



# EXPANSE

## A Ternary Division DAO

Christopher Franko, James Clayton, Dan Conway

[founders@expanse.tech](mailto:founders@expanse.tech)

<http://www.expanse.tech>

### Abstract

A 3 division Decentralized Organization built from a smart contract that lives on a blockchain and manages an organization's development, operations, and finances is ideal for ensuring the integrity, longevity and transparency of the organization over its lifespan. One of the problems commonly seen in legacy organizations is the translucent and often times opaque management of the organization's financial resources. It is absolutely vital to the success of an organization that they manage their finances wisely and transparently in order to remain solvent and ward off institutional corruption. Another common pitfall in many organizations is a lack of shareholder incentive to participate in the organization's decision making process which leads to the shareholder feeling insignificant and having little impact on the outcome of important issues. By combining blockchain record keeping with software enforced bylaws and incentivized community involvement, the Ternary Division DAO solves many of the problems faced by both traditional and decentralized organizations.

### Introduction

The purpose of this Whitepaper is to explain the advantages a Ternary Division DAO has for creating transparency, integrity, and longevity for an organization, while also offering a great deal of community participation. We will provide descriptions, examples and flowcharts to help simplify understanding the concept of the Ternary Division DAO; How it offers innovative advantages over past organizations in terms of solving problems of institutional corruption, external financing requirements, incentivization of development, and involvement of the community in project management without being controlled or influenced by external entities.

## Solving problems for organizations with the Ternary DAO

The rise of Blockchain technology offers great promise for the future, but there are problems intrinsic to the development of new Blockchain platforms that carry over from existing centralized systems. Many of the challenges faced by such systems stem from the financial requirements to develop and maintain any significant project. These requirements typically lead to the need for outside funding, often resulting in loss of various levels of organizational control to outside parties. In the case of a community project, this can create a situation where it is no longer truly decentralized, no longer driven by community interests, and is de-incentivizing of community participation.

We propose a Ternary Division DAO that generates and maintains its own operational funding, builds value based on the talent added by all that join the community, and facilitates for management by its members rather than a centralized entity. This DAO will function by use of Smart Contracts operating on the Expanse Blockchain that build a decentralized structural foundation secured with immutable code. The Smart Contracts will release funding by consensus as approved by the community, from a reserve built from the Genesis Block. Additionally they will provide a self enforcing voting system where new voting topics can be proposed and voted upon by users. In this way we can offer a system that is self funding with built in incentives, can continue to grow further decentralized over time, and does not rely outside funding or support from existing financial systems. This can be done in a public and transparent manner, solving the problems of institutional corruption, reliance on outside financing, and development incentives all without being controlled or overly influenced by any third party entity.

## Smart Contracts for securing longevity and transparency

Smart contracts are computer protocols that facilitate, verify, or enforce the negotiation or performance of a contract, or that obviate the need for a contractual clause. Smart contracts usually also have a user interface and often emulate the logic of contractual clauses. In the case of the Ternary DAO, smart contracts are the organization's bylaws written in code rather than pen and notarized.

The DAO will initially be composed of four smart contracts operating on the expanse blockchain. The top contract known as the META contract, it functions as the parent contract for the organization. The META contract maintains 3 child contracts that make up and facilitate the 3 divisions of the ternary DAO system.

## The Division Contracts

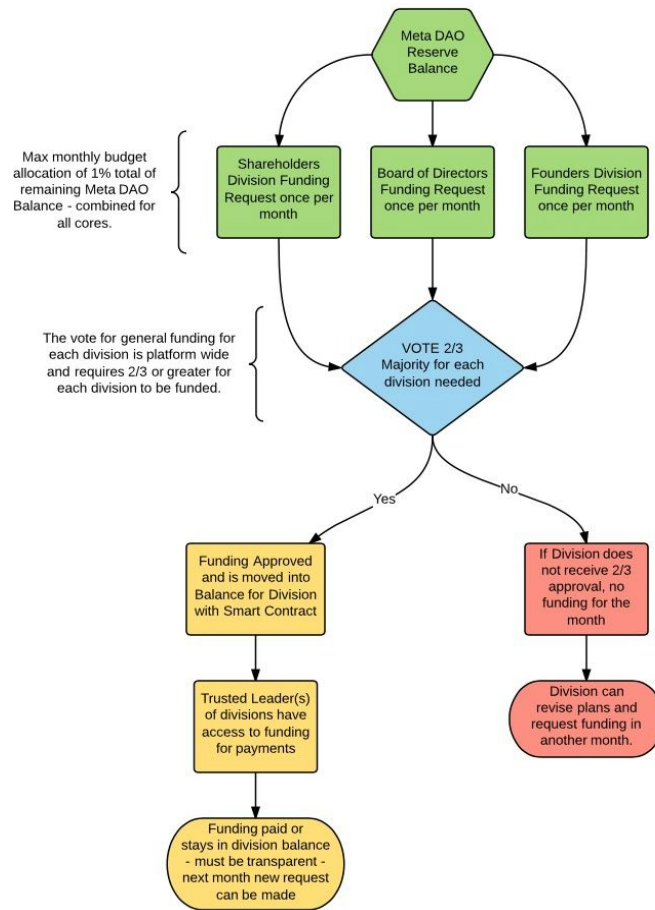
### 1. META CONTRACT

- a. The Founders Division
  - i. A 3/3 Multisig Contract
  - ii. Each member has a voting token
  - iii. Voting Tokens can be sent to other addresses.
- b. The Board of Directors Division
  - i. An m of n contract.
  - ii. Each member will have a voting token.
  - iii. Voting tokens can only be passed to someone else by vote.
  - iv. Voting tokens can be voted into and out of existence.
- c. The Community Division.
  - i. Users vote with their expense balance.
    - 1. Voting balances are determined by the addresses balance during a specified state.
    - 2.

### Each division contract has these basic bylaws

- 1. Each division will have a spendable balance that only that division and its parent can spend.
- 2. Each division will have to vote in order to spend its balance.
  - a. A single spending prop can only max at 10% of the divisions spendable balance.
- 3. Each division can request an allowance from its parent contract/division.
  - a. The allowance can only be 1% of the parents spendable balance.
- 4. Each allowance request creates a cascading sibling vote.
- 5. Each division can have one or more child/subdivisions.
- 6. Each division can be updated by unanimous vote.

## DAO Division Contracts Overview



## Voting

Voting is a formal expression of opinion or choice, either positive or negative, made by an individual or body of individuals. Expanse users propose voting topics and submit votes through the DAOs smart contracts that directly enforce the division's voting bylaws.

## Case Examples

### *Example 1 - Approved Spending Past Budget*

If the Advisory board want to build a widget and their division doesn't have funds, they will have to request an allowance from the parent contract, in this case, the META contract. This will then create a cascading vote to the Founders Division and the Shareholder Division. If the community or founders agree the board should be allocated the funds through voting consensus, the funds are transferred from the META contract and to the Advisory Board. The board then have to create another vote to send these newly acquired funds to their intended widget creator.

### *Example 2 - Sub Committee*

Imagine if the Community Division wants to create an action committee, this action committee would be a sub-division or child of the Community division. Someone would need to create the action committee contract, then submit a special type of vote to the Community division, if the community division passes the vote than the new child (action committee) is added to the family of contracts and initialized with 1% of the parent contracts balance.

### *Example 3 - Technology Implementation Debate*

Often times in development of new technologies, there can be multiple paths in technological or organizational development with an unclear view of which option will produce the best end result. In a traditional organization, an internal team would research and review options, and a centralized entity would make the decision on how to proceed. In a modern decentralized organization, various members research and propose solutions often providing an array of potential solutions from varied perspectives, but often lack a mechanism from which a clear consensus can be drawn. The clearest example of this at the time of writing is the Bitcoin Blockchain size debate; It is a situation in which there is a clear split between multiple proposed solutions, but no clear method to establish consensus. Major miners and service providers are in opposition on which proposed solution to implement creating a tense and controversial atmosphere. In Expanse, the issue would be posed as a topic for voting, users can discuss and debate the topic and in a prescribed amount of time place a vote providing clear consensus and a direct enforceable outcome.

## Voting and Incentivized Participation

When an organization has a low voter turnout it can be less than favorable because the voters are not a true representative sample of the organization. The disparities between those who vote and those who don't introduces disadvantages, like unequal representation. These concerns have caused some legacy organizations to consider various methods of increasing participation including efforts to lower the barrier to entry (lowering registration laws, early voting, voting by mail) as well as punishing voters for not participating. Increasing voter turnout is an urgent issue because it decreases disparities between the voters and nonvoters.

A novel solution to this problem is the introduction of gamification mechanics to the voting process. Each time a voter participates in the process they are rewarded with unlockable achievements, as well as voter attributes such as, Influence and Accuracy. Attributes such as Influence are used to calculate Voting Power and directly weigh the impact an account has on a votes outcome.

## Voter Attributes

Voter attributes are specialized statistics and non transferable tokens awarded to accounts for participating in the voting process. They are earned through voting and other forms of participation in the DAO.

- Influence
  - Each time someone votes they earn influence.
  - Each time someone misses a vote their influence decays
  - Decay is calculated over the last 100 votes held by the division
  - The more influence a user has the more power their vote has.
  - max influence is 10%

```
influence.max = 0.10
if votes.held.count < 100
influence.decay = votes.held.count / account.participation.count
else
influence.decay = 100 / sum of accounts participation over the last 100 votes held
account.influence = influence.max / influence.decay
```

### Influence Example:

The total votes held was 50, and the user has voted 25 times, and they own 10,000 exp, they should get a 5% addition in voting power.

*if 50 < 100*

*account.decay = 50/25*

*account.influence = 0.10/2*

*vote.power = 10000+(10000\*0.05)*

*vote.power = 10500*

- Accuracy
  - Each time someone votes for the winning side they earn Accuracy.
  - Each time someone votes for the losing side they lose Accuracy.
  - Accuracy is used to calculate someone's position in the voting leaderboard.
  - Accuracy does not affect vote results.
- Achievements
  - Non Transferable tokens awarded to user for various accomplishments.
- LeaderBoard Rank
  - A voters leaderboard score is determined by Accuracy+Power.
  - LeaderBoard position does not affect vote results.

## Voter Power

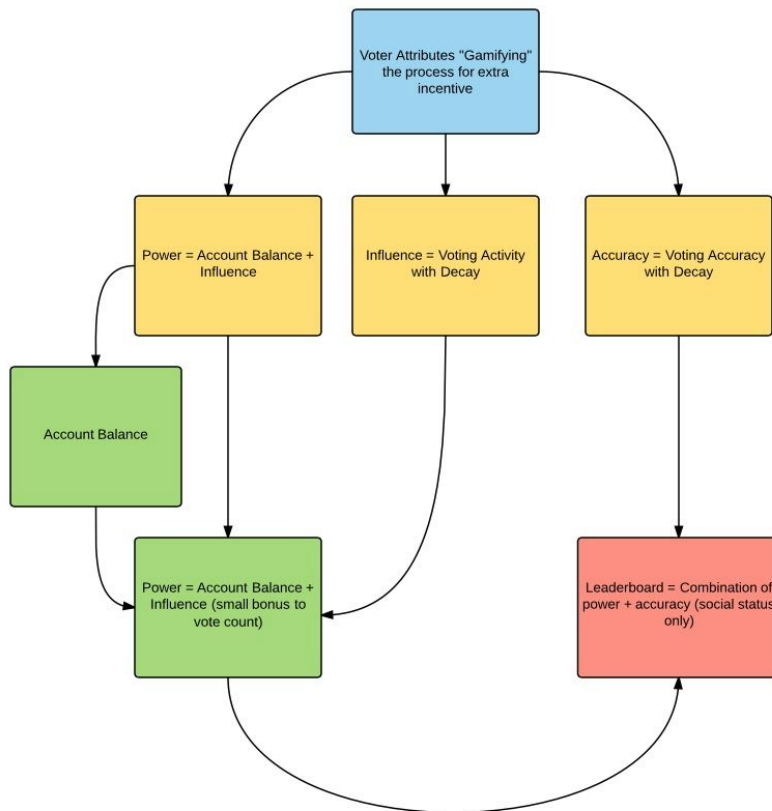
Voter power is the metric used to determine how valuable a voter is to the community. Voters with higher participation have a vote weight who participate more are considered more valuable.

A voter's power is calculated as:

*voter.power = account.balance\*influence*

*vote.outcome = votes.total+voter.power.total*

## Voter Attributes Overview



## Prevention and Mitigation of Fraud and Abuse

Voting fraud is a catastrophic failure of any democratic process, and as such it is paramount that potential vectors of abuse or exploitation are considered in both the technical and political design and development of the organization.

## Balance Transfer Fraud

When users vote on an issue, it references the amount currently held by the address or identity placing the vote. It would be possible however, for someone simply to transfer the tokens to another account and place additional votes from that address, in effect committing voter fraud. For this reason, we reference the balance of accounts participating in the vote at the time the vote was initiated. So for example if a new voting topic was created on block 100,000, any balance on the network participating in the vote as of block 100,000 will be taken into consideration and balances at block 100,001 and after will be ignored.



## Sustainability

As with any organization, sustainability and solvency are key issues and at the forefront of conversation. The Expanse DAO will initially be created with internal reserve funds estimated to finance its operations for 10 years. As that resources is finite, the DAO will need to establish additional mechanisms to generate income in order to continue on. Below are some of the current propositions for sustaining the organization:

## Possible methods to sustain

1. Proof of Stake
  - a. Because each contract will have its own balance, that balance could theoretically earn a sort of “interest” on the balance.
2. Identity Registration Fee
  - a. Each voter would pay a small amount of exp to register a name with the dao. This could then go into the community contracts balance.
3. Voluntary Mining Donation
  - a. Miners could send a small % of their block reward to a division of their choice.
4. Trusted utility contracts that cost a small amount of EXP to use
  - a. An example of this would be a name registration fee.
  - b. Trusted Oracle fees
5. For-Profit DAPPS or Subsidiary DAOs

## Conclusion

Blockchain technology has paved the way for exciting and innovative solutions to legacy problems. Smart contracts further enable us to solve complex tasks with relative ease. A decentralized autonomous organization whose bylaws are engraved with the immutable tools of mathematics and logic is the evolutionary next step in organizational governance. Imagine a future where politicians, corporations, and any other organizational construct are held to the standard the Expanse DAO demonstrates. This is what the Ternary Division DAO can offer, a proof of democracy, and a means to provide transparent tools with immutable code, creating a future where people can build up something much greater together than could ever be achieved alone.

## Further Reading

- Incentivizing Participation Increases Political Information [http://cess.nyu.edu/policon2012/wp-content/uploads/2012/09/Shineman\\_CESS\\_IncentivizingParticipationIncreasesPoliticalInformation.pdf](http://cess.nyu.edu/policon2012/wp-content/uploads/2012/09/Shineman_CESS_IncentivizingParticipationIncreasesPoliticalInformation.pdf)
- [Ethereum](#): A Next-Generation Generalized Smart Contract and Decentralized Application Platform
- [Bitcoin](#): A Peer-to-Peer Electronic Cash System
- The Idea of Smart Contracts [http://szabo.best.vwh.net/smart\\_contracts\\_idea.html](http://szabo.best.vwh.net/smart_contracts_idea.html)
- Origins of the Joint-Stock Company <http://szabo.best.vwh.net/jointstock.html>
- Secure Property Titles with Owner Authority <http://szabo.best.vwh.net/securetitle.html>

## Definitions

**DAO** - A Decentralized Autonomous Organization (DAO), is a decentralized network of autonomous agents that perform computationally intractable tasks. It can be imagined like an organization that is under the control of an incorruptible set of business rules. One that a human can be incentivized to provide services for the company, and that can provide a share of the profits for growth, and in some cases a say in how it is run.

**Blockchain** - Is an incorruptible and trustless form of decentralized record keeping where everyone asynchronously shares the same records, and every new record entry is validated by mathematics to prevent one from making contradictory entries. For example Chris can't send the same tokens to James that he already sent to Dan because the entry that shows Chris sending the tokens to Dan already exist in the blockchain.

**Smart Contract** - Smart contracts are computer protocols that facilitate, verify, or enforce the negotiation or performance of a contract, or that obviate the need for a contractual clause. Smart contracts usually also have a user interface and often emulate the logic of contractual clauses. Proponents of smart contracts claim that many kinds of contractual clauses may thus be made partially or fully self-executing, self-enforcing, or both. Smart contracts aim to provide security superior to traditional contract law and to reduce other transaction costs associated with contracting.

**Ternary** - Composed of three parts, based on the number three.

**Consensus** - Is a group decision-making process in which group members develop, and agree to support, a decision in the best interest of the whole. Consensus may be defined professionally as an acceptable resolution, one that can be supported, even if not the "favourite"

of each individual. Consensus is defined by Merriam-Webster as, first, general agreement, and second, group solidarity of belief or sentiment. It has its origin in the Latin word *cōnsēnsus* (agreement), which is from *cōnsentiō* meaning literally feel together.[1] It is used to describe both the decision and the process of reaching a decision. Consensus decision-making is thus concerned with the process of deliberating and finalizing a decision, and the social and political effects of using this process.

**Mining** - The mechanism in which new blockchain entries are added to the list of past entries. When a person is said to be “mining” they are using some sort of computational hardware to solve a mathematical puzzle that guarantees the legitimacy of every entry that makes it into the blockchain. Mining is intentionally designed to be resource-intensive and difficult so that the number of blocks found each day by miners remains steady. Individual blocks must contain a proof of work to be considered valid. This proof of work is verified by everyone in the network each time they receive a block.