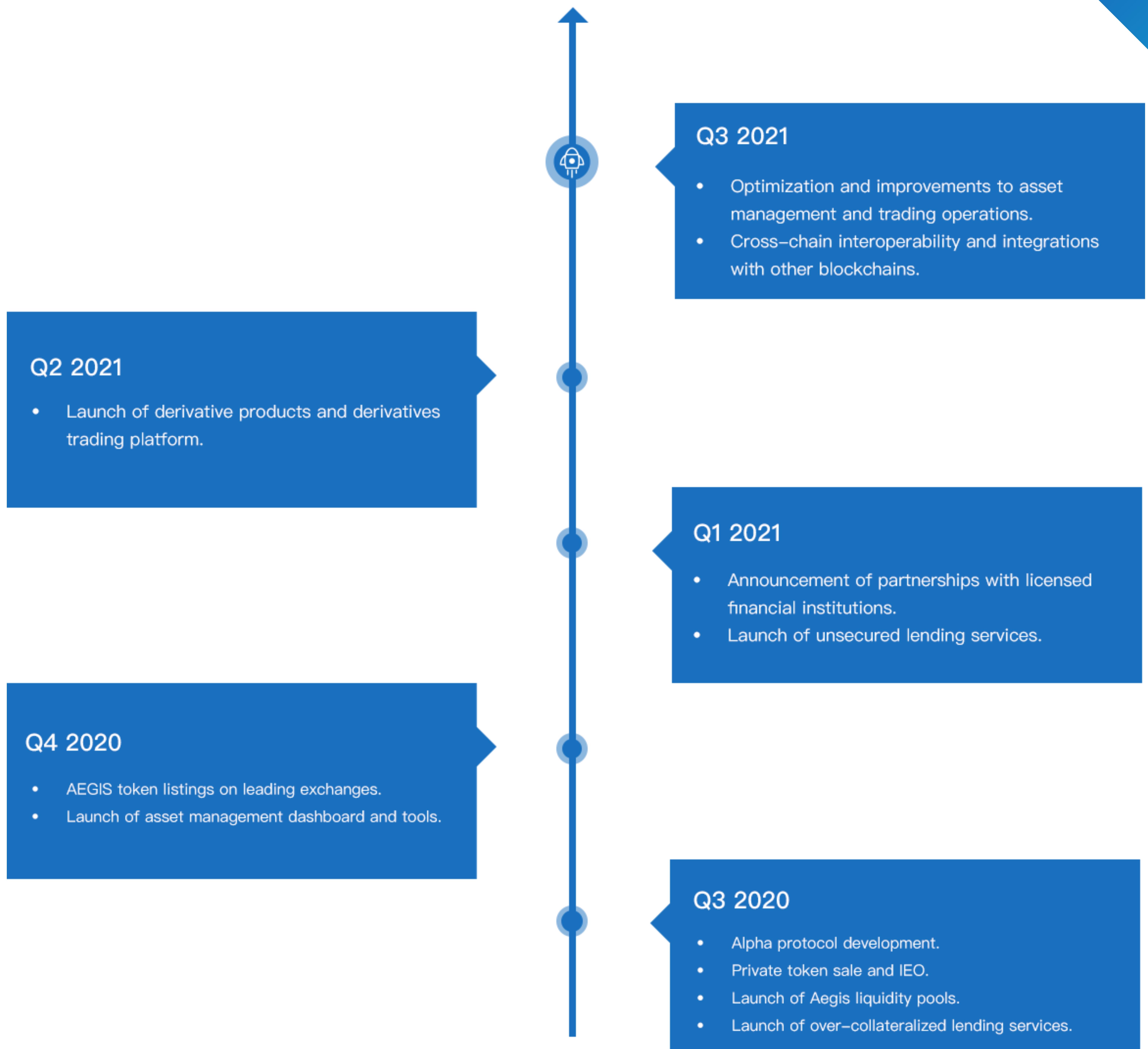
Aegis is committed to community governance, and AEGIS token holders can vote for potential changes and improvements to the platform. Stakeholders can then continue to monitor the changes and ensure that Aegis Network is constantly improving and evolving in accordance to both the industry's and users' needs.

Similar to public corporate governance, Aegis Foundation act as the board of directors to execute the will of the governing community. The Foundation shall designate third-party auditors to monitor and guarantee that Aegis liquidity pool is in sound and healthy condition for the security and assurance of our liquidity providers.

Aegis ensures with each asset comes with a risk profile recommendation, and each user has done their risk profile assessment before trading any assets. All subsequent asset management decisions are independently done by the users, giving users full control and freedom over their personal financial management.



# ■ Chapter 7: Roadmap and Future Developments



**DeFiner of DeFi 2.0**

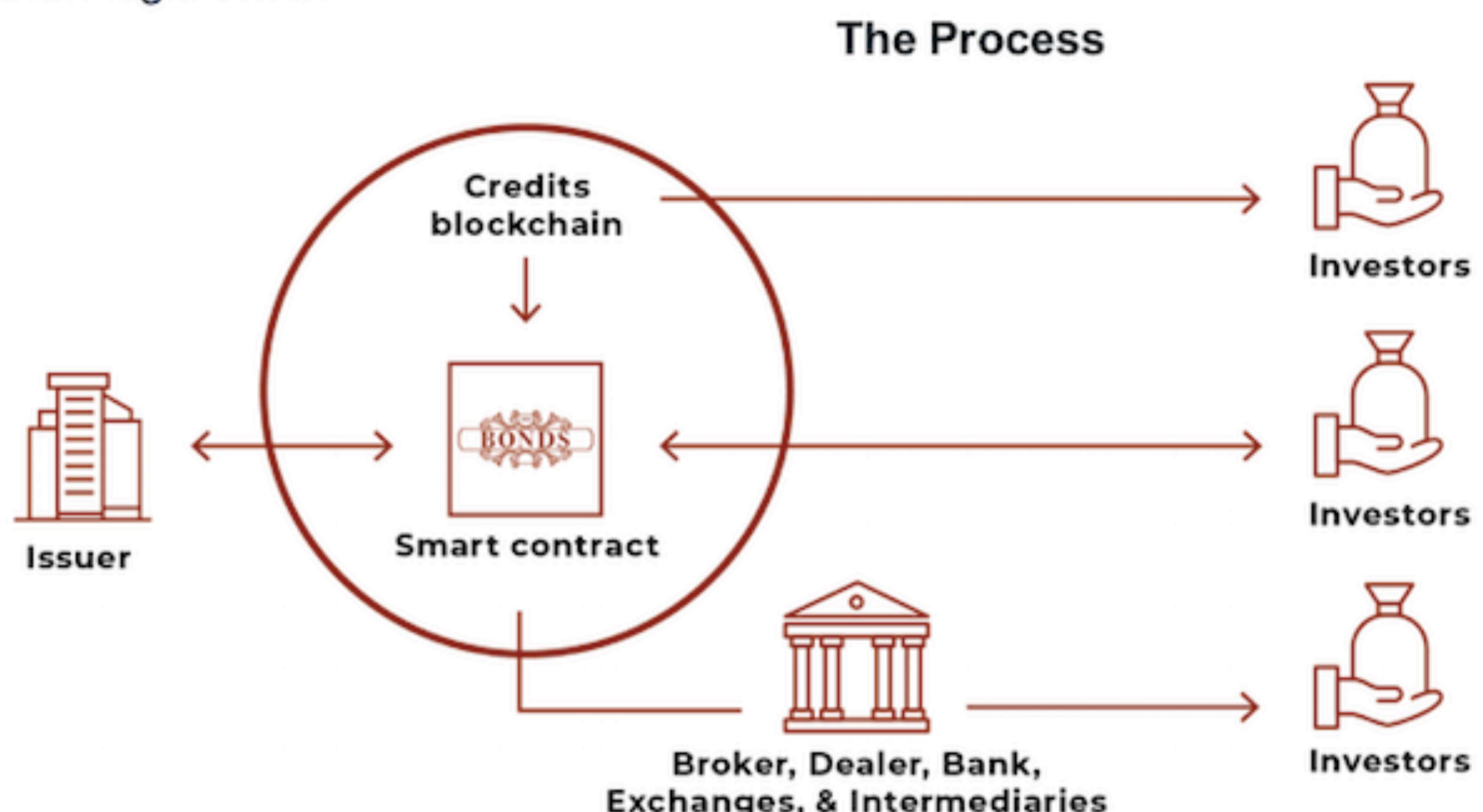
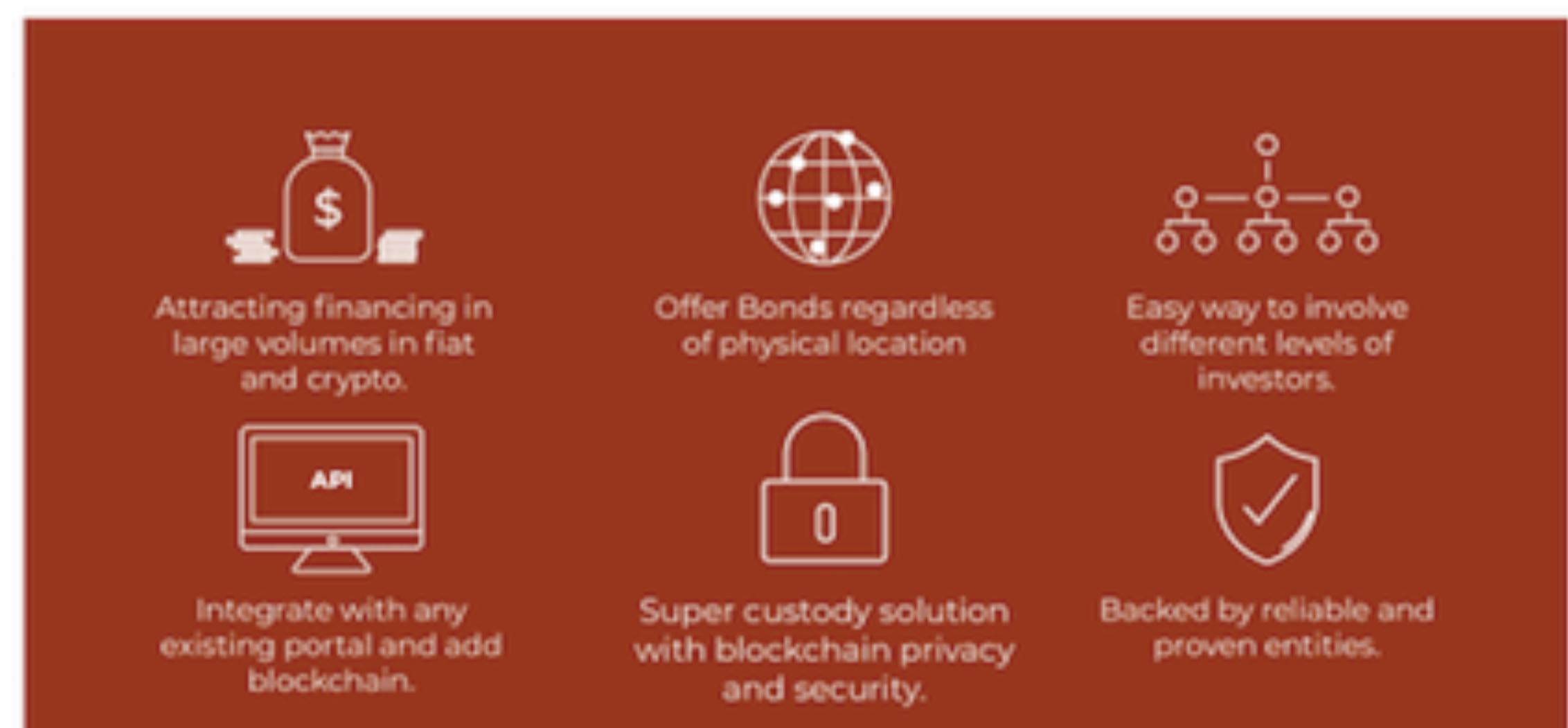
# Use Cases of Aegis

## Case 1: Digital Copper Issuance & Trading on the Blockchain

Add issuance of assets such as Digital Copper on the blockchain to any existing investment portal and easily enrich your offering with the power to accept crypto. The assets are backed by real copper mines that Aegis owns.



The Benefits



## Case 2: Crypto Asset Derivative Index

- Index pegged tokens on Aegis backed by top crypto assets
- Carefully curated baskets are generated by a high-complexity algorithm



The Benefits

