Building Modular Organizations

... and the governance structures underlying them
Life's Family Tree

Trace any branch back through time to see how it connects to any other of life's major branches. Use the curved time scale to find when their common ancestor lived. Five mass extinctions are marked by an abrupt decrease in life's diversity, followed by renewed diversity.

This Tree of Life is drawn from the human point of view. That is why humans are the final branch and most Tree of Life details are found in vertebrates (animals with a backbone).

A Tree of Life drawn from a bacterial point of view would look very different!

Eukaryotes

Archaea

Bacteria

All the major and many of the minor living branches of life are shown on this diagram, but only a few of those that have gone extinct are shown. Example: Dinosaurs - extinct

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Experiment at the speed of software
Arc is an evolutionary framework for scalable governance

**Adaptive**
Arc supports an infinite number of governance elements. Its library of schemes and global constraints will evolve as the DAOstack ecosystem grows, with new templates and modules developed and added by the open-source development community and third parties.

**Modular**
Every DAO's governance structure is made of small building blocks – governance modules, or elements – that can easily be added, combined, edited or removed. Modules do not need to be redeployed onto the blockchain, but rather only referred to, saving storage and operation costs and enhancing security.

**Upgradable**
The governance structure of each DAO can easily be upgraded to use new schemes and constraints, or different parameters of existing ones. More granularly, each DAO created through Arc comes with a particular set of rules, which by default include the rules to change the rules.
Introducing **Kelsen**: easy governance for products, services and organizations.

Simple, transparent and incorruptible governance for everyone.
Welcome to Aragon 0.5 – The Architect

What do you want to do?

- Assign Tokens
- Vote
- Check Finance
- New Payment

Connected to the network
### Token Balances

<table>
<thead>
<tr>
<th>Token</th>
<th>Amount</th>
<th>USD Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCC</td>
<td>26</td>
<td>$340,358.69</td>
</tr>
<tr>
<td>ETH</td>
<td>3.14</td>
<td>$1,613.52</td>
</tr>
<tr>
<td>ZRX</td>
<td>453</td>
<td>$319.01</td>
</tr>
<tr>
<td>DNT</td>
<td>137</td>
<td>$9.26</td>
</tr>
<tr>
<td>ANT</td>
<td>0</td>
<td>$0</td>
</tr>
<tr>
<td>MANA</td>
<td>0</td>
<td>$0</td>
</tr>
<tr>
<td>SPANK</td>
<td>0</td>
<td>$0</td>
</tr>
<tr>
<td>SNT</td>
<td>0</td>
<td>$0</td>
</tr>
<tr>
<td>MKR</td>
<td>0</td>
<td>$0</td>
</tr>
</tbody>
</table>

### Transfers

<table>
<thead>
<tr>
<th>Date</th>
<th>Source/Recipient</th>
<th>Reference</th>
<th>Token</th>
</tr>
</thead>
<tbody>
<tr>
<td>13/04/18</td>
<td>0x610d46312613f04053b6e875c72e9d4a22348da2be5</td>
<td>Food aid</td>
<td>-753 BCC</td>
</tr>
<tr>
<td>13/04/18</td>
<td>0x39a4d265db942361d92e2b0039cae73e72a2ff9</td>
<td>Requested airdrop (test tokens)</td>
<td>+453 ZRX</td>
</tr>
<tr>
<td>13/04/18</td>
<td>0x772080b0d48de808d0e805083b0f9205f6d29</td>
<td>Ether transfer to Finance app</td>
<td>+3,14152 ETH</td>
</tr>
<tr>
<td>13/04/18</td>
<td>0x39a4d265db942361d92e2b0039cae73e72a2ff9</td>
<td>Requested airdrop (test tokens)</td>
<td>+137 DNT</td>
</tr>
</tbody>
</table>
## Opened Votes

<table>
<thead>
<tr>
<th>TIME REMAINING</th>
<th>QUESTION</th>
<th>TOTAL VOTES</th>
<th>PROGRESS</th>
<th>ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>00 D 23 H 58 M 14 S</td>
<td>Should we fund disaster relief for victims of hurricane Irma?</td>
<td>33.33%</td>
<td>✔️</td>
<td>View Vote</td>
</tr>
</tbody>
</table>

## Closed Votes

<table>
<thead>
<tr>
<th>STATUS</th>
<th>QUESTION</th>
<th>TOTAL VOTES</th>
<th>RESULT</th>
<th>ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔️ Approved</td>
<td>Token Manager (ngo): Mint 1 tokens for 0xC43B0C4b6d227536238f071fBa7e624b2A632830</td>
<td>50%</td>
<td>✔️</td>
<td>View Vote</td>
</tr>
<tr>
<td>✔️ Approved</td>
<td>Should we help reimagine democracy in the United States of America?</td>
<td>50%</td>
<td>✔️</td>
<td>View Vote</td>
</tr>
<tr>
<td>✔️ Approved</td>
<td>Finance: Create a new payment of 753 BCC. It will be executed 1 times at intervals of 0 days</td>
<td>50%</td>
<td>✔️</td>
<td>View Vote</td>
</tr>
<tr>
<td>✔️ Approved</td>
<td>Token Manager (ngo): Mint 1 tokens for 0x15bdC665f5a5e9Cef07b2a981dd2708A505051</td>
<td>100%</td>
<td>✔️</td>
<td>View Vote</td>
</tr>
</tbody>
</table>
How should the following features be prioritized?

<table>
<thead>
<tr>
<th>OPTIONS</th>
<th>Votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identity</td>
<td>25.83%</td>
</tr>
<tr>
<td>Permissions app</td>
<td>62.79%</td>
</tr>
<tr>
<td>App Manager</td>
<td>11.38%</td>
</tr>
</tbody>
</table>

**Time Remaining**
- Time out

**Description**
This proposals is intended to discuss and gauge sentiment of the community on how to prioritize between 3 short term features for Aragon Core.

**Web Link**
[https://github.com/aragon/governance/issues/19](https://github.com/aragon/governance/issues/19)
### Opened Votes

<table>
<thead>
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<th>Progress</th>
<th>Actions</th>
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<tbody>
<tr>
<td>00:23:58:54</td>
<td>Should we fund disaster relief for victims of hurricane Irma?</td>
<td>33.33%</td>
<td></td>
<td></td>
</tr>
</tbody>
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<tr>
<td>Approved</td>
<td>Token Manager (npo): Mint 1 tokens for 0xc4380C46d227F53e23B71Bf71Ba7e624b2eA632630</td>
<td>50%</td>
<td></td>
<td>View Vote</td>
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<tr>
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<td>Should we help reimagine democracy in the United States of America?</td>
<td>50%</td>
<td></td>
<td>View Vote</td>
</tr>
<tr>
<td>Approved</td>
<td>Finance: Create a new payment of 753 BCC. It will be executed 2 times at intervals of 0 days</td>
<td>50%</td>
<td></td>
<td>View Vote</td>
</tr>
<tr>
<td>Approved</td>
<td>Token Manager (npo): Mint 1 tokens for 0x1sBc665f85a5e90Cc0f7b249f81dd72f8BA5555031</td>
<td>100%</td>
<td></td>
<td>View Vote</td>
</tr>
</tbody>
</table>
### Vote

#### Opened Votes

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</tr>
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<tbody>
<tr>
<td>00:02:38:56:14</td>
<td>Should we fund disaster relief for victims of hurricane Irma?</td>
<td>33.33%</td>
<td></td>
<td></td>
</tr>
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#### New Vote

- [New Vote]
But that’s not all... 🌟
### Token Balances

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</tr>
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### New Transfer

**Recipient:**
```
thai-cave-rescue.donations.eth```

**Amount:**
150000 DAI

**Reference:**
Disaster relief (Thai cave rescue)

**Submit Transfer**
Enfranchised people (normally 18 years and older)

1: Elections are every 2 years. Apportionment is based on each state's population
2: Each state is represented with 2 senators. Senators serve 6-year-terms, but one-third of the seats are up for election every two years
3: Head of state and government, as well as commander-in-chief
4: The state levels can vary from state to state
5: Presidential vetoes can be overridden by a two-thirds vote in both house. The Supreme Court can declare laws as unconstitutional and thereby repeal them

Legislative branch
- elects
- appoints or controls
- veto-power / can repeal

Executive branch
- approves

Judicial branch
1. Every 4 years, election of direct mandates and parties
2. State chamber. Apportionment is based on each state's population
3. Head of government with policy-making power. Is proposed by the President
4. Head of state. "Neutral power" – only in state of emergency increased power
5. The state levels and the names of the organs vary widely from state to state
 Constituent Builds Coalition, Tries Again

Nothing Happens

Constituent Issue

Congressional Hearing

Issue Gains Support

Legislation is Drafted

Stakeholders Weigh In

Draft Bill is Introduced

Amendments Made/Language Rewritten

Stakeholders Weigh In

Support for Legislation

Bill Passes Subcommittee then Full Committee

Amendments Made/Language Rewritten

Stakeholders Weigh In

Bill is Passed on Floor (by House or Senate) and sent to the other side

Amendments Made/Language Rewritten

Bill Becomes Law
contract DAOFactory {
    function newDAO(address root) public returns (Kernel) {
        Kernel dao = new Kernel();
        dao.initialize(root);  // Assume this also creates an ACL for the DAO
        ACL acl = ACL(dao.acl());

        Vault vault = Vault(dao.newAppInstance("vault"));
        Voting voting = Voting(dao.newAppInstance("voting"));
        Finance finance = Finance(dao.newAppInstance("finance"));
        TokenManager tokenManager = TokenManager(dao.newAppInstance("token-manager"));

        acl.createPermission(finance, vault, vault.TRANSFER_ROLE());
        acl.createPermission(voting, finance, finance.CREATE_PAYMENTS_ROLE());
        acl.createPermission(voting, finance, finance.EXECUTE_PAYMENTS_ROLE());
        acl.createPermission(voting, tokenManager, tokenManager.MINT_ROLE());
        acl.createPermission(voting, tokenManager, tokenManager.ASSIGN_ROLE());

        return dao;
    }
}
Permissions

Access Control List (ACL):

```solidity
interface IACL {
    function initialize(address permissionsCreator) external;
    function hasPermission(
        address who,
        address where,
        bytes32 what
    ) external view returns (bool);

    /* Non-interface suggestions for implementations:
    function createPermission(address who, address where, bytes32 what) external;
    function grantPermission(address who, address where, bytes32 what) external;
    function revokePermission(address who, address where, bytes32 what) external; */
}
```

Interface: [https://github.com/aragon/aragonOS/blob/dev/contracts/acl/IACL.sol](https://github.com/aragon/aragonOS/blob/dev/contracts/acl/IACL.sol)

Implementation: [https://github.com/aragon/aragonOS/blob/dev/contracts/acl/ACL.sol](https://github.com/aragon/aragonOS/blob/dev/contracts/acl/ACL.sol)
Permissions

Using the ACL: auth()

```solidity
/**
 * @notice Create a new vote about "_metadata"
 * @param _executionScript EVM script to be executed on approval
 * @param _metadata Vote metadata
 * @return voteId Id for newly created vote
 */

function newVote(bytes _executionScript, string _metadata) auth(CREATE_VOTES_ROLE) external returns (uint256 voteId) {

}
```

Forwarders

Escalating requests to other modules:

```solidity
interface IForwarder {
    function isForwarder() public pure returns (bool);
    function canForward(address sender, bytes evmCallScript) public view returns (bool);
    function forward(bytes evmCallScript) public;
}
```

Interface: https://github.com/aragon/aragonOS/blob/dev/contracts/common/IForwarder.sol
Forwarders

```solidity
contract Voting is IForwarder, AragonApp {
    function isForwarder() public pure returns (bool) {
        return true;
    }

    function canForward(address _sender, bytes _evmCallScript) public view returns (bool) {
        return auth(_sender, CREATE_VOTES_ROLE);
    }

    /**
     * @notice Creates a vote to execute the desired action, and casts a support vote
     * @dev IForwarder interface conformance
     * @param evmScript Start vote with script
     */
    function forward(bytes evmScript) public {
        require(canForward(msg.sender, _evmScript));

        // Boom *
        newVote(evmScript);
    }
}
```

EVMScripts

```solidity
interface IEVMScriptExecutor {
    function execScript(bytes script) external returns (bytes);
}

contract CallsScript is IEVMScriptExecutor {

    /**
    * @param _script, in the bytes format of:
    *     [ specId (uint32) ]
    *     many calls with this structure ->
    *     [ to (address: 20 bytes) ] [ calldataLength (uint32: 4 bytes) ] [ calldata (calldataLength bytes) ]
    */
    function execScript(bytes _script) external returns (bytes) {
    }
}
```

Interface: https://github.com/aragon/aragonOS/blob/dev/contracts/evmscript/IEVMScriptExecutor.sol
Implementation: https://github.com/aragon/aragonOS/blob/dev/contracts/evmscript/executors/CallsScript.sol
EVMScripts

Running a script: execScript()

```solidity
contract Voting is IForwarder, AragonApp {
    function executeVote(uint256 voteId) public {
        require(canExecuteVote(voteId));
        Vote storage vote = votes[voteId];
        vote.executed = true;

        // Boom ⚡
        execScript(vote.executionScript);
    }
}
```

Finance

Token Balances

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$16,938.11 $1,481.15 $557.47 $5.37 $0

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<td>Request</td>
</tr>
</tbody>
</table>

Sign Transaction

Permission note:
You cannot directly perform this action. You do not have the necessary permissions.

Action Requirement
Here are some options that you can use to perform it:

- **Voting (ANT)**
The Voting (ANT) app will create a new voting for ANT holders to decide whether to perform this action or not.

- **Tokens (XVT) → Voting (ANT)**
  1. The Tokens (XVT) app will forward actions requested by XVT token holders.
  2. The Voting (XVT) app will create a new voting for ANT holders to decide whether to perform this action or not.

Action to be triggered
This transaction would eventually perform a payment to address 0x62b...1ka11 Estimated payment cost ✈️

Sign Transaction
- function hasPermission(
    address who,
    address where,
    bytes32 what
  ) returns (bool);

- function forward(bytes evmScript);

- function execScript(bytes evmScript) returns (bytes);
Experiment at the speed of software
3 Steps to Governance

```
// 1. Inherit from AragonApp
contract App is AragonApp {

    // 2. Define some roles
    bytes32 constant public REALLY_IMPORTANT_ROLE = keccak256("REALLY_IMPORTANT_ROLE");

    // 3. Use auth()
    function doSomethingReallyCool(uint256 voteId) public auth(REALLY_IMPORTANT_ROLE) {
    }

    // Boom ✯
}
```

Tutorial: https://hack.aragon.org/docs/tutorial.html
Painless add upgradeability and gui-managed-ACL to my hobby project, with 10 LoC contract. Thanks @AragonProject 👏
github.com/adriamb/bcmemb ...

6:12 PM - 15 Feb 2018

2 Retweets 10 Likes
Pando is distributed **versioning control system** enforcing **DAO-based** versioning, contribution tracking and governance. It is built on top of **IPFS, ethereum and aragonOS**.

This repository is a monorepo including pando related smart contracts, libraries and tools. Each public sub-package is independently published to NPM.
<table>
<thead>
<tr>
<th>Component</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kernel</td>
<td>0xb82f6d410e34d83597669338308707054a54ee89</td>
</tr>
<tr>
<td>ACL</td>
<td>0x3fba1a86cdd9e4373985d30af6db9a38fc169e0</td>
</tr>
<tr>
<td>Tree</td>
<td>0x8f524ad69a3202e2495a0b8068000f8a27372d1e</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Branch</th>
<th>Head</th>
</tr>
</thead>
<tbody>
<tr>
<td>master</td>
<td>undefined</td>
</tr>
</tbody>
</table>

```bash
~/d/d/test >>> vim test.md
~/d/d/test >>> pando stage test.md
Modifications staged
~/d/d/test >>> pando commit -m 'First commit'
Modifications snapshot with cid zdpuAnMxwT1DrdTGwNiop3WmJaoreudwru6vxxkoVMCwDJ8dF
~/d/d/test >>> pando remote deploy origin
Remote 'origin' deployed at address 0xb82f6d410e34d83597669338308707054a54ee89
~/d/d/test >>> pando remote show origin
```

```bash
~/d/d/test >>> pando push origin master
Modifications pushed at tx 0x15ae9f8432d28e10f60a1f47260b289b7cd9a060ab8eebeeabc814631b4619d8a
~/d/d/test >>>
```
pando init
Repository initialized at /Users/osarrouy/Documents/devs/dapps/test2
pando config
? Enter an Ethereum node URL: http://localhost:8545
? Select an account: 0xB8B6ccf6DbF56a51f04Cee5c88ba7F0eBF783bB
Local pando configuration updated
pando remote add origin 0xb82f6d410e34d835976693830b7054a54ee89
Remote 'origin' added
pando pull origin master
Modifications pulled from 'origin:master'
lstest.md
cat test.md
Hi there!
vim test.md
mkdir dir
vim dir/test2.md
pando stage test.md dir/test2.md
Modifications staged
pando commit -m 'Second commit'
Modifications snapshot with cid zdpuB1VJJSwAwhthY8isdui2qVvOq23j7DuiBfjZWjj8jLXt5f
pando push origin master
You do not own PUSH role over remote 'origin'

DAppNode
Connect to the decentralized Internet
INSTALL NOW
Mr @jbaylina just deployed the first @AragonProject DAO in the Ethereum mainnet. It is an Aragon Package Manager Registry that will be the backend of @DAppNODE's Docker image registry. dnp.dappnode.eth is now owned and operated by a DAO 🦅💥

etherscan.io/tx/0xa1ce5838e ...
Thank you!

@sohkai
Aragon - The Fight for Freedom

https://www.youtube.com/watch?v=AqjlWmiAidw