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Vega White Paper

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Abstract: A decentralized, crowd-managed, funding platform built on Ethereum, designed to source decisions from a global network of knowledge, driven by cryptoeconomic and prediction market concepts. Leverages the impact of individual investors in the Ethereum-Based Token market by properly taking advantage of the wisdom of the crowd - an often misunderstood concept.. A platform that aids in the development of token market deal structures and standards that add value to both investors and startups.

Disclaimer: Vega is in an early and largely conceptual stage. As such, many of the things detailed in this White Paper are not final. We published this early draft so that the community could see the project's ideas and evolution in real-time. However, we reiterate that the details outlined below are not all set in stone and that readers should base their perspective and feedback on this fact.

1. Introduction

Fundraising today is centralized, expensive, complex and not often available to the vast majority of the world's population. Investing with a traditional venture capital firm today is far beyond most people's means. Crowdfunding platforms, both reward and equity based such as Kickstarter and Crowdfunder have enabled many start-ups to raise capital without the complications and overhead of holding a VC funding round. However, traditional, centralized crowdfunding platforms come at their own expense: they have high fees for processing payments and the management of the platform. On top of this, fees become even greater when cross border payments are required due to complexities in FX exchange.

Decentralized, trustless, peer-to-peer innovations like Bitcoin and Ethereum have enabled individuals to make fluid transactions on a global level with immaterial costs. One of the greatest use cases for

decentralized services is crowdfunding. The ability for anyone in the world with internet access to take part in the funding of new enterprise is an amazing innovation. Networks like Ethereum have created the platform and infrastructure required to enable massive global access to efficient, low-cost financial transactions. Recently, Initial Coin Offerings have been an extremely popular way for projects to receive the financing they need to develop and grow. However, while ICOs can be extremely advantageous for projects and investors alike, there are some problems: investors, because of personal capital constraints, are often forced to choose between making a meaningful impact on a specific project via investment and diversifying their risk. A decentralized funding platform eliminates this problem by allowing people to pool their money together and have an impact on projects while also being able to sufficiently diversify their exposure to risk. A decentralized funding platform is one of those products that will enable individuals to effectively and securely invest in early stage organizations and projects.

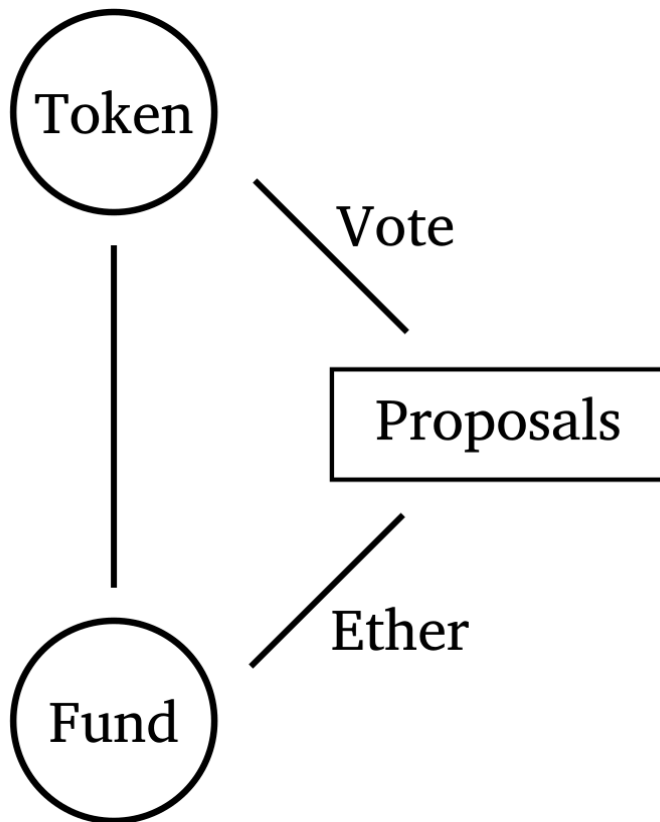
Ethereum has enabled organizations to form with no central point of failure, and organizations are often governed in a completely decentralized nature. Ironically, while many projects play into the ‘decentralization’ theme, their biggest flaws actually come from centralization. This was evident in ‘The DAO’, whose central team failed to react to warnings of a large security vulnerability and caused the loss of millions of dollars.

While The DAO itself failed, the immense demand for such a service was made apparent by the sheer amount of money raised in the biggest crowd-sale to date. People in this space are now wary of the concept behind The DAO, but we believe the issue clearly belonged to the execution of the idea, and was not inherent to the idea itself.

Just as many great ideas fail at first, they do not go away, but rather grow stronger with each iteration. A truly decentralized platform is required to obtain the benefits associated with crowdfunding and traditional venture capital funding. The creation of a zero-fee platform, owned and operated by token holders with a dynamic range of options for control of the platform’s evolution and decision making is the chief goal of Vega.

2. Fund Structure

Vega’s fund structure is comprised of three main sections: Vega Tokens, offers, and the fund itself.



Vega Tokens are a representation of a holder's stake in the fund. Tokens also represent a holder's rights and access to functions of the fund, such as voting on offers. Tokens as 'stake' ultimately has two meanings, one with regard to voting and one with regard to money.

The first meaning, with regard to voting, is that the weight of a token holder's vote in project and DFI offers is equal to his or her stake.

- $\text{Vote weight} = \text{tokens owned} / \text{current total token supply}.$

The second meaning, with regard to money, is that a holder's stake as a percentage corresponds to an amount of Ether in Vega's pool of available funds to invest with. If there are 100,000 Ether in the fund, a token holder with a stake of 20% represents 20,000 Ether. It is important to note, however, that Vega Tokens are not redeemable for Ether, by default. Vega Tokens can be traded between individuals in exchange for the market value. Due to the nature of fund's holdings (early stage projects), no 'redemption' program can be offered, at least initially. This is because a portion of the fund's holdings may be highly illiquid. If a token holder wishes to leave the fund they will be able to sell their tokens through a secondary exchange or through peer to peer interaction.

Because Vega will likely have token holders who do not vote or do not intend to vote, we are actively researching different ways to preserve the rights of the token holder while simultaneously ensuring that the fund has maximum access to available Ether. One way we believe would be effective to do this is by

having a ‘voting claim period’ after the initial sale of Vega tokens. People who purchase tokens would have, say, 30 days to claim their voting rights after purchase. If the 30 days passes without any claim being made, the voting capacity underscored by the unclaimed tokens will be deferred to another party. The actual owner can still claim rights at any time - during the initial 30 days no one will be able to vote in their place, and afterwards the deferral of voting rights will be revoked if and when the true owner claims that right.

Vega Token holders will have to option to defer their voting rights to another Vega Token holder if they do not want to vote themselves. This is the concept of a liquid democracy, where one could forward their voting weight without transferring tokens.

Project offers are the method through which investment decisions are made. Project offers can be created by any Vega Token holder. The offers have a number of required inputs, which are given in a visual example of a project offer in the figure below:

Function	Project Proposal
Input Params	Name: "Decentralized Software Company" Beneficiary: 0xa3a95Cd3D5C40DDF0dcDbb54955DBEDABdcB1c1F Goal: 100,000 ETH Duration: 30 days Terms: "We are offering our backers 5X tokens, when we ICO, which is scheduled to happen around summer of 2017, all other terms are provided in the beneficiary contract address"
Output	Id: 0x692a70d2e424a56d2c6c27aa97d1a86395877b3a

The “Name” defines the human readable project name that is seeking funding.

The “Beneficiary” parameter defines where, upon success of the offer, the Vega platform will direct funds. This can be either a contract or wallet address. In the figure above, the example is a pre-sale offered by *Decentralized Software Company* and the Beneficiary address is a contract, as opposed to a wallet. Allowing both wallets and contracts to be beneficiaries allows special deal structures to be made for each offer offered. For example a beneficiary contract could be standardized into a solidity version of a SAFE (Simple Agreement for Future Equity) agreement, if it seems that is the best option for funding a offer.

The “Goal” parameter defines the amount of funds needed for the project to make the offer a success.

The “Duration” parameter defines the amount of time the funding campaign will last for.

The “Terms” define in plaintext what exactly is being offered to the Vega community. This is an area where terms that cannot be easily explained in contracts and various other references can be made.

The fund is a collection of all the assets owned by the fund, project offers, special programs such as the DFI, etc.

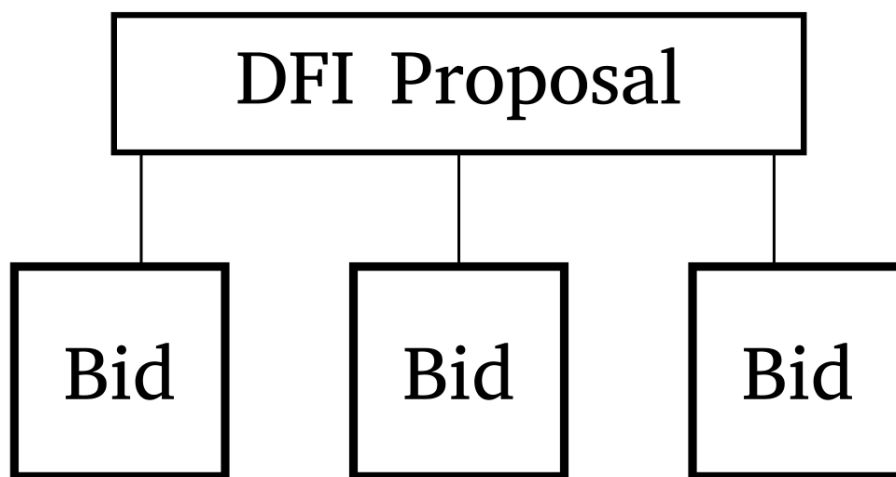
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While most of Vega's funds will be directed to Ethereum-based projects seeking early fundraising, Vega recognizes the vital role of individual contract developers in the Ethereum ecosystem. Expanding on this understanding, Vega plans to implement a program we've dubbed the 'Developer Funding Initiative'. The Vega community (Vega Token holders) will bear the responsibility of scrutinizing Vega itself just as they perform due diligence on companies seeking funding. As the Vega community sees areas of the fund that

need improvement, they'll propose new contracts or updates on existing contracts that need to be made, and individual developers will compete for the job. The community will review all bids from developers created in response to the offer and then have a vote to determine which one is payed for and implemented. The DFI provides numerous incentives and benefits to Vega and the Ethereum ecosystem, such as –

- *Security* – The biggest pitfall many solid developer teams have run into is viewing security as something absolute as opposed to something needing constant refinement. An example of this was the DAO, who before having their security breach exploited were warned many times about the breach by the community, but failed to act on the threat. With the Developer Funding Initiative, if the community sees a serious security threat in Vega's code, they can immediately fund a solution.
- *Antifragility* – In the same vein as security, by having a pool of funds constantly ready to be deployed for constant improvement of Vega's platform we can ensure that Vega is maximally dynamic and robust, allowing it to withstand the rapidly changing state of the market. Antifragility itself means that Vega gains from disorder as opposed to being fragile, or hurt by disorder. The DFI makes Vega antifragile by turning problems into a source of immediate improvement.
- *Technology Growth* – While the main purpose of Vega is to encourage the growth of projects, by providing a funding base for developers *and* startups we can simultaneously support the exploration of the platform's potential and the refinement of individual developer's skillsets from the grassroots level.

The DFI allows independent token holders to propose a development contract that anyone is allowed to bid on. To accomplish this, a token holder would call a function that will create a DFI offer, which then can be bid on by any token holder.

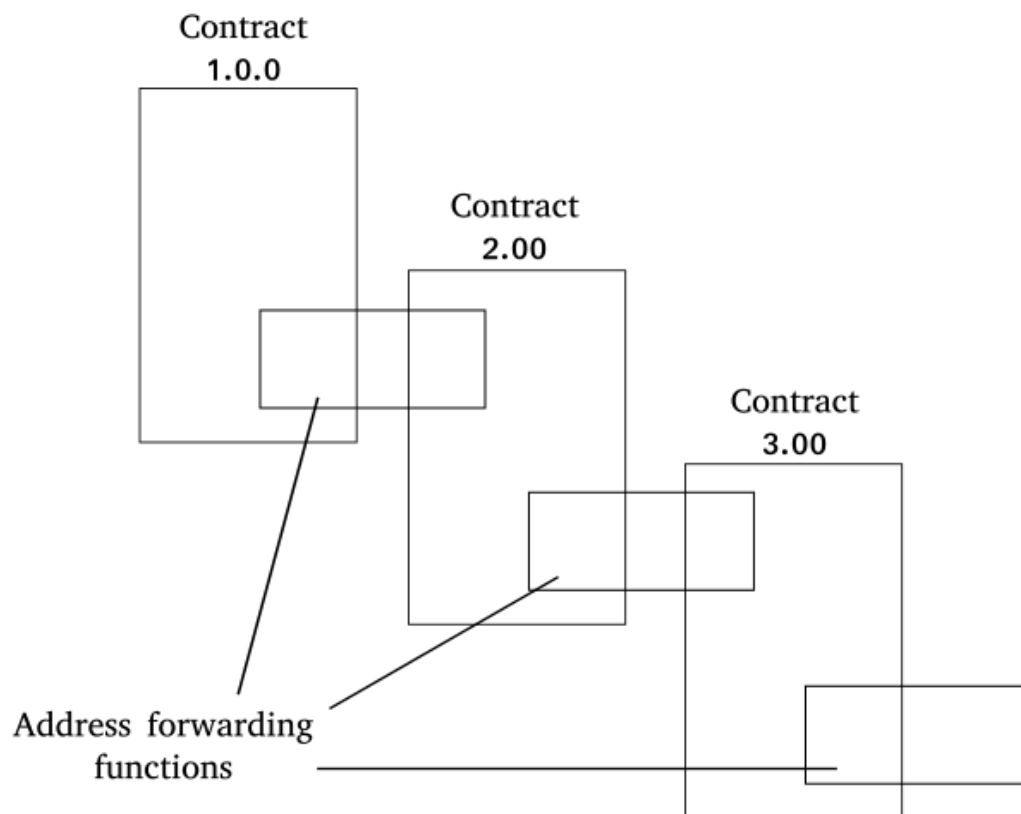


A "Bid", in this context, represents two things: a newly developed smart-contract that (ideally) solves the problem put forth by a Vega Token holder, and a price for the development of said smart-contract.

The function will require some parameters in order for the token contract to automatically update (forward) a contract address to another address. The image below is a graphical representation of the parameters the function requires.

Function	Developer Funding Initiative (DFI) Proposal	
Input Params	Address: 0x5e72914535f202659083db3a02c984188fa26e9f Contract: "There is a concern that problems could arise out of the "0x5e72914535f202659083db3a02c984188fa26e9f" contract. These concerns are that funds could be at risk due to the X, function call. We belive Y could be a good solution, please quote for a chance to be selected."	
Output	Id: 0x08970fed061e7747cd9a38d680a601510cb659fb	
		id link
Function	Bid On Contract	
Input Params	Proposal_id: 0x08970fed061e7747cd9a38d680a601510cb659fb Bid: 15 ETH Data: 606060405234610000575b610171806100196000396000f300606060405263ffffffff60e060020a60003504166370a0823181146100455780638620410b14610070578063a3201daa180029 Address: 0xef55bfac4228981e850936aaf042951f7b146e41	
Output	Id: 0x8c1ed7e19abaa9f23c476da86dc1577f1ef401f5	

When a “Bid On Contract” Id receives enough votes to be executed, the platform will automatically allow the addressed contract to forward to the “Bid On Contract” Address. The following is a graphical representation of how this dynamic versioning system works.



Each contract will require a “Address forwarding function”. This is how the next contract can be called and avoid the problem that a contract become the last possible version. This works by using a function

modifier to only allow the “owner” to change the contract’s forwarding address. The “owner” is only a bid on contract id that has collected enough votes to be executed.

```
contract AddrForward {
    address public version;
    address public dfiContractOwner;

    function AddrForward(address initAddr) {
        version = initAddr;
        dfiContractOwner = msg.sender;
    }

    function update(address newAddr) {
        if(msg.sender != dfiContractOwner) throw;
        version = newAddr;
    }

    function(){
        if(!version.delegatecall(msg.data)) throw;
    }
}
```

5. Mint and Credit Offers

In addition to project and DFI offers, there are two other available offers that token holders are able to create and vote for. These are the “Mint offers” and the “Credit offers” - each have unique characteristics and offer various options to token holders.

Mint offers are an option for token holders to collectively decide to mint further tokens for the purpose of raising additional funds from new participants seeking entry in the fund. The offers are limited to a 60 day voting period, and require a majority (>50%) vote to succeed. Mint offers are executed by a smart contract that will automatically mint and sell a defined amount of tokens for a defined price. Any token holder may create a mint offer at any time. Two required parameters are needed to create a offer. These are the “Issue” (Amount of tokens to mint), and the “Price” (At what price to sell the tokens). The figure below highlights on a high level the function used to create such offer:

Function	Mint Proposal
Input Params	Issue: 15,000 Tokens Price: 5 ETH / Token
Output	Id: 0x5e72914535f202659083db3a02c984188fa26e9f

The “Issue” is the amount of tokens that are being proposed to be issued.

The “Price” is the Ether exchange rate at which the “Issue” is being offered.

Token holders will always have a subscription right to have the first option, without obligation, to purchase the new token issue before the public is offered the sale of tokens. This subscription right will last for a 15 day period, and all non-purchased tokens will be for sale after this period to any Ethereum address that will pay the defined price set in the offer.

Of course, depending on the pricing of newly issued tokens, certain token holders will face dilution of their stake in the fund. This is something token holders must bear in mind when voting on mint offers. If an offer is successful, that would ideally reflect that the majority of the fund views the benefits of having more capital available for use as greater than the drawbacks of stake dilution.

Another option if the fund decides to create a Mint offer is to offer new tokens for sale in the format of a dutch auction, this way the price could more accurately reflect the market's opinion of the price of the tokens.

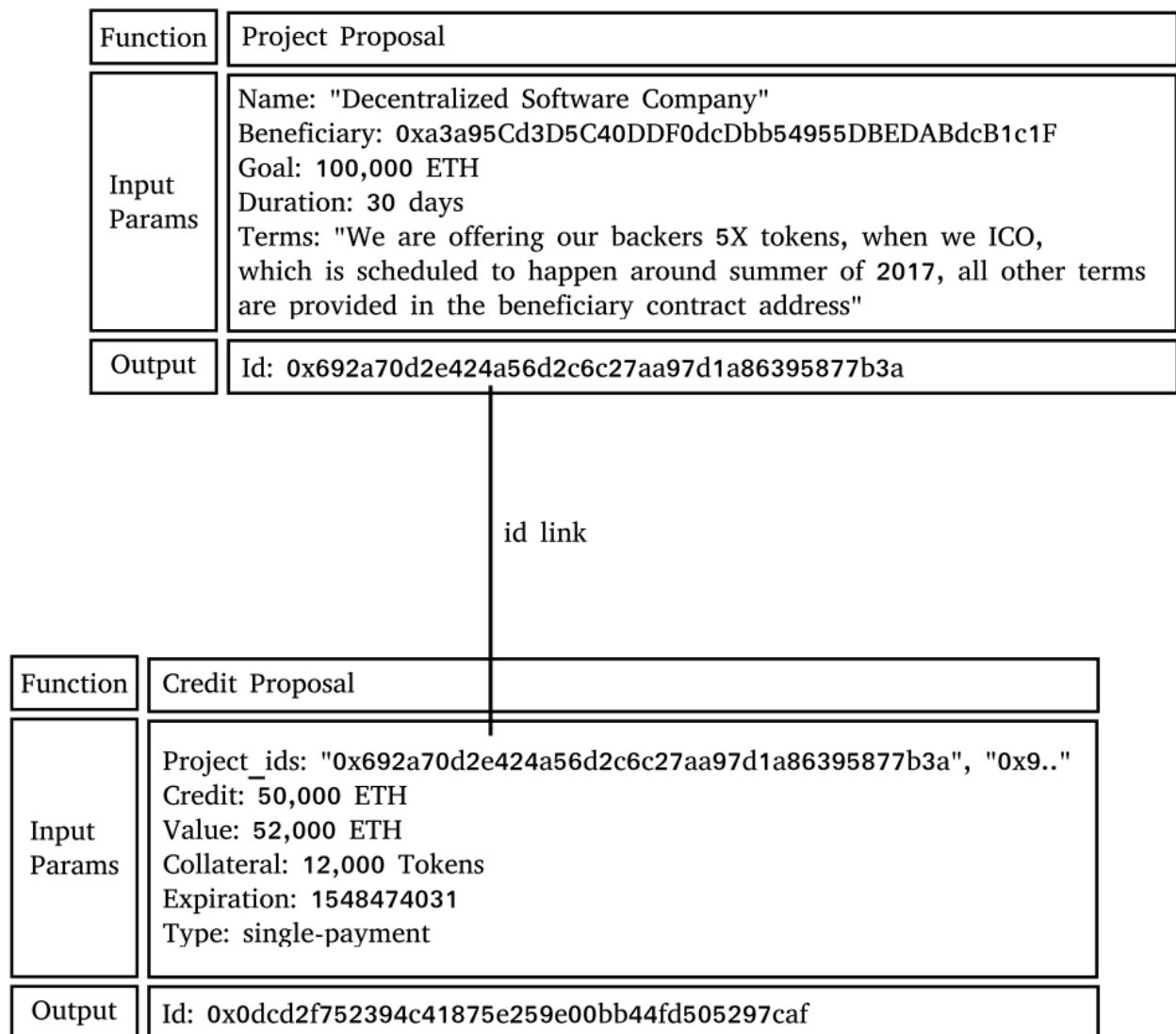
Credit offers are a way for token holders to decide to take on debt to fund a portion of a project offer's funding goal by using leverage. This allows outside parties to lend Ether to the fund in exchange for a fixed interest rate. Lenders are incentivised both by the interest rates offered from the fund, and, in case of a loan failure, are able to collect the project tokens (not Vega Tokens) as collateral.

Token holders are incentivised to take on leverage by the ability to finance projects without locking up portions of the fund's capital, and by access to higher potential returns for a cheaper investment.

Token holders are the creators of credit offers, set interest and collateral terms, defined by the holders themselves. In order to create a offer, there must be one or more eligible corresponding project offers that will be receiving the Ether loan. For the corresponding project to be eligible it must have already hit or passed the funding goal.

This ensures there is sufficient consensus among the Vega community that the project is likely to be a good investment. If the project offer meets the requirements, then a credit offer can be created by any token holder.

Voting for a credit offer is limited to a 3 day period. Any number of credit offers can be created for a project within the 3 day period, but only one can be executed. The credit offer with the majority vote after the 3 day period will be selected and made available to outside parties to lend to. Just as with every other Vega offer, a credit offer will have a few required input parameters for its creation. The following image highlights how the credit offer creator function works and its relationship to a project offer.



The “*Project_ids*” defines which projects will receive debt financing. Note this can be more than one project; if the credit offer receives majority vote and holds two “*Project_ids*” than the debt is distributed equally among both of the projects.

The “*Credit*” parameter defines the principal amount of debt to take on for the project. Note that a credit offer will not be able to be created if it defines more credit than the project offer’s own funding goal defines.

The “*Value*” parameter defines what will be owed by the fund upon expiry of debt taken on. This is simply principal + interest payments.

The “*Collateral*” defines the amount of project tokens that will be minted and paid to lenders if the loan is not repaid to the lenders prior to the expiration time.

The “*Expiration*” defines the time at which “*Value*” is due.

Finally, the “*Type*” only has one option as of the initial creation of the Vega platform: “single-payment”. This means that the loan will be paid back by the smart contract at one single time. The “*Type*” is subject to additional options after initial development of the platform and consultation with presale participants.

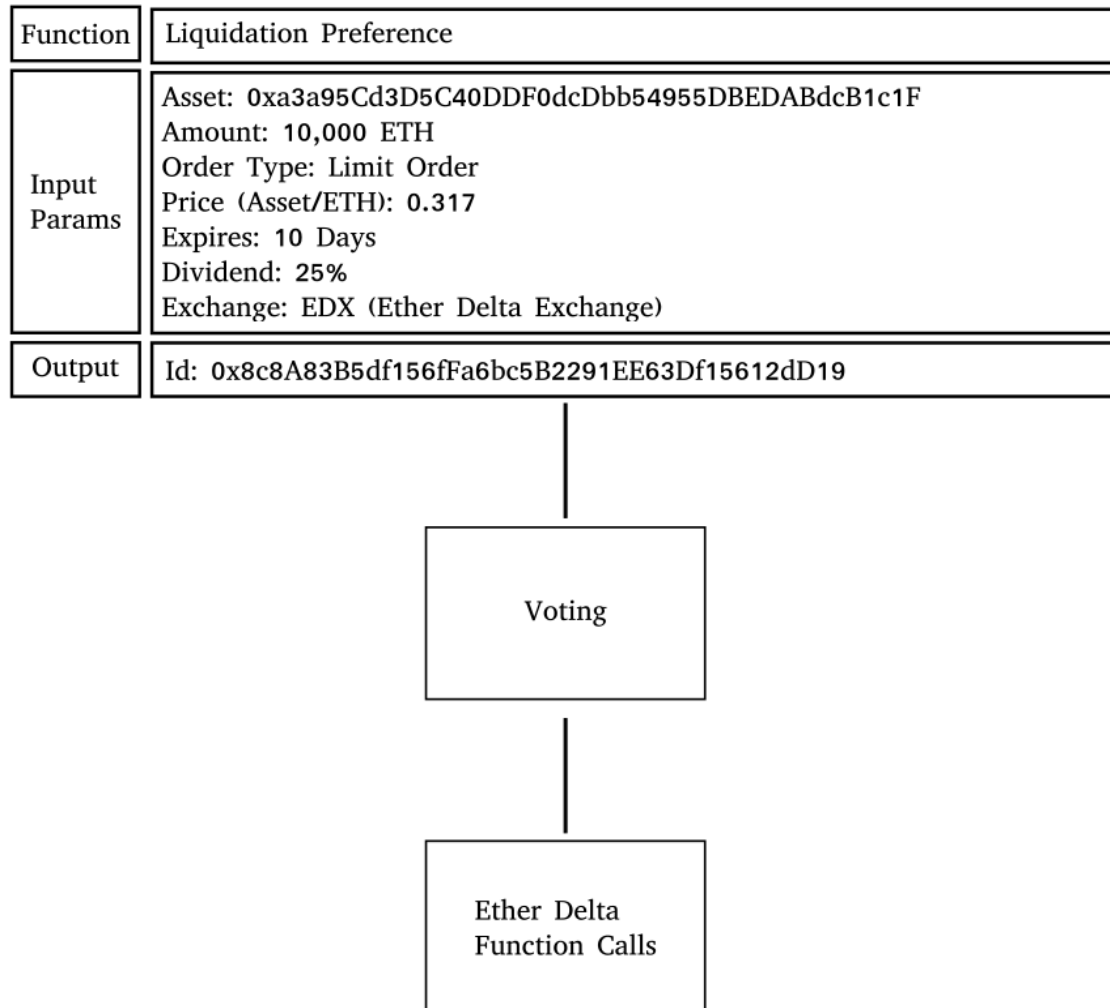
6. Liquidation

The fund will need to have the ability to liquidate its assets at some point in order to re-invest capital into new projects and pay a portion of return as a dividend to token holders. Previously, liquidation for a product that is truly decentralized, usually comes at the expense of trusting a party to liquidate an asset on a centralized exchange. However, due to new progress made in the decentralized exchange space, exchanges like 0x, Ether Delta and Maker Market are now beginning to offer a solution to exchange assets, without a trusted trader or ‘custodian’. These decentralized exchanges provide a number of benefits, including transparency, an easy ability to audit transaction records, and one can trade any ERC-20 standard coin / token on Ethereum.

In order to take advantage of what decentralized exchanges have to offer, the Vega Platform will be specifically designed to integrate parts of its functionality to interact with decentralized exchanges and perform function calls on the exchange contracts themselves. Some concerns that are often associated with decentralized exchanges as of the time of writing this are that they offer poor liquidity for trading, and the spread is often very large, making order execution much harder to perform than on a centralized exchange. While these concerns are valid, we believe that is only a matter of time before decentralized exchanges make sufficient development progress to be viable, and will be the most preferred method of exchange. In the meantime, these exchanges still can be used even without a large amount of liquidity.

If the fund decides to sell an asset at slightly less than what a exchange rate on a centralized exchange offers, arbitrageurs will be able to lift the order and sell on a centralized exchange, providing a solution to liquidity problems in the short run.

The question then becomes at what point will the fund decide to liquidate, and which assets to liquidate. While this is currently active research, we believe that a liquidation event will be decided via a liquidation offer. This would be much like all other offers, in that a number of definitions regarding how the liquidation will be conducted can be created by a token holder, at any given time, and then Vega Token holders may choose to vote on this action. The figure below will provide an example of one of the possible ways the fund could decide to perform a liquidation event.



“Asset” is an identifier reference to where the funds tokens are held.

“Amount” is the amount of Ether or token that is proposed to be sold.

“Order Type” is what kind of order is being proposed, currently a limit order is the only option on decentralized exchanges, but this could change very shortly in the future.

“Price” is the proposed exchange rate.

“Expires” is when the order will expire if the asset is not sold.

“Dividend” is what percentage of the sale will be eligible for withdrawal, and what portion will *roll* back into the fund.

“Exchange” is where the asset will be listed for sale. Right now Ether Delta and Maker Market are the largest two decentralized exchanges offered.

Dividend pool: if a liquidation offer, defines a dividend, the funds will be sent to pool of dividend, that are eligible for proportional withdrawal at anytime for 90 days. If any funds are left over in the pool after 90 days they will go back into the fund for future investment.

7. Incentive Structure (Finder’s Fees, Voting Rewards, etc.)

Vega’s creation was largely inspired by prediction markets. As such, we’ve spent a lot of time researching how prediction markets work for corporate and public governance. In our view, the most important piece of prediction markets is incentive. While Vega is not a prediction markets platform, there are many parallels due to our core function—democratized funding decisions. The success of these decisions banks, in part, on the idea of the ‘wisdom of the crowd’—a key idea behind prediction markets.

However, the wisdom of the crowd is often misconstrued. It’s not about simply aggregating information from as many people as possible, but rather doing so while *also distinctly incentivizing those with high-level knowledge on the topic to come forward*. Wisdom of the crowd effects would not manifest in prediction markets without this, and it is paramount to their successful implementation that those who can consistently make the right calls come forward.

Translating this to Vega, there are a few main items to bear in mind. To ensure the best possible selection of project offers for our users, we need to do the following:

- Encourage deal flow—reward people who make good offers.
- Discourage spam—penalize the creation of bad offers, malicious, joke, or otherwise.
- Incentivize high-level knowledge—specifically encourage those with the information to facilitate or bring about especially good deals to come forward.

We will bring about the above abstractions by implementing a ‘finder’s fee’ for project offers. In practice, this means that the incentive structure for project offers will be as follows:

Creator’s Deposits’ - The cost of creating a project offer. To create a project offer, Vega users will deposit an amount of Vega Tokens determined by the following equation:

$\text{creatorsDeposit} = \text{requestedEther} * \text{rewardRate}$

Where *requestedEther* is defined by the amount of Ether being asked for raise in a project offer and *rewardRate* is defined by the voting rewards reward rate (defined in a later paragraph).

This deposit will be returned to the offer creator in full if the offer is successful.

‘Finder’s Fee’ - This is the additional reward reaped by the creator of a project offer if their offer is successful. This reward will be in Vega Tokens, and the reward rate will be determined via ‘Finder’s Fee Offers’. This method of rate discovery will likely be limited to early stages of development as we seek to provide a more fluid and continuous mechanism for reaching platform-wide reward rate consensus.

In addition to incentivizing good deal flow and penalizing spam/malicious offers, we wish to incentivize token holders to be active participants in the operations of the platform, and avoid large amounts of unused voting power. To achieve this, we plan on implementing a ‘voting reward’ - similar to the finder’s fee, this will be a reward in Vega Tokens for users who voted positively on a successful project.

Unlike the finder’s fee structure, voting rewards are expressed as a multiplier between 0 and 1. This multiplier is determined via ‘rewards offers’. As with the finder’s fees, this method of rate discovery will ideally be phased out over time for a more fluid alternative.

Voting members can realize voting rewards regardless of whether their vote was ‘in-support’ or ‘against’ and regardless of whether the proposal was successful or not. For a user to realize their reward for voting on a project offer, they will call a function that determines what share of the vote they have (their token holdings) and expresses that number as a new variable called ‘*votingPoints*’. Another variable, ‘*votePercentage*’, is a value between 0 and 1 that is determined by what percentage of the vote was ‘in-support’ for a successful offer and ‘against’ for a failed offer.

Example: a successful offer where 75% of the vote was in-support would have a corresponding ‘*votePercentage*’ variable of .75. A failed offer where 60% of the vote was against would have a ‘*votePercentage*’ of .6.

Then,

$\text{votePercentage} * \text{votingPoints}$

$\text{votingPoints} * \text{rewardRate} = \text{voting reward}$

8. Conclusion

Ethereum has given individuals widespread access to technological and financial innovations never before available to the masses. This opportunity allows us to build out a variety of advanced services that are non-exclusive, free of fees, and free of reliance on a single party to facilitate the services offered. The explosive growth of the ICO market provides Vega a perfect window to offer both individuals and startups an opportunity to gain exposure to the decision making of a global network of knowledge.

9. Future development options

This section describes current features that Vega is considering implementing as a part of the platform, but are in the earliest conceptual stage.

Offer reputation: As a part of active research Vega is looking at how to implement a method to have offer creators gain some form of reputation to provide a better metric for determining a offer's likelihood and probability of being both successful and legitimate.

Offer identity: Vega is considering options and way to include identity of both offer creators and their beneficiaries to allow token holder to validate that the person who claims to be who they say they are to really be that person. We are looking at projects that are working on this issue now and discussing ways to include this feature in the platform.

Management team election: Another option that Vega is considering at this time is implementing an elected team model to be in charge of platform maintenance. This could eliminate some of the problems with management efficiency while also maintaining the consensus and trust of the token holders. This would work by having a management team elected to run the platform at some recurring interval of time, which would most likely be either a period of block count or every quarter or the year. Implementing such a model could be in addition to implementing the DFI, as the two are not mutually exclusive.