



DRep Program - Content



Glossary

Appendix - Glossary - 1/3

- **DRep** (shorthand for Delegated Representative)
 - A person or entity who is given voting power by way of delegation from other wallets.
- **Delegator**
 - A person or entity who decides to delegate their voting power to a DRep.
- **Ada Holder**
 - A person or entity in possession of any amount of ada cryptocurrency.
- **CIP-1694**
 - CIP-1694 introduces a new on-chain governance model for Cardano. This CIP seeks to advance the current governance system ensuring every ada holder has a voice in Cardano's governance.
 - The proposal outlines a tricameral model consisting of stake pool operators (SPOs), Delegated Representatives (DReps), and a Constitutional Committee (CC), each with distinct responsibilities and roles.

Appendix - Glossary - 2/3

- **Governance Actions**
 - A governance action is an on-chain event triggered by a transaction. Governance actions have an expiration period, after which the action cannot be enacted.
 - Any ada holder can submit a governance action for a vote on-chain. Once the action is recorded on the ledger, voters submit voting transactions.
- **Metadata Anchor**
 - In the context of CIP-1694, metadata anchors are a mechanism to attach contextual data to on-chain governance artifacts. These anchors include a URL pointing to metadata plaintext and a hash of the plain text metadata hosted at the metadata URL.
 - The hash can be used to verify the integrity of the metadata hosted at the URL. These can be attached to on-chain DRep registrations to allow DReps to share profile information hosted off-chain. Such metadata should conform to the structure defined by [CIP-0100? | Governance Metadata](#) or subsequent CIPs.

Appendix - Glossary - 3/3

- [CIP-30](#)
 - This CIP defines communication between web-based stacks and Cardano wallets.
 - This API offers base, generic functionality to allow DApps to query wallet information such as wallet balance, network connection, and UTXOs owned.
- [CIP-95](#)
 - This CIP extends the CIP-30 API to add specific support for governance functionality.
 - This allows sharing of DRep identifying keys between wallets and DApps to allow DApps to identify users who have registered as DReps on-chain.

Appendix - Additional 1/2

- [GovTools](#)
 - A platform for delegating to a DRep, becoming a DRep or being a Direct Voter.
- [Direct Voter](#)
 - Vote on governance actions with your own voting power directly.
- [SanchoNet](#)
 - The testnet network used for testing Cardano Governance features before implementation on mainnet.
- [MBO - Intersect](#)
 - Membership based organisations such as intersect has a facilitation role in governance and in general in the Cardano ecosystem such as Intersects core infrastructure working group, or the constitution drafting and ratification working group.

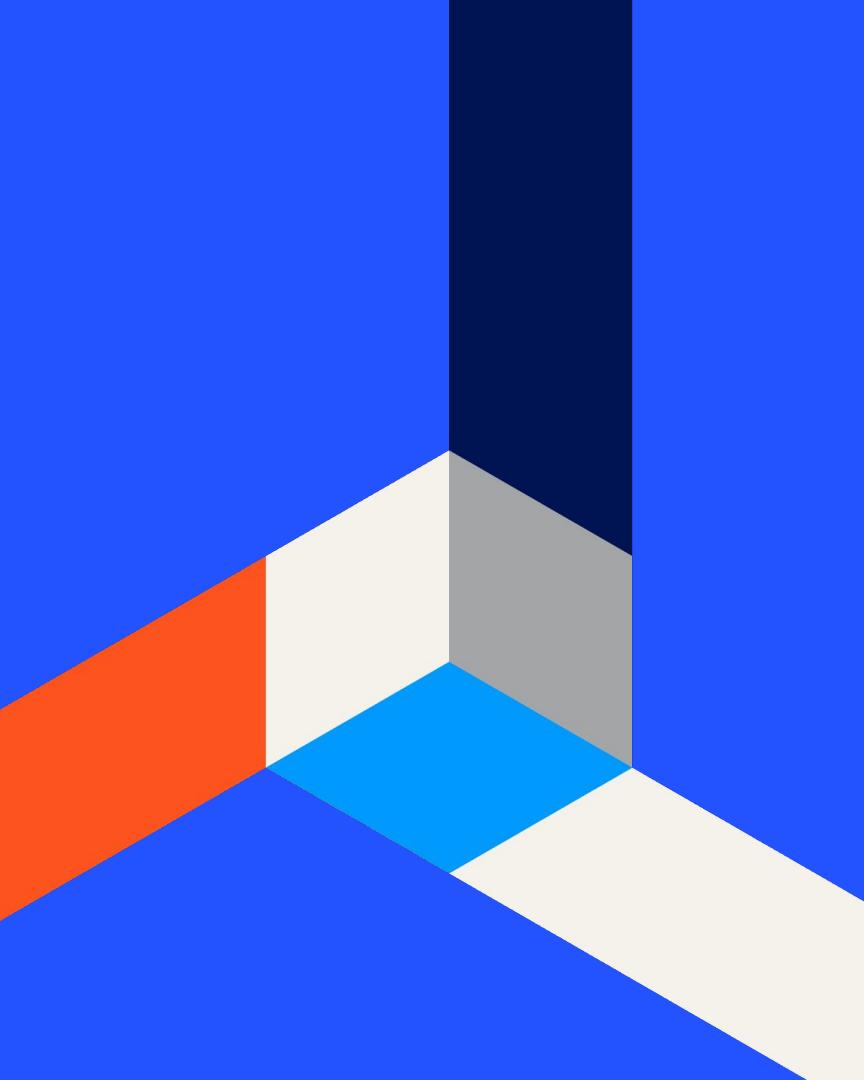
Appendix - Additional 2/2

- [Cardano interim constitution](#)
 - A constitution for the transition to the final ratified constitution for Cardano.
- [Intersect Constitutional Council](#)
 - A council of 10 members (7 full and 3 alternates) at intersect that holds one of the 7 seats of constitutional committee who according to the CIP 1694 will decide on the constitutionality of governance actions.
- [Reward Schemes for DReps](#)
 - 4 researched variations of reward schemes proposed by Philip Lazos and Evangelos Markakis @ IO Research
- [Cardano Improvement proposals](#)
 - As defined in CIP-0001: A Cardano Improvement Proposal (CIP) is a formalised design document for the Cardano community and the name of the process by which such documents are produced and listed.



Module 1

Cardano's Governance and Roles

A large, abstract graphic occupies the left two-thirds of the slide. It consists of several overlapping triangles and trapezoids in various colors: blue, dark navy, light gray, white, orange, and light blue. The shapes overlap in a way that suggests depth, creating a stylized, modern design.

Module 1

During module 1 we will provide participants with a comprehensive understanding of key aspects of Cardano's blockchain ecosystem, focusing on its on-chain governance design, gaining deep insights into the expectations and responsibilities of the DRep role. Additionally, the module will highlight the importance of delegation, emphasizing its role in decentralization.

- Cardano's on-chain governance design
- DRep role
- Why delegation



1. Cardano's On-Chain Governance Design

Module 1

Terminology

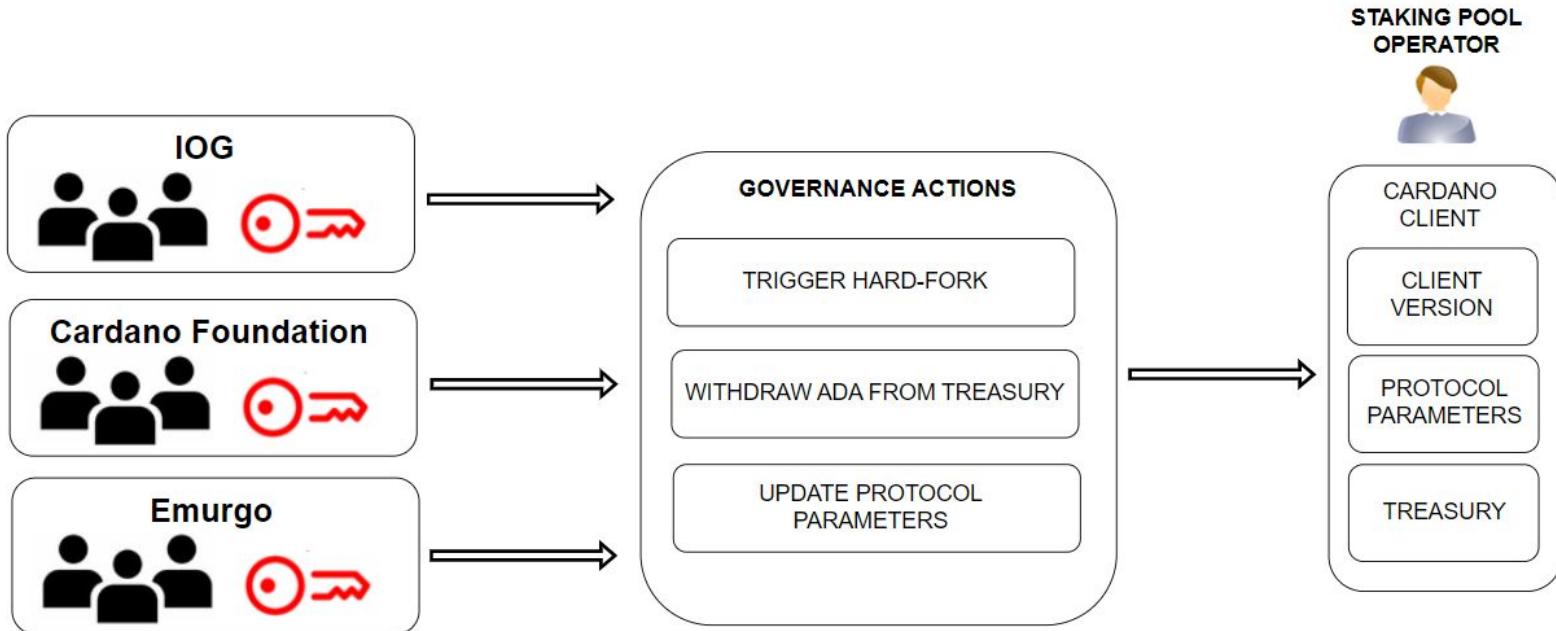
- [Shelley era](#) roadmap stage to encompass the critical early steps of Cardano's decentralization from federated pools to fully given block production to community staking pools, delegation and incentive schemes who can arguably be seen as some of the first governance of cardano with the choice of who secures the network.
- [Voltaire era](#) roadmap stage where cardano governance is developed - Introduction of a voting and treasury system, network participants will be able to use their stake and voting rights to influence the future development of the network.
- [Chang Upgrade](#) Hard fork named in honor of Phil Chang who passed away, a IOHK and community member who worked on Cardano governance. The hard fork will enable Cardano on-chain participatory governance.
- [Conway ledger era](#) - the ledger implementation and specifications of the Cardano Blockchain for the voltaire era of governance that is initiated with the Chang Hard fork.

The Shelley Era transition

- Currently there are 7 Genesis keys that are controlled by the 3 founding entities (IOHK, Cardano Foundation and Emurgo)
- The Shelley Era has no formal governance on the Cardano blockchain other than the delegation of stake to staking pools deciding who are securing the network.
- Catalyst as an example runs through [jormungandr](#) a node implementation of Oroborous in Rust and is not directly on the Cardano blockchain itself.
- Currently founding entities are able to transfer ada from the reserves through [Move Instantaneous Reward certificates \(MIR\)](#)

Shelley Era Governance

Image from Jaromir Tesar (aka [Cardano Yoda](#))

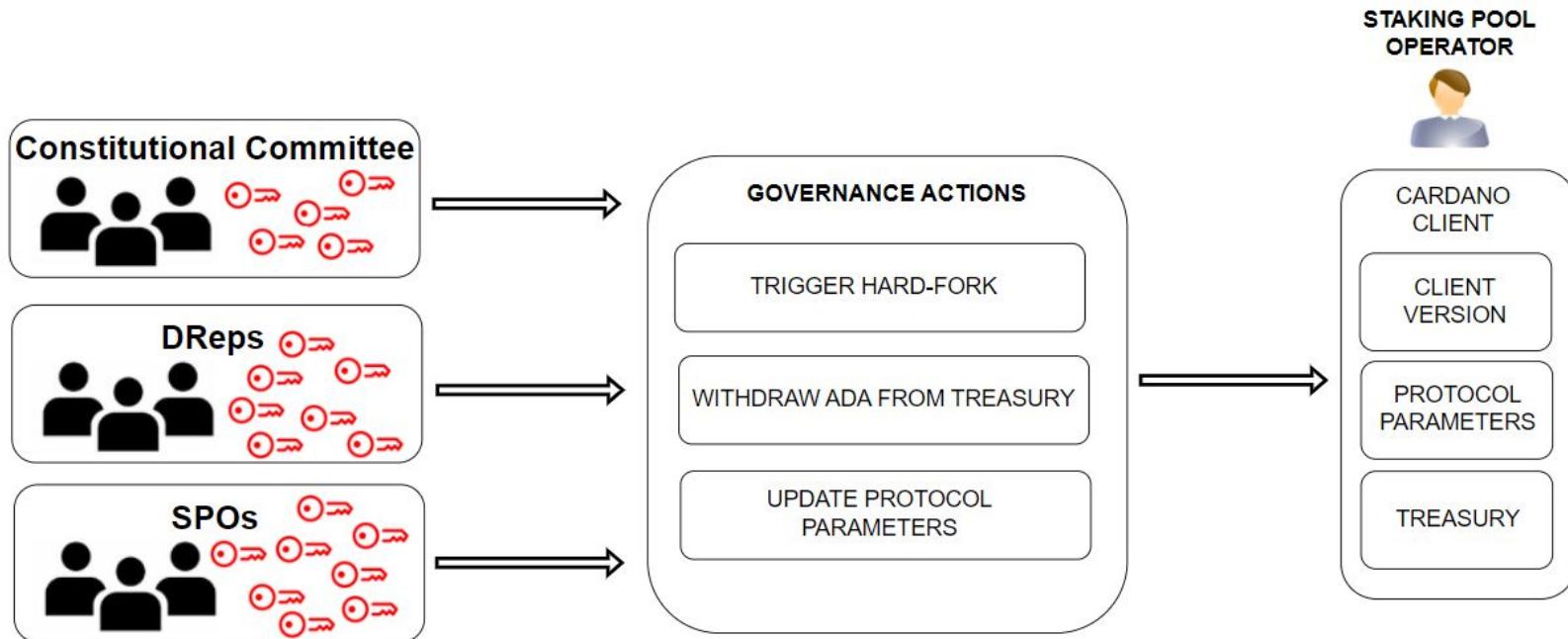


Voltaire Era transition

- The Interim constitution committee holds 7 keys and the members consists of 1 from the MBO Intersect, 1 from IOG, 1 from CF, 1 from Emurgo and 3 members voted by the larger community.
- There is no limit on the number of Delegated Representatives that will hold voting keys.
- There is no limit on the number of staking pools that will hold voting keys.
- Any ada holder will be able to propose governance actions with a governance deposit (Intersect Protocol Parameter group recommends 100.000 ada)
- The 3 bodies (CC, DRep and SPO) have a constitutional right to participatory governance.

Voltaire Era Governance

Image from Jaromir Tesar (aka [Cardano Yoda](#))



Discussion

What do you think the transition from the Shelley Era to the Voltaire Era means for you as a member of the Cardano community?

Three pillars of Cardano governance in the age of Voltaire



Institutions

Strong institutions drive good governance. Intersect, as a member-based organization, creates an enhanced framework for the community to continue its role in developing and improving Cardano.



Constitutional Representation

The Constitution and the Constitutional Committee play a key role in the stability and security of the network.

Delivered throughout 2024, Cardano's constitution will evolve from an interim to a fully ratified version on-chain.



Democratic Consent

Cardano Improvement Proposal-1694 ([CIP-1694](#)) describes a governance system to bring decision making for the Cardano network on-chain.

It seeks to advance the current governance system ensuring every ada holder has a voice in Cardano's evolution.

Governance Roles

There are five roles describing community member participation in governance



Delegate Representative (DRep)

Directly casting votes on all governance actions, DReps represent those ada holders delegating stake to them.



Constitutional Committee (CC)

Voting only on the constitutionality of actions, if the CC oversteps this bound, the role can be revoked with a no-confidence action. The role is also revoked automatically when terms expire.



Stake Pool Operator (SPO)

SPOs vote only on specific governance action types.



Delegating ada holders

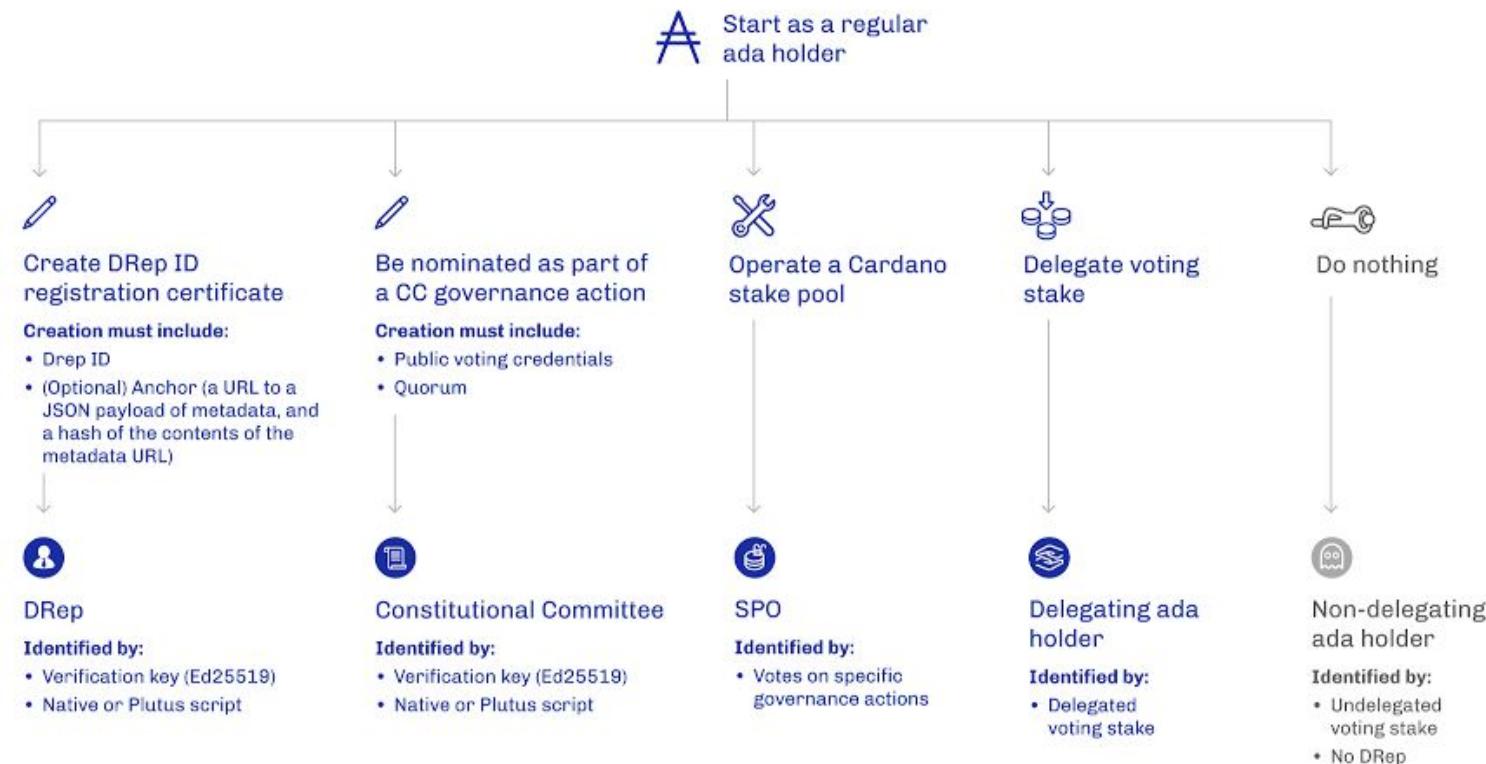
Ada holders who do not become DReps can delegate voting stake to the DRep of their choice, so the DRep may vote on their behalf.



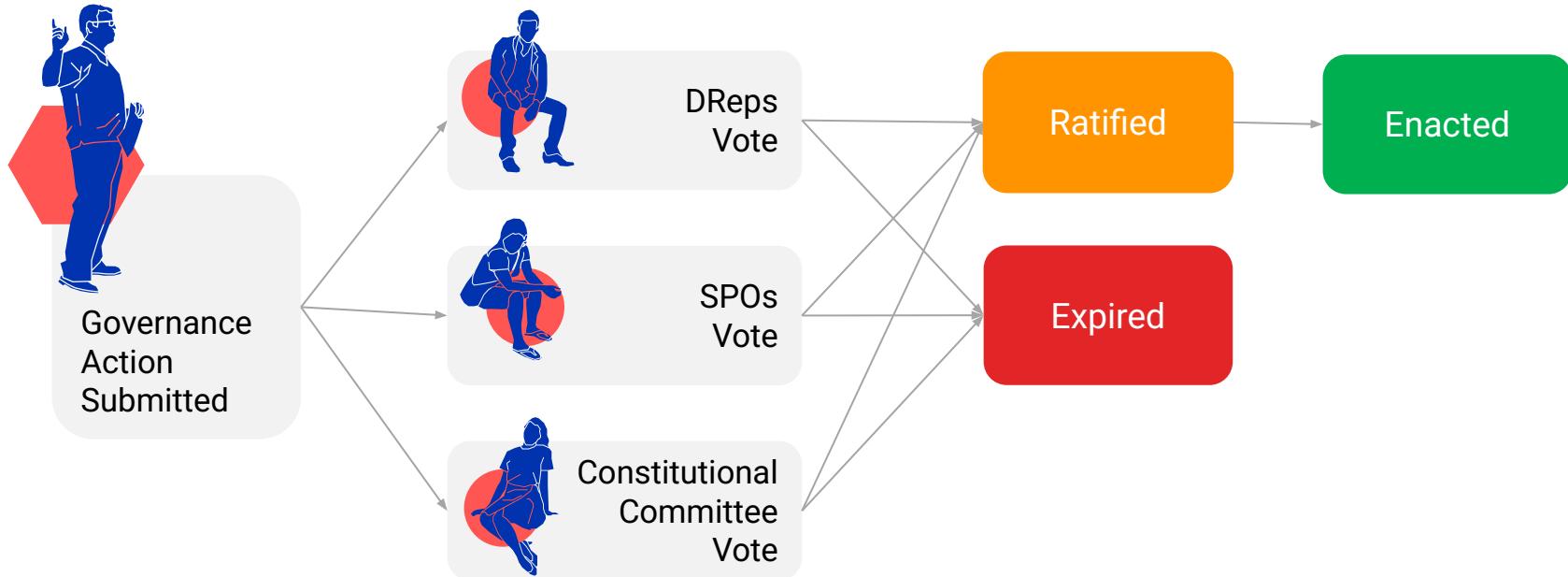
Non-delegating ada holders

Ada holders who do not delegate their voting stake to any DRep automatically fall into this category.

The governance roles are attained through the defined processes outlined below



Overall Governance Action Enactment Process



Any Ada holder can submit -----> Specific Groups Vote -----> Automated Ratification and Enactment

Ratification process

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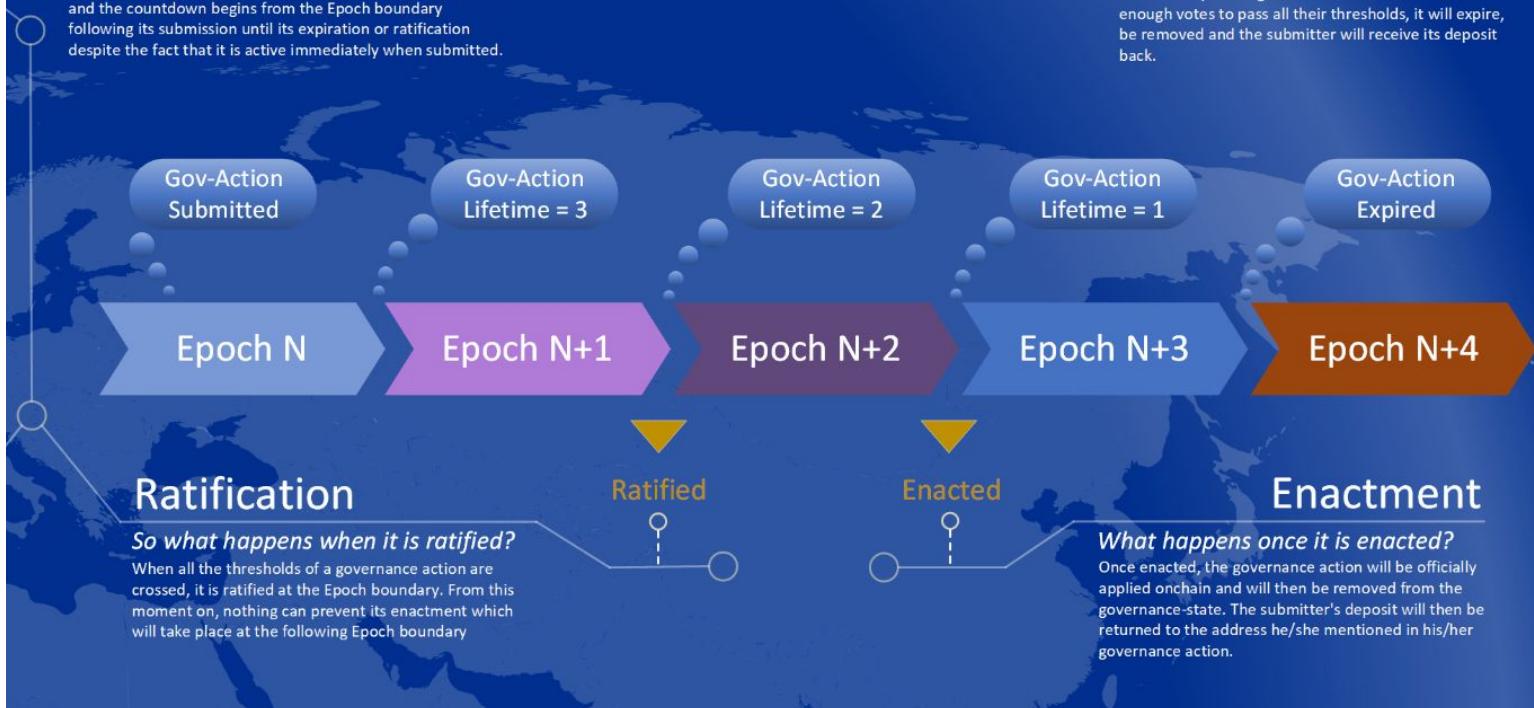
protocol parameters group

"govActionLifetime"

How long does my governance action last on chain and what happens when it is ratified?

The value of the "govActionLifetime" parameter is in Epoch and the countdown begins from the Epoch boundary following its submission until its expiration or ratification despite the fact that it is active immediately when submitted.

Example: In the example below, the value of "govActionLifetime" is 3. The governance action is visible in the governance-state as soon as it is submitted and can receive votes immediately. If the governance action does not receive enough votes to pass all their thresholds, it will expire, be removed and the submitter will receive its deposit back.



Governance Actions

Governance action type	CC	DReps	SPOs
1. Motion of no-confidence	-	P_1	Q_1
2 _a . New committee/threshold (<i>normal state</i>)	-	P_{2a}	Q_{2a}
2 _b . New committee/threshold (<i>state of no-confidence</i>)	-	P_{2b}	Q_{2b}
3. Update to the Constitution or proposal policy	✓	P_3	-
4. Hard-fork initiation	✓	P_4	Q_4
5 _a . Protocol parameter changes, network group	✓	P_{5a}	-
5 _b . Protocol parameter changes, economic group	✓	P_{5b}	-
5 _c . Protocol parameter changes, technical group	✓	P_{5c}	-
5 _d . Protocol parameter changes, governance group	✓	P_{5d}	-
6. Treasury withdrawal	✓	P_6	-
7. Info	✓	100	100

But also Q5 for SPOs related to security relevant protocol parameters

Constitution Committee

- Votes on the constitutionality of governance actions related to a constitution. Current interim constitution can be fund at <https://constitution.gov.tools/en/interim-constitution>
- Can be person(s) or entities. Currently in the interim period the 3 community spots are all councils (entities) and Intersect has also announced they are having a council. The 3 remaining keys are to CF, Emurgo and IOG.
- The Cardano constitution is a text document that has a hash value on the blockchain so it can be verified.
- The CC is either a normal state or a state of no confidence. During a state of no confidence it is only possible to vote on a new committee and during normal state the CC can vote on all governance actions.

CC

Governance

GOVERNANCE

protocol parameters group

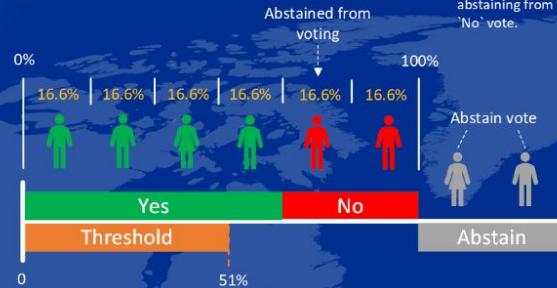


Threshold

How many thresholds do Constitutional Committee members have and how is their vote calculated?

The Constitutional Committee has only one threshold which can be determined and modified through an "Update Committee" governance action. No matter how many members they are, their voting power will always be equally distributed among each of them.

Example: If there are for example 8 CC-members in total, each of them will have equal voting power. The 'Abstain' vote still works in the same way for SPOs, DReps and CC-members. They can remove their influence from this calculation. And remember, abstaining from voting has the same weight as a 'No' vote.



"committeeMinSize"

What happens when the total number of CC-members falls below this value?

Whenever the number of active committee members (those who are neither expired nor resigned) falls below the "committeeMinSize" protocol parameter, the system enters a mode in which it is as though all committee members have cast a 'No' vote.

Example: If for example, a Committee made up of eight members with a "committeeMinSize" value of 7 loses two members, they will no longer be able to actively participate in governance as long as the number of CC-members remains below 7.



Image from Mike Hornan

CC Governance 2/2

GOVERNANCE

protocol parameters group



"committeeMaxTermLength"

How can you calculate the maximum submissible term limit of a CC-member ?



Example: In the example below, you can add the value of all these parameters to know the maximum term length that you can assign for each CC-member's cold-key-hash when you submit an "Update Committee" governance action. All these values are in Epochs.



"proposedIn"

The epoch number when the "Update Committee" governance action is proposed.



"govActionLifetime"

You can add to this the number of epochs of the total lifetime of a governance action.



"committeeMaxTermLength"

Add the value of the "committee max term length" which will give you the maximum value that can be submitted as term length for one or more members of the constitutional committee.

SPOs in governance

- Votes with same voting weight as delegated stake through the staking pool.
- Can be person(s) or entities. A pool can have multiple owners.
- Votes on the confidence in committee members and on approving a new committee as well as hard forks and security related protocol parameters.

Spo Governance 1/2

GOVERNANCE

protocol parameters group



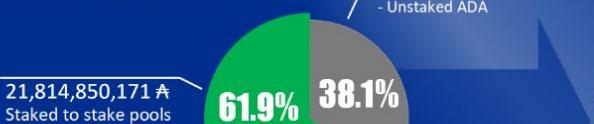
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UNITING THE CARDANO ECOSYSTEM



Thresholds

What represents 100% of the voting power on which SPOs threshold can be calculated?

All ADA staked to stake pools are included within the SPO's active voting stake calculations. On the other hand, all unstaked ADA and ADA staked to retired stake pools as well as SPO's abstain votes are not included in the SPO active voting stake.



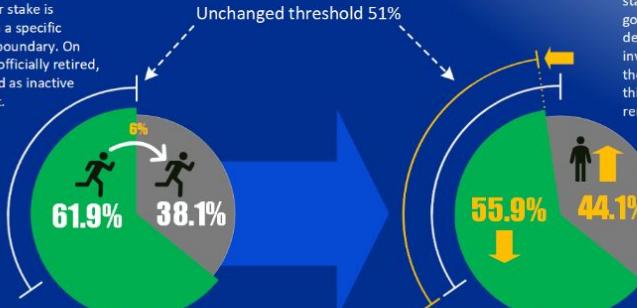
Example: This pie chart represents a Snap shot from March 18, 2024 where you can see the percentage of ADA staked to stake pools. Consequently, 61.9% of the ADA which is staked represents 100% of the SPOs voting power. It is important to understand that the SPO thresholds are calculated from this amount.



Abstention

What happens to stake pool's voting power when they votes abstain or retire?

When an SPO votes abstain, then their stake is actively marked as not participating in a specific governance action at the next epoch boundary. On the other hand, When a stake pool is officially retired, its voting power will not be considered as inactive until 2 epochs following its retirement.



Example: In this example, a centralized exchange holding 6% of the total amount of ADA in circulation in their stake pools does not wish to be involved in the governance of Cardano for regulatory purposes and decides to vote abstain on all governance actions involving an SPO vote. So no longer being part of the active voting stakes, it allows the percentage of this influence to be redistributed to the other remaining SPOs.

Image from Mike Hornan

Spo Governance 2/2

GOVERNANCE

protocol parameters group

"poolVotingThresholds"

How many updatable thresholds do SPOs have and what are they?

SPOs has five thresholds in total. And two of them are linked to the same governance action. ("committeeNormal" and "committeeNoConfidence").
Being the security stewards of the Cardano network, they also have a security threshold among three of the four protocol parameter groups that DReps can vote on. ("ppSecurityGroup")

"hardForkInitiation"

The SPO voting threshold value that must be reached to approve the initiation of a Hardfork. It is very important to note that when SPOs vote in favor of a "hardForkInitiation", they are confident that enough SPOs have updated their node to a commonly approved updated version and that the initiation of this "hard fork" will be done in due form.

"ppSecurityGroup"

Some protocol parameters are relevant to security properties of the system. Any proposal attempting to change such a parameter requires an additional vote of the SPOs

"committeeNormal"

The SPO voting threshold value that must be reached to approve an "Update-Committee" action during a Committee "Normal State". This consists of electing and/or removing one or more Constitutional Committee members and/or also modifying their terms and threshold value

"committeeNoConfidence"

The SPO voting threshold value that must be reached to approve an "Update-Committee" action during a Committee "No-confidence State". This consists of electing one or more Constitutional Committee members following the ousting of the previous committee.



2. The DRep Role

Module 1

DRep video intro

Ha Nguyen from Whiteboard Cardano team made an intro video to DReps:



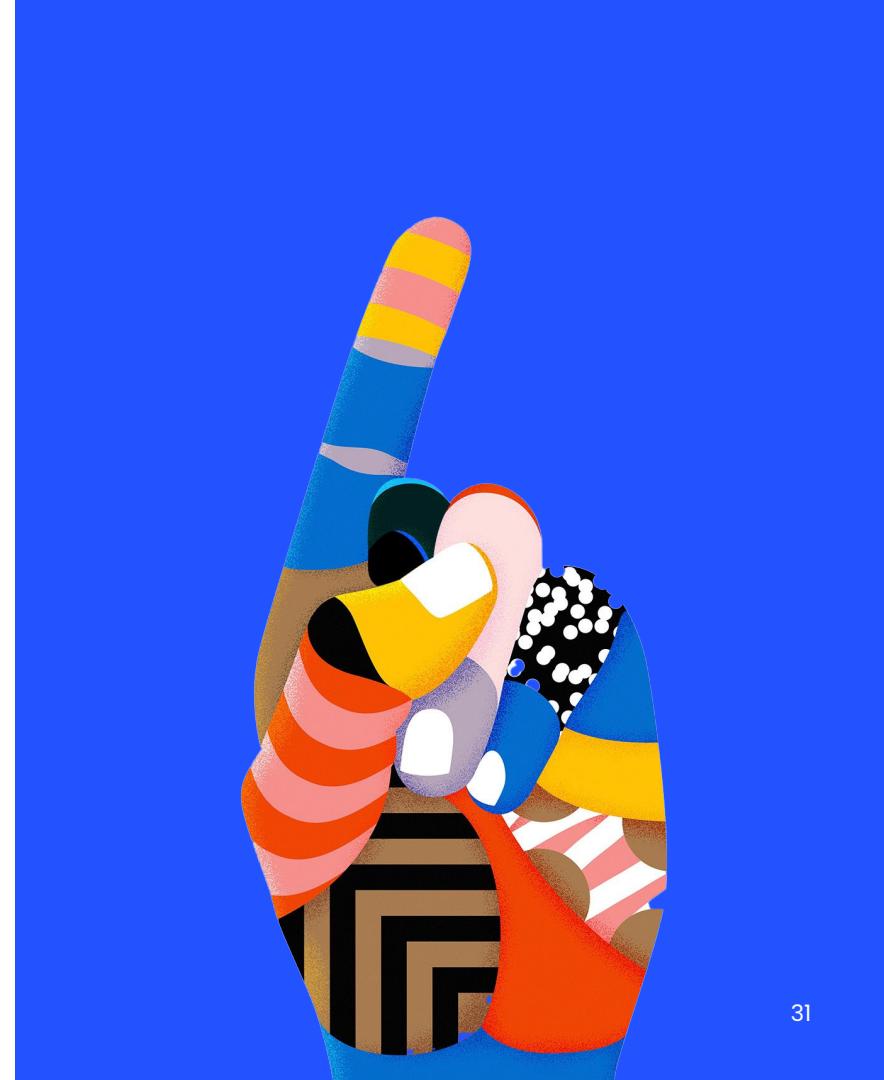
Video by
Whiteboard
Cardano team

The DRep role

A DRep serves as the community's spokesperson, actively participating by voting on governance actions and advocating for their delegator's collective interests.

DReps hold significant responsibilities in the governance process, voting on important system updates. Approval depends on the governance action type and requires a sufficient vote from the corresponding governance bodies (SPOs, the constitutional committee, and DReps).

As a DRep, you'll have the power to vote 'yes,' 'no,' or 'abstain' on governance actions. Your vote represents the ada holders' collective voice, making your role crucial in Cardano's decentralized decision-making.



DRep in the network 1/3

- A DRep pays a small Ada sum for the transaction to send a Registration Certificate to the Cardano Blockchain with a DRep id, a deposit and an optional anchor.
- A DRep can represent himself through his own ADA, or through delegated ADA from others.
- DReps can attach a metadata anchor to give information on themselves in the registration certificate.

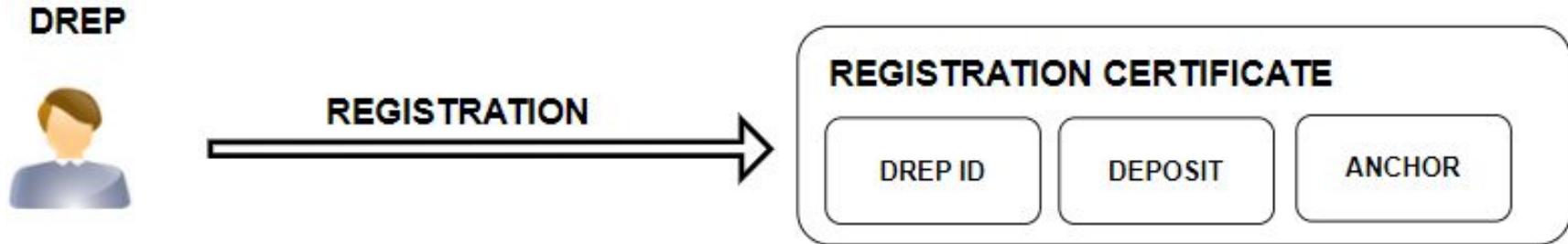


Image by Jaromir Tesar / Cardano Yoda

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DRep in the network 3/3

- Every DRep has to remain active by regularly voting (later slide will show this concept) and if the DRep has not submitted any votes for a particular number of epochs it will be considered Inactive.
- The registered credentials of a DRep is either a verification key (ED25519) or a native or pluto script. The DRep ID is a hash of the DRep credentials.
- Apart from registration certificates for DReps there is also retirement certificates (a DRep id included) and vote delegation certificates (a DRep id and the stake credentials of the delegator)
- An anchor is an url to a JSON of metadata and a hash of the content of the metadata.

Discussion on DReps in the network

A DRep can be a single person or through a script multiple persons in an entity – do you see any risks related to more than one key having to sign a vote for a DRep or other cons of smart contract dreps as well as any pros of this approach?

How do you plan to secure your DRep credentials?

DRep Governance 1/4

GOVERNANCE

protocol parameters group



Thresholds

What represents 100% of the voting power on which DReps threshold can be calculated?

In the Cardano governance system, only active DReps and the automated no-confidence DRep are included within the active voting stake calculations. On the other hand, automated abstain DRep, inactive DRep and any abstain votes are not included in the calculation.



Example: If there are only 5 active DReps in total (including automated no-confidence DRep) and each of them have the same amount of voting power, i.e. 10000 ada. Then each of them will represent 20% of the total active voting stake. No matter the amount of ada available in circulation.



Inactivity

What happens when a DRep is inactive, votes abstain or abstain from voting?

When a DRep votes abstain or becomes inactive, they indirectly increase the influence of other active DReps. On the other hand, when they abstain from voting, the ledger evaluates the lack of vote of this DRep in the same way as if he had voted no.

= Automated no-confidence DRep
 = Human / script DRep

Example: With a threshold of 70% on a specific governance action. If one of the 5 DReps that has not yet voted decides to vote abstain or becomes inactive, then the percentage of its influence on the system is redistributed to the DReps remaining active. Which, in this example, will lead to the ratification of the governance action.

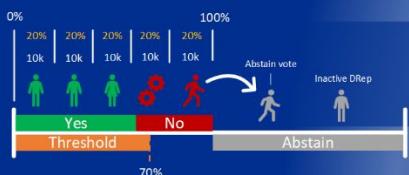


Image from Mike Hornan

DRep Governance 2/4



"dRepActivity"

What is this parameter and how can I be sure, as a DRep, to stay active.

Registered DReps will need to vote regularly to still be considered active. Specifically, if a DRep does not submit any votes for "dRepActivity"-many epochs, the DRep is considered inactive.

Example: In the example below, a DRep inactive since Epoch 281 immediately becomes active again after having performed a vote during epoch 287. It therefore resets its expiry counter to "Epoch N + dRepActivity".



May you enjoy governance as much as I enjoyed building this diagram for the community. Together we will change the world, one vote at a time.
— Mike Hornan

Image from Mike Hornan

GOVERNANCE

protocol parameters group



"dRepDeposit"

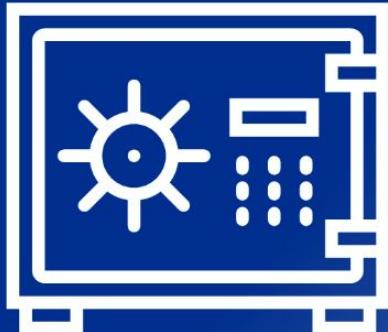
What is it?

"dRepDeposit" is a deposit that must be made when an ADA holder wishes to become a DRep. This deposit must be made when they submit their DRep registration certificate onchain and can be recovered when they deregister.

DRep Governance 3/4

Why are DRep deposits necessary?

In the case of registering DRep credentials, it protects the blockchain against sybil attacks. This prevents a malicious actor from spamming the network with millions of DReps credentials.



Where are these deposits going?

These deposits go into a pot assigned for them. At all times this deposit is linked to the credential which was used for the submission of a certificate or a governance action.

Image from Mike Hornan

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GOVERNANCE

protocol parameters group

"dRepVotingThresholds"

How many updatable thresholds do DReps have and what are they?



DRep Governance 4/4

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DRep - The expectations

01 Community Leader

Being a DRep shows the community and wider Cardano ecosystem that you have a vested interest in the future for Cardano.

02 Transparency

Commit to transparency and at all times remain open if any conflicts of interest arise with other roles or positions within the community. You must provide voting rationale for each proposal (this will be made public). Your delegators and others can view this. {Guidance and template will be shared ahead of vote.}

03 Minimum Asks

One of the key goals for delegation is to improve the quality of decision making and to create a more equal landscape with voting power.



3. Understanding Delegation

Module 1



Why delegation

- Delegation enables ada holders to delegate some (or all) of their voting power to a Delegate Representative (DRep).
- DReps can coordinate and form policies together, review data, consult with experts, and ultimately vote on proposals.
- Delegation is used today in several liquid democracy applications (e.g. for decision making within political parties and within other medium/large sized organizations)
- Free software also available for setting up a liquid democracy environment (e.g. the liquid feedback platform)



Why delegation

Why not direct voting?

- **Concern #1:** Overwhelming number of transactions in the system if a big number of stakeholders vote within the same period
- **Concern #2:** For some governance actions, esp. of more technical nature, it may not be easy for all stakeholders to form a confident opinion
- **Concern #3:** Many individuals may find it challenging to prioritize voting as a DRep amidst their busy schedules. Hence, it's essential for more engaged community members to step up and take the lead.



Why delegation

Does delegation help?

- **Yes** if the majority of the DReps take the time and effort to form a well-justified opinion
- **Yes** if the stakeholders delegate their voting power to DReps that they trust (or generally tend to agree with)
- **No** if the DReps do not do their job and not care about the election outcome (and the future of Cardano)

DRep delegation 1/2

- A stake credential must be delegated to a registered DRep to be able to participate in governance through an onchain transaction of a delegation certificate. A DRep can represent himself through his own ADA, or through delegated ADA from others.
- The Ada never leaves the wallet of the delegate and the network is only issued a delegation certificate in a cardano blockchain transaction. There is one delegation certificate for delegating to SPOs and one for delegation to DReps.
- There are no saturation limits on delegation to a DRep in the CIP 1694 as this was removed in an earlier version.

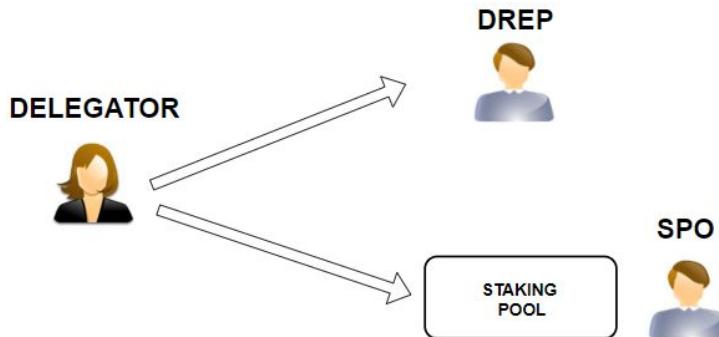


Image by Jaromir Tesar / Cardano Yoda

DRep delegation 2/2

- You can delegate to a DRep representing a real person / entity (through a smart contract more than one staking key can be a DRep). You can also delegate to abstain to not participate in governance, and finally to no confidence if you have no confidence in the CC.
- Delegating to Abstain DRep means you will not be part of Active Voting Stake, but you will be considered for protocol rewards for ada holders to delegate voting stake.
- Delegating to no confidence means a yes vote on every No Confidence Action and a NO on all other actions. You will be considered for protocol rewards and part of active voting stake.
- Unregistered stake will not be able to withdraw staking rewards.

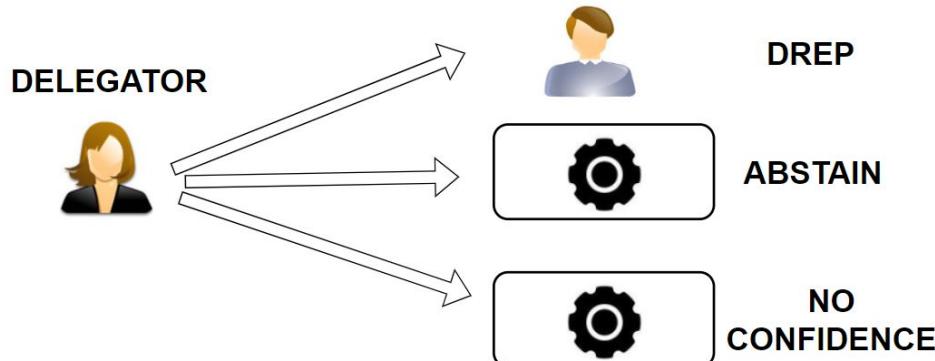


Image by Jaromir Tesar / Cardano Yoda
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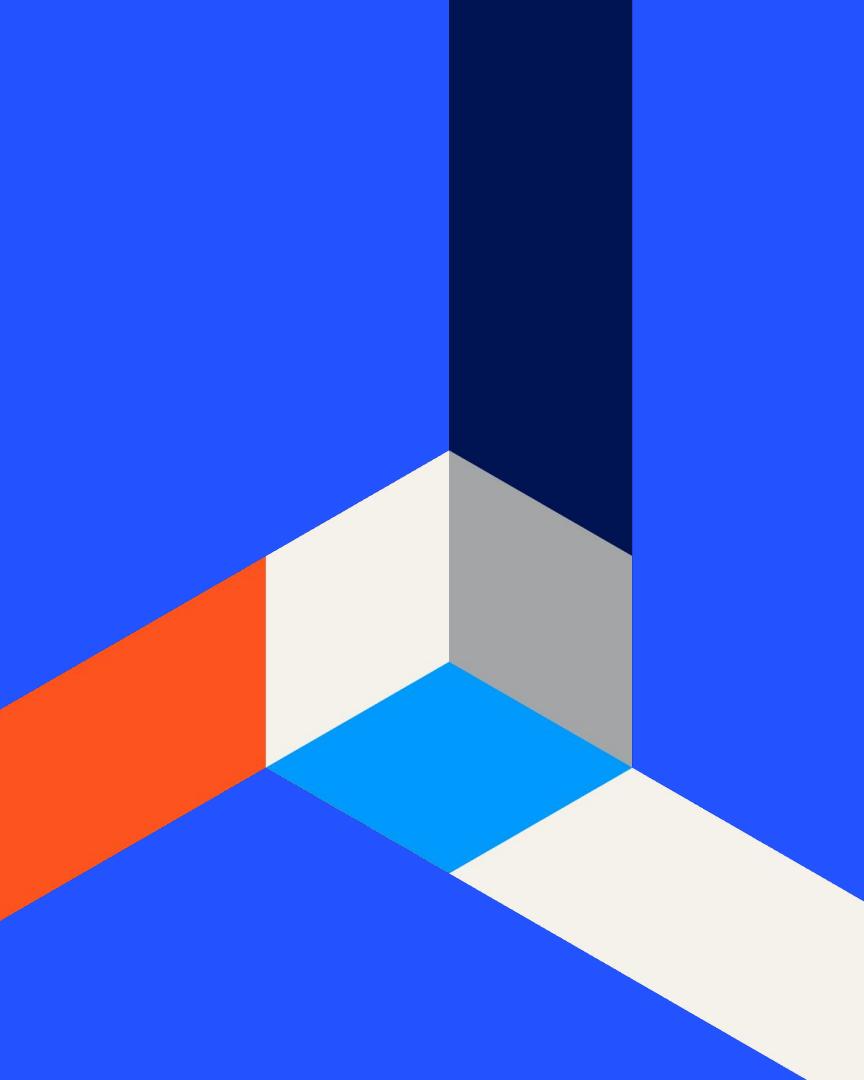
Discussion on DReps in the network

- **There are no saturation limits on DReps – can you think of pro's and con's of this approach?**
- **Do you plan to delegate to individual DReps or entity based DReps and do you see pros and cons to each of these approaches?**
- **Currently a delegation certificate delegates all of your ada to a single DRep – how would you envision that the delegators could be able to support more than one DRep and do you see pros/cons to this approach?**



Module 2

DRep Code of Conduct



Module 2

On module 2 we will focus on the Delegated Representative Code of Conduct specifically for CIP 1694.



Code of conduct

Road from first versions to the current v2.0

https://docs.google.com/presentation/d/1ic2_Cz6Gr0f_OXgDq87pealcKbqvUpsm2pGKI1rXaYE/edit?usp=drive_link



Code of conduct

DRep Ethics:

A DRep is a representative of delegators and should actively vote through governance tools.

A DRep has to promote both effective and efficient governance meaning both governance that moves along at a sufficient speed and that promotes good governance outcomes.

To promote these two goals you need DReps with knowledge on issues and willing to have effective debates in the community.

Arguably you also need transparency and accountability for long term effective governance to not have problems with hidden collaboration (collusion).



Code of conduct

Values, not rules:

<https://docs.google.com/document/d/1plqxxWdk1cJORigtBXbkJ-mY8dK6SoLR0KP4ZLGoWE/edit#heading=h.xzmsaw7ygrol>



Code of conduct

Current Version 2.0:

https://docs.google.com/document/d/1uyCOzWO9uk71GRCv_UT08Rt3kGBQMXFDXF3iiXejjU/edit?usp=sharing



Code of conduct

DRep deck of cards scenarios

https://docs.google.com/document/d/1TFC7DZF8m8sEttrsA5P_TdREv8RQmNc_1awIwYSol4A/edit?usp=sharing



Module 3

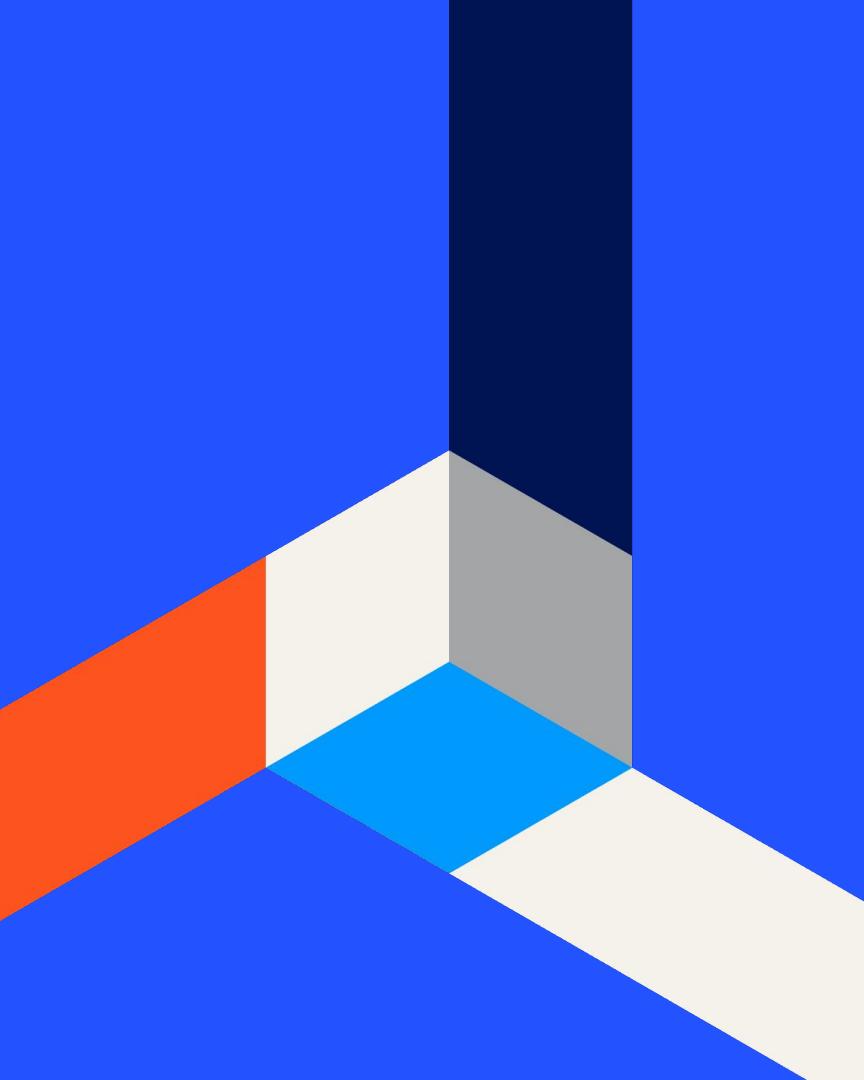
Reward Schemes for DReps

DRep rewards video

- Ha Nguyen from Whiteboard Cardano team made an intro video to DRep rewards:

<https://www.youtube.com/watch?v=2qxUsPTujRE>



A large, abstract graphic occupies the left half of the slide. It features a central dark blue vertical rectangle. Behind it are three diagonal bands: a light orange band on the left, a light blue band in the middle, and a light grey band on the right. In front of these bands are three diagonal stripes: a bright orange stripe on the far left, a bright blue stripe in the middle, and a light beige stripe on the far right.

Module 3

On the third module we will provide an overview of potential reward schemes for DReps.

Vangelis Markakis

IOG Research



1. Reflecting on DReps Compensation

Module 3



Should DReps be compensated?

Still an ongoing debate...

- Evaluating the effects of election outcomes, getting more informed on an election topic, aggregating and refining the input of other stakeholders takes time and effort.
- Many (e.g., SPO's) are already incentivised to participate given their stake, whose value can be affected by governance actions.
- Monetary rewards could attract more participation and engagement within Cardano by smaller/medium-size stakeholders.

Why reward DReps?

- Promote efficiency through rewarding people for taking time in governance leading to better governance outcomes.
- Incentives expertise of DReps by rewarding time spent on issues and good outcomes of governance actions if held accountable by delegators.
- If rewards are tied to delegation can also promote community engagement and DReps can become just as SPOs a great marketing and engagement tool for the rest of the community by actively trying to get delegation to themselves.

DRep reward schemes

Proposal: An on-chain compensation mechanism that rewards DReps in ADA:

- The reward is based on the stake delegated to each DRep.
 - A measurable quantity, easy to take a snapshot of delegated stake at predetermined epoch boundaries
- We could also have dependence of rewards on other parameters too
 - E.g. on number of wallets delegating to a DRep
 - This however may create incentives for misbehavior (Sybil-related attacks)
- At the moment, we favor simplicity and propose as an initial scheme that rewards are solely dependent on delegated stake
- There is flexibility for adjustments later on

DRep incentives vs. SPO incentives



SPO

Any honest SPO, no matter how small, adds to the decentralization and improves the security of the system.



DRep

A DRep only improves the outcome if:

- They offer a deeper understanding of the issue at hand
 - Otherwise, it would be better for voters to vote directly based on their understanding, than delegate to a marginally more informed DRep.
- The voter's effort to find an appropriate DRep is less than that of voting directly.

As a result: the DRep reward scheme should induce more competition so that DReps are incentivized to engage with the community, present convincing arguments and eventually attract delegations



DRep Incentives – Some findings so far

- Purely proportional reward sharing (according to delegated stake) does not seem desirable
 - Theoretical analysis implies that it does not induce much competition (and thus motivation for engagement)
- Core of the proposed candidate schemes for Voltaire:
 - Reward up to m DReps in terms of stake delegated to them, parameter m to be determined
 - Or proportionately but with a bonus to the top m DReps

Considerations of Reward schemes

- Blockchain simplicity: Rewards should be easy to administer, automated and not overload the blockchain.
- Rewards should promote what is considered good governance in the code of conduct such as expertise and other forms of effective governance by DReps such as positive outcomes and it should promote activity of DReps to have an efficient governance system
- Rewards should not have attack vectors such as sybil attacks or drain the treasury of Cardano to a point that it has problems getting funding for core infrastructure maintenance or other critical tasks.
- Rewards should align with what the community wants and what creates the best outcomes for DReps across a global ecosystem.

Discussion of DRep incentives

- How can DRep incentives be sufficient to promote expertise and even organisations forming, while not creating only a few DRep organisations able to gather enough delegation to be able to be DReps over longer term - in other words how do we ensure DRep diversity over time?
- Can you think of any attack vectors to DRep reward schemes?
- How can we align DRep rewards with the different economic realities across the world of DRep participants?



2. DRep Reward Schemes

Module 3

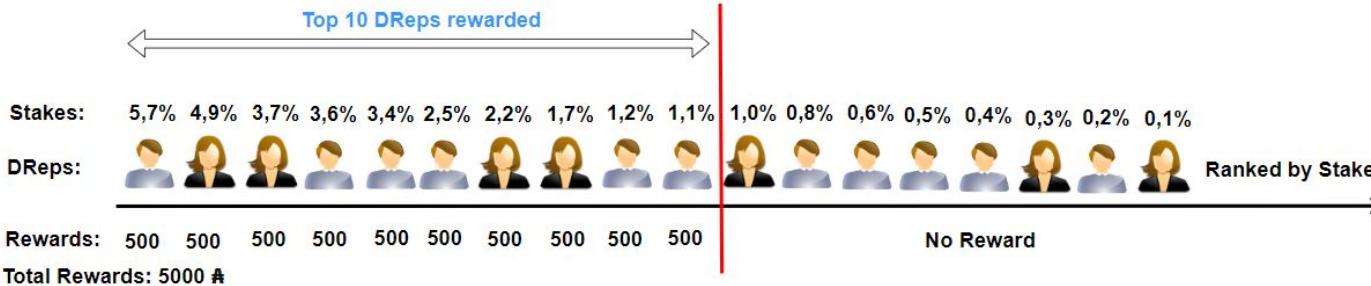
Simple schemes: Variants 1a & 1b

- Let s be the stake delegated to a DRep in an election for a governance action (as percentage of total delegated stake)
- $f(s) = r$ reward given to a DRep with delegated stake equal to s
- **Variant #1a: top-m flat scheme:** $f(s) = r$, as long as the DRep is among the top m DReps in terms of stake delegated to him/her
 - m and r are parameters that will need to be determined based on available funds.
 - **Example:** Suppose $m = 100$ and $r = 1000$ ADA. Suppose also that there are 250 DReps.
 - Rank the DReps by their total delegated stake
 - The first 100 DReps receive 1000 ADA, the remaining 150 do not receive any payment
- **Variant #1b: top-m threshold-based scheme:** $f(s) = r$, as long as the stake delegated to a DRep is at least $1/m$ as a percentage of the total active voting stake
 - This scheme rewards up to m DReps (in some cases it will pay less than m DReps)
 - It provides better incentives for DReps to make an effort, but also makes it more difficult for a DRep to collect a reward

Simple schemes: Variants 1a & 1b

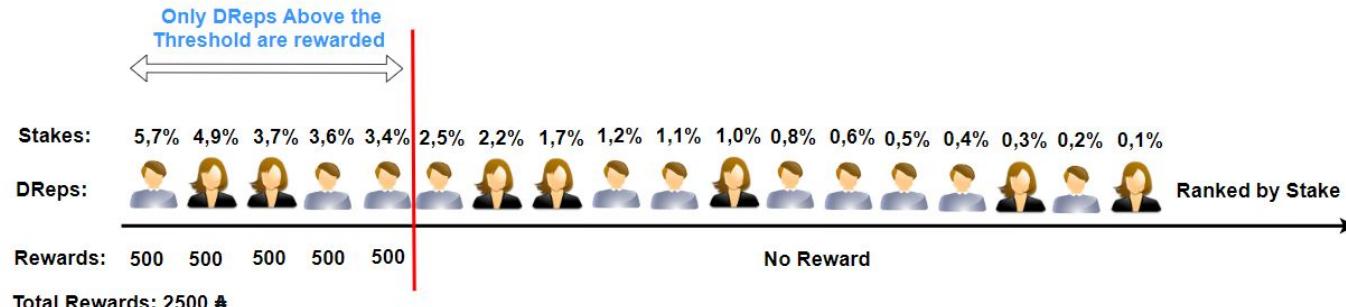
Reward $r = 500 \text{ A}$
DReps $m = 10$

1A) Equal Rewards for the top DReps by Stake



Reward $r = 500 \text{ A}$
DReps $m = 30$
Threshold = 3,33%

1B) Equal Rewards for the top DReps by Stake
above a Minimum Threshold



Images by Jaromir Tesar / Cardano Yoda

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Variants 1a & 1b discussion

How do you think the cutoff reward version of either the top M amount delegated ada of DReps or the top m threshold of active stake delegated to DReps will affect the DReps that are under the threshold?

Are there any parallels we can draw from how the SPO game theory has worked out?

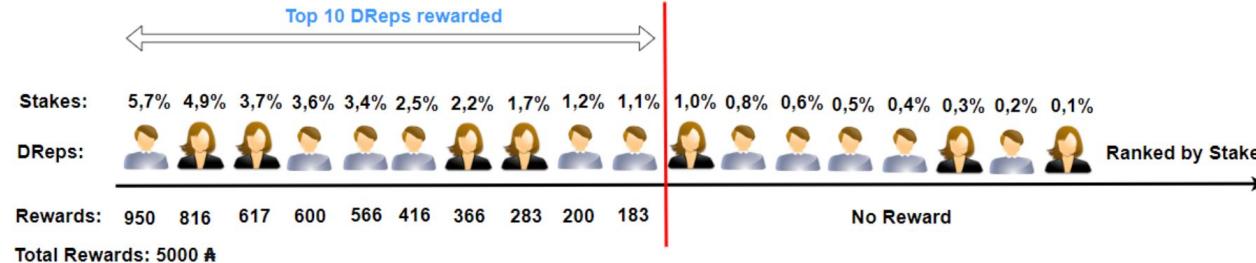
Simple schemes: Variant 2a and 2b

- Still a top- m rewarding scheme but DReps with higher delegations collect a higher reward
- **Variant #2a: top- m proportional scheme**
 - Again, we rank the DReps by their total delegated stake
 - We select the first m to receive a reward
 - If B is the available budget for rewards, the protocol pays the top m DReps, but in proportion to the stake delegated to them
 - Most likely, the payment of the m -th DRep will not be very large
- **Variant #2b: top- m linear/proportional scheme**
 - We rank the DReps by their total delegated stake
 - Difference with #2a: we select up to m DReps to receive a reward (only those whose delegated stake is at least $1/m$ as a percentage of the total active voting stake)
 - Proceed as in the last step of #2a

Simple schemes: Variants 2a & 2b

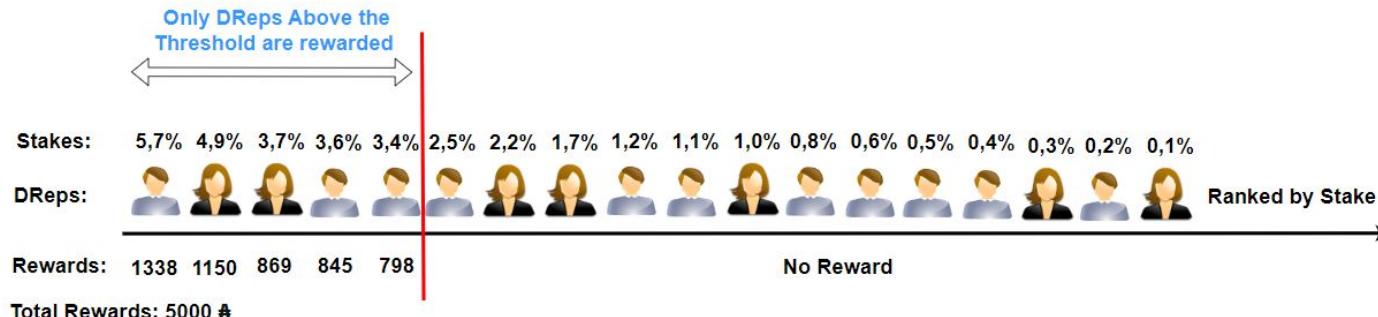
Reward Budget $B = 5000 \text{ A}$
DReps $m = 10$

2A) Proportional Rewards for the top DReps by Stake



Reward Budget $B = 5000 \text{ A}$
DReps $m = 30$
Threshold = 3,33%

2B) Proportional Rewards for the top DReps by Stake above a minimum threshold



Images by Jaromir Tesar / Cardano Yoda

Variants 2a & 2b discussion

How do you think the distribution of rewards and incentivizing the top DReps will affect the DReps at the top receiving the highest rewards and the DReps at the bottom receiving the lowest rewards?

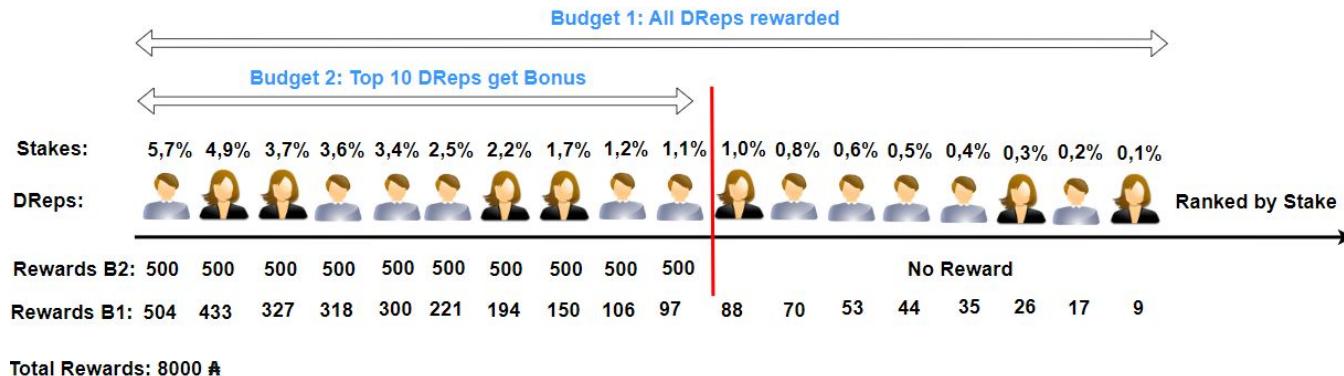
Variant 3

- We could also accommodate a reward to every DRep, while still providing higher payments to the top DReps
- **Variant #3 – proportional with a bonus for top-m:**
 - Parameters: budget B1 (to be split among all DReps), budget B2 (to be split among top DReps)
 - The protocol pays all the DReps in proportion to the stake delegated to them from budget B1
 - But it also gives an additional bonus to the top m DReps from budget B2 (we can use any of the variants 1a, 1b, 2a, 2b for this)
- This could make all DReps happier, while still inducing competition to be among the top DReps
- For simplicity, we could have $B1 = B2 = B/2$, where B is the total amount of available funds

Simple schemes: Variant 3

Reward Budget B1 = 3000 \$
Reward Budget B2 = 5000 \$ (Bonus)
DReps m = 10

3) Proportional Rewards for the top DReps by Stake, With a Bonus



Images by Jaromir Tesar / Cardano Yoda

Variant 3 discussion

Could a base level + a bonus reward hurt or increase efficiency of DReps?

Could the bonus reward be tied to activity instead of the top M amount of DReps – or is there any other relevant metric that the bonus reward could be tied to?



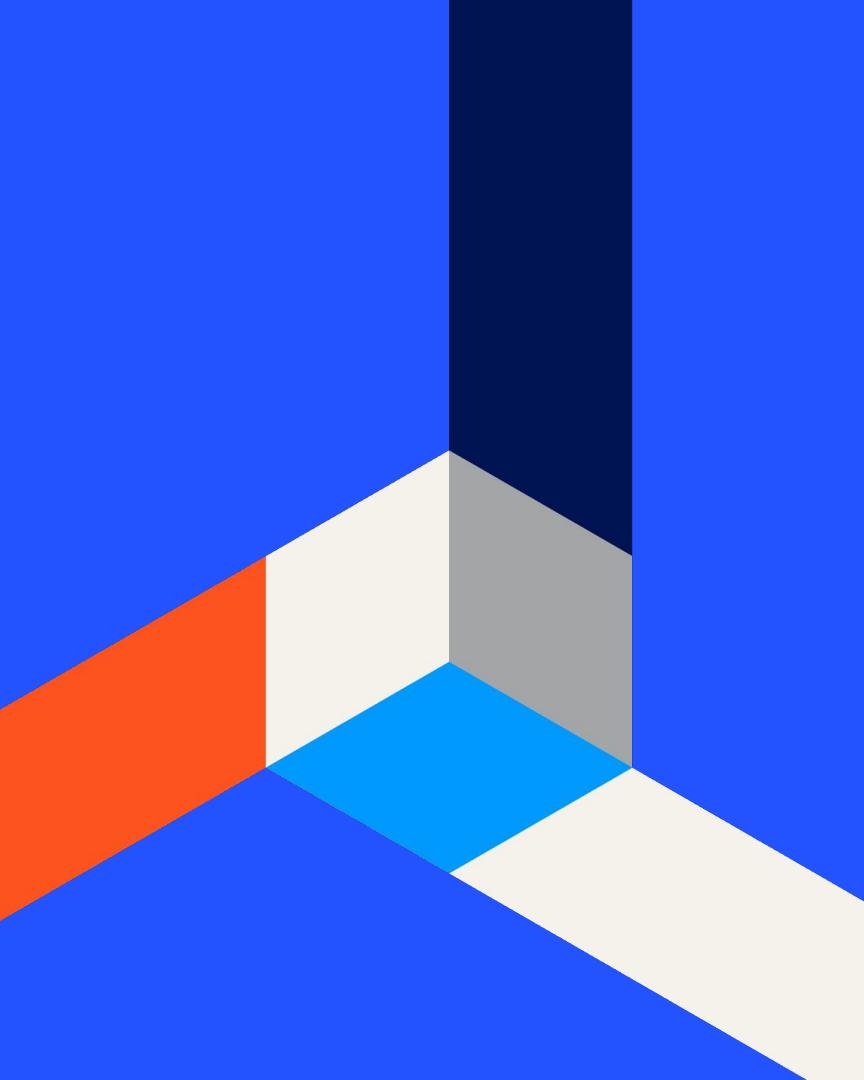
Drep Rewards – Summary

- Main spirit underlying all schemes: incentivize DReps to attract delegations
- Most variants have already been presented to the Edinburgh 1694 workshop
- All variants are easy to implement
- The proposal is agnostic to the source of funds for paying the DReps
 - Some could come from the treasury, some from the proposer (but the specific amounts are not necessarily a research question).



Module 4

Joining the DReps Ecosystem



Module 4

Overall, the module focuses on guiding individuals through the process of becoming involved in the DRep ecosystem. It covers essential steps such as understanding how to become a DRep, exploring opportunities for engagement within the community, and reviewing available tools to facilitate participation.

- How to become a DRep
- How to engage with the community? Review available tools

How to become a DRep

In this module we will focus on how to become a DRep in a practical and easy-to-understand way, through a demo.

Step by step

Any member of the Cardano community can register and be identified by their DRep ID. This means they can receive voting power delegated to them by ada holders. Registration is the only requirement to become a DRep and what determines the influence of any one DRep is how much voting power is accumulated by them.

This means there is no set number of DReps although details are subject to discussion. At any point, the number of active DReps can increase or decrease, as ada holders migrate their voting power from different representatives.



1. SanchoNet

Module 4

SanchoNet

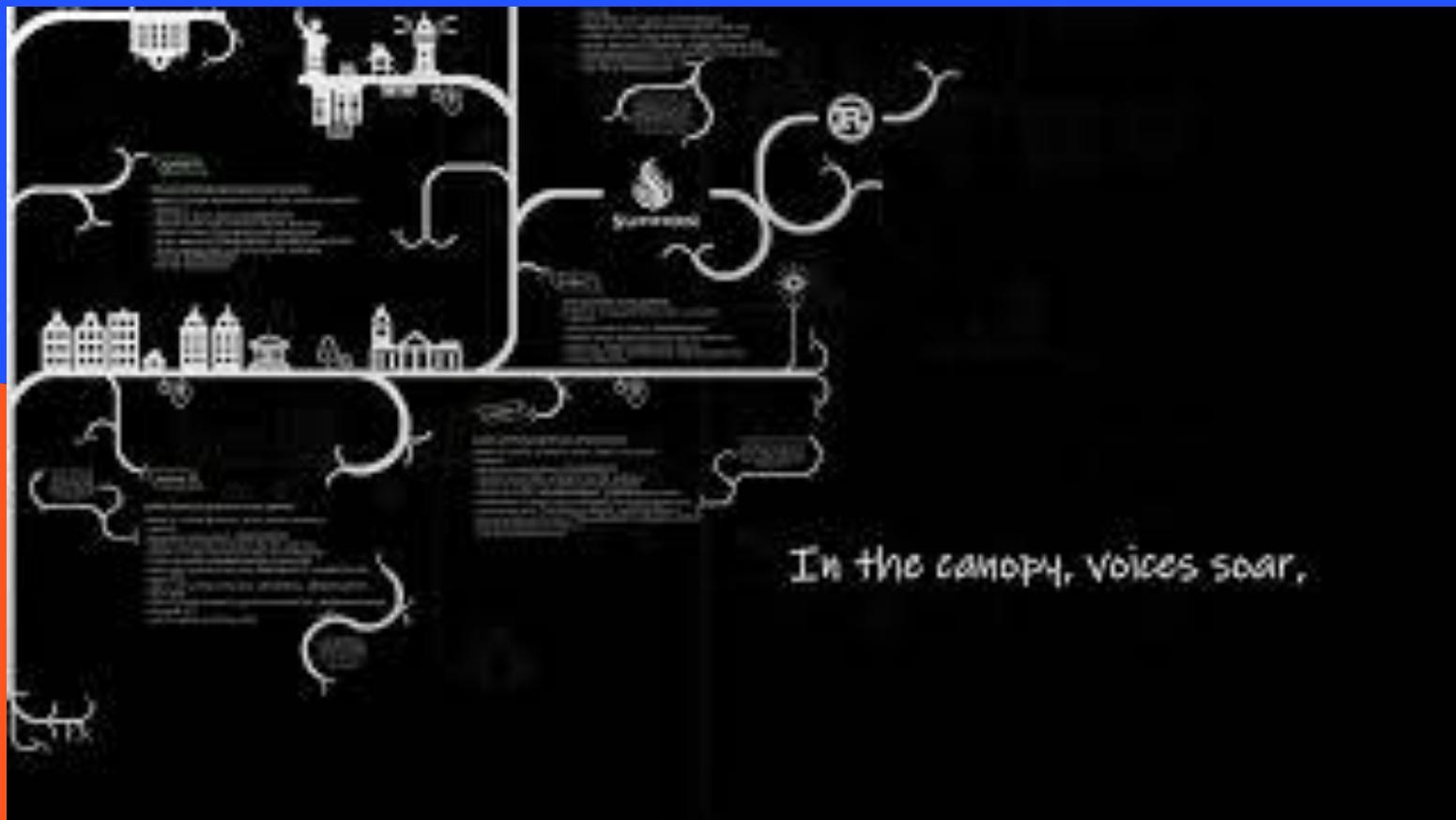
<https://intersect.gitbook.io/drep-pioneer-program/guides/steps-to-register-as-a-drep-on-sanchonet>



1. CLI

Module 4

Cardano-CLI DRep governance Tree



In the canopy, voices soar.

Cardano-CLI DRep governance Tree - Register DRep

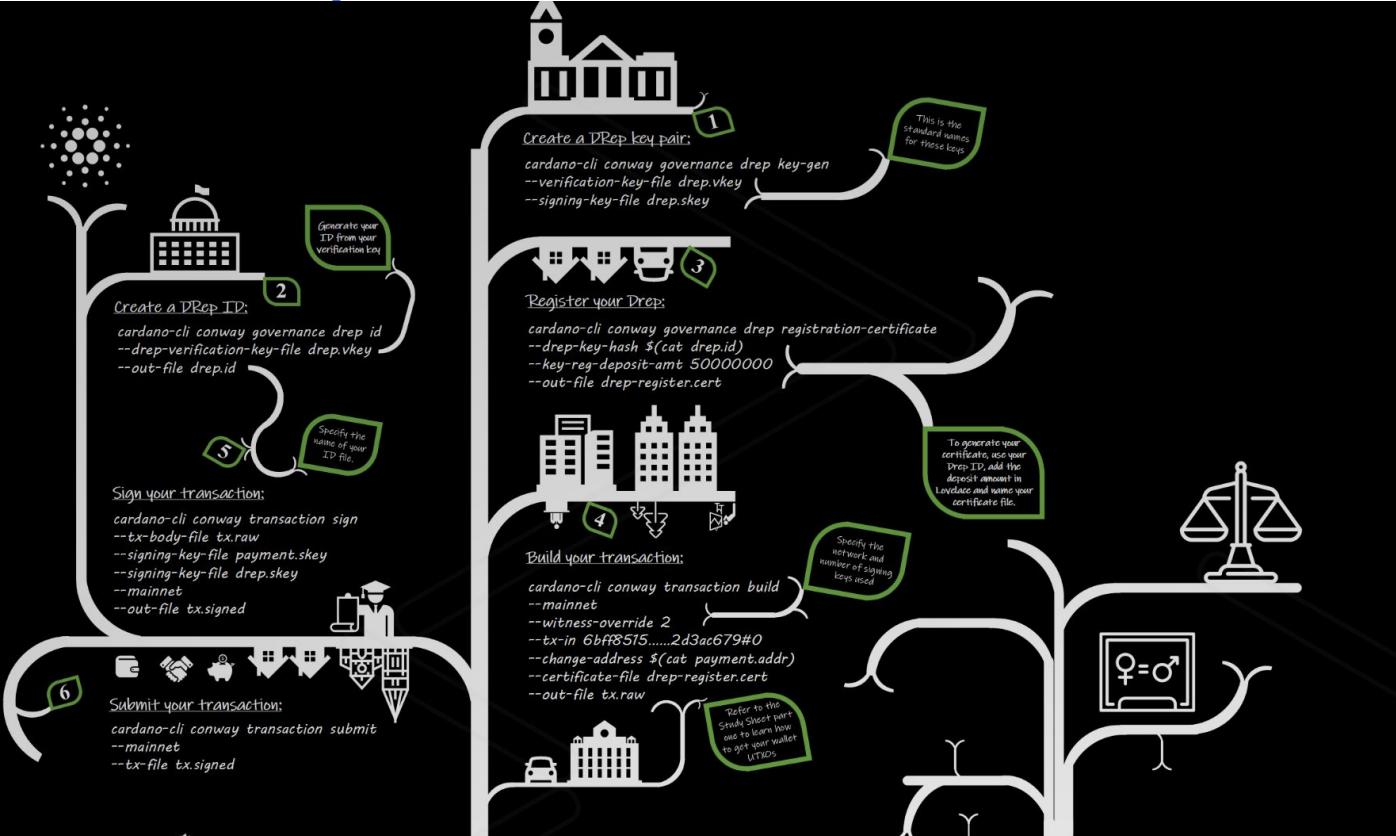


Image from Mike Hornan

Cardano-CLI DRep governance Tree - Make a vote

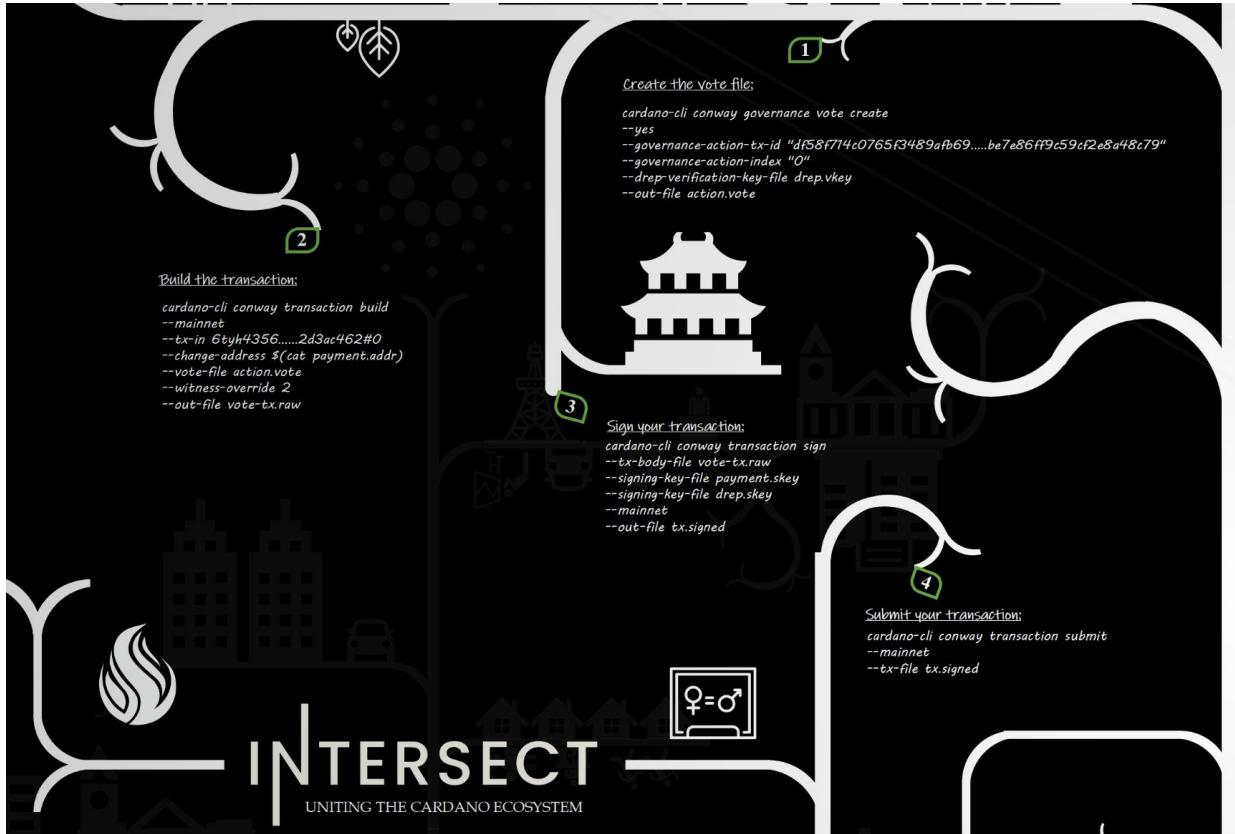
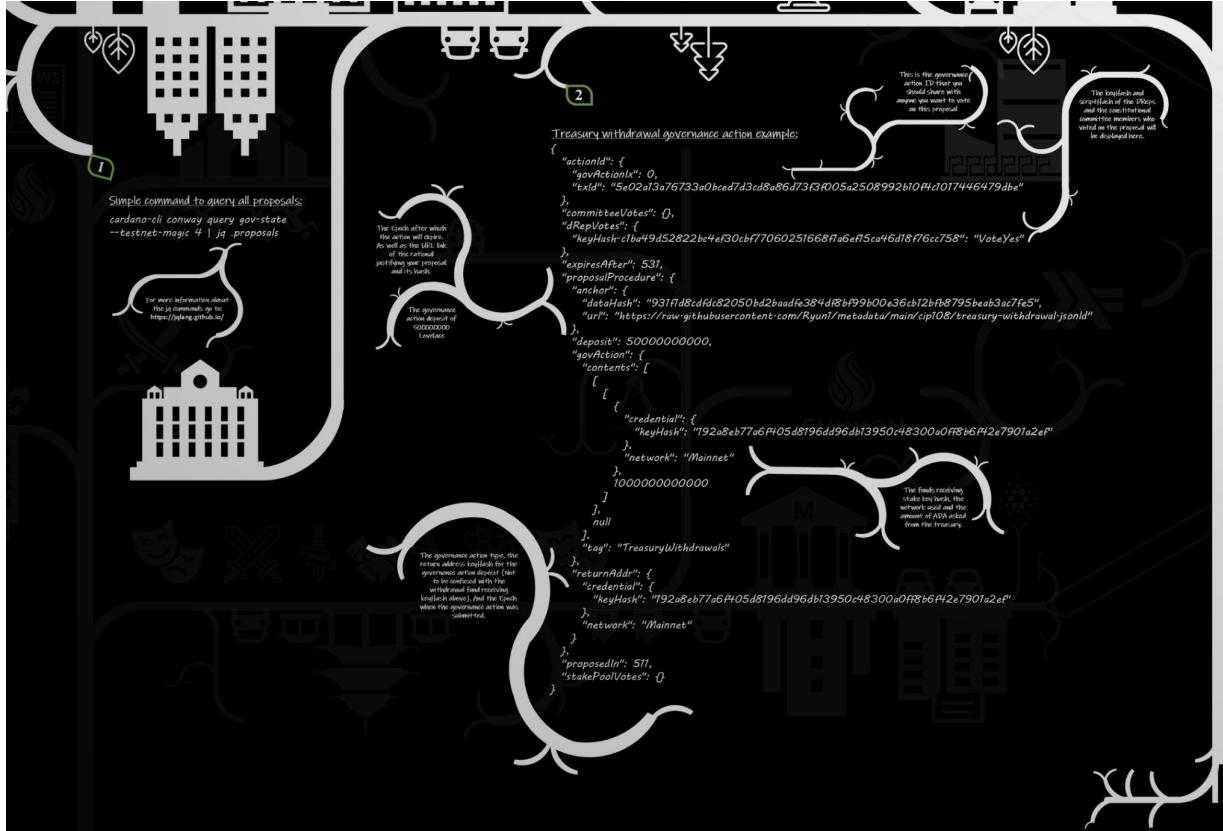


Image from Mike Hornan

Cardano-CLI DRep governance Tree - Query governance proposals



Cardano-CLI DRep governance Tree - Delegate vote

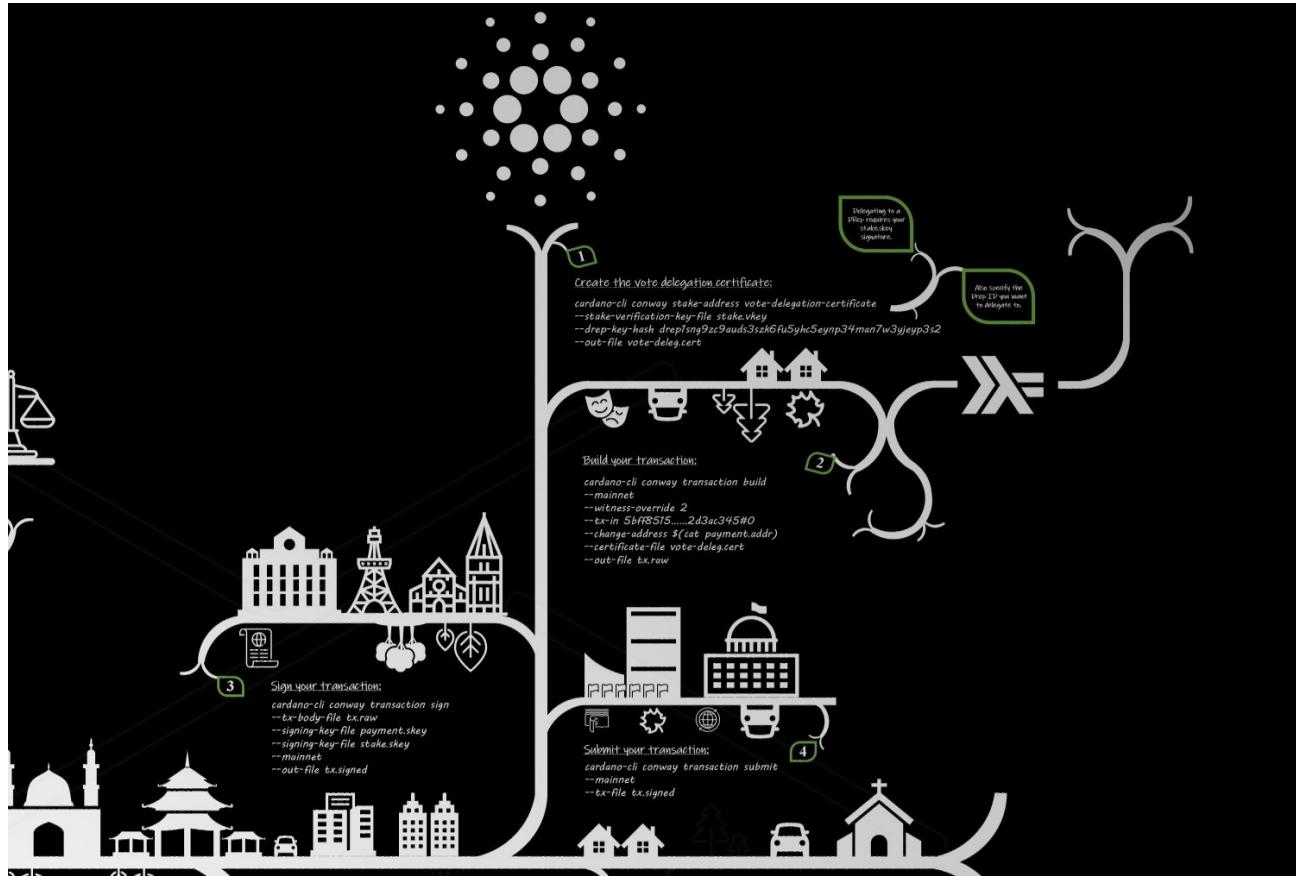


Image from Miles Holman © 2023. Intersect. All Rights Reserved

Cardano-CLI DRep governance

cardano-cli conway governance drep

```
key-gen           --verification-key-file <FILE>
                  --signing-key-file <FILE>

id               (--drep-verification-key <STRING>
                  |--drep-verification-key-file <FILE>
                  )
                  [--output-format <STRING>]
                  [--out-file <FILE>]

registration-certificate  (--drep-script-hash <HASH>
                           |--drep-verification-key <STRING>
                           |--drep-verification-key-file <FILE>
                           |--drep-key-hash <HASH>
                           )
                           --key-reg-deposit-amt <NATURAL>
                           |--drep-metadata-url <TEXT>
                           |  --drep-metadata-hash <HASH>
                           --out-file <FILE>

retirement-certificate   (--drep-script-hash <HASH>
                           |--drep-verification-key <STRING>
                           |--drep-verification-key-file <FILE>
                           |--drep-key-hash <HASH>
                           )
                           --deposit-amt <LOVELACE>
                           --out-file <FILE>

metadata-hash        --drep-metadata-hash <FILE>
                  [--out-file <FILE>]
```

cardano-cli conway governance vote

```
create            (--yes |--no |--abstain)
                  --governance-action-tx-id <TXID>
                  --governance-action-index <WORD32>
                  (--drep-verification-key <STRING>
                   |--drep-verification-key-file <FILE>
                   |--drep-key-hash <HASH>
                   |--drep-script-hash <HASH>
                   |--stake-pool-verification-key <STRING>
                   |--cold-verification-key-file <FILE>
                   |--stake-pool-id <STAKE_POOL_ID>
                   |--cc-hot-verification-key <STRING>
                   |--cc-hot-verification-key-file <FILE>
                   |--cc-hot-key-hash <STRING>
                   |--cc-hot-script-hash <HASH>
                   )
                   |--anchor-url <TEXT>
                   |  --anchor-data-hash <HASH>
                   --out-file <FILE>

view              [--output-json |--output-yaml]
                  --vote-file <FILE>
                  [--out-file <FILE>]
```

Image from Mike Hornan

Cardano-CLI DRep governance 2/2

cardano-cli conway stake-address

```
stake-and-vote-  
delegation-certificate  ( --stake-verification-key <STRING>  
| --stake-verification-key-file <FILE>  
| --stake-key-hash <HASH>  
| --stake-script-file <FILE>  
| --stake-address <ADDRESS>  
)  
( --stake-pool-verification-key <STRING>  
| --cold-verification-key-file <FILE>  
| --stake-pool-id <STAKE-POOL-ID>  
)  
(--drep-script-hash <HASH>  
| --drep-verification-key <STRING>  
| --drep-verification-key-file <FILE>  
| --drep-key-hash <HASH>  
| --always-abstain  
| --always-no-confidence  
)  
--out-file <FILE>  
  
vote-delegation-  
certificate      ( --stake-verification-key <STRING>  
| --stake-verification-key-file <FILE>  
| --stake-key-hash <HASH>  
| --stake-script-file <FILE>  
| --stake-address <ADDRESS>  
)  
(--drep-script-hash <HASH>  
| --drep-verification-key <STRING>  
| --drep-verification-key-file <FILE>  
| --drep-key-hash <HASH>  
| --always-abstain  
| --always-no-confidence  
)  
--out-file <FILE>
```

Image from Mike Hornan

How to engage with the community?

GovTool: The GovTool, empowers ada holders to register as delegate representatives (DReps), delegate voting power to DReps, and review and vote on governance actions.

DRep campaign platform: a tool to enrich the vital role DReps and delegation play in Cardano's on-chain governance. This tool is an excellent way for ada holders to identify a representative's domain of expertise, their perspective and interests, how they voted in the past, and many more things. Equally, DReps need a place where they can share their profile and credentials, and campaign for ada holders to delegate their voting power to them.

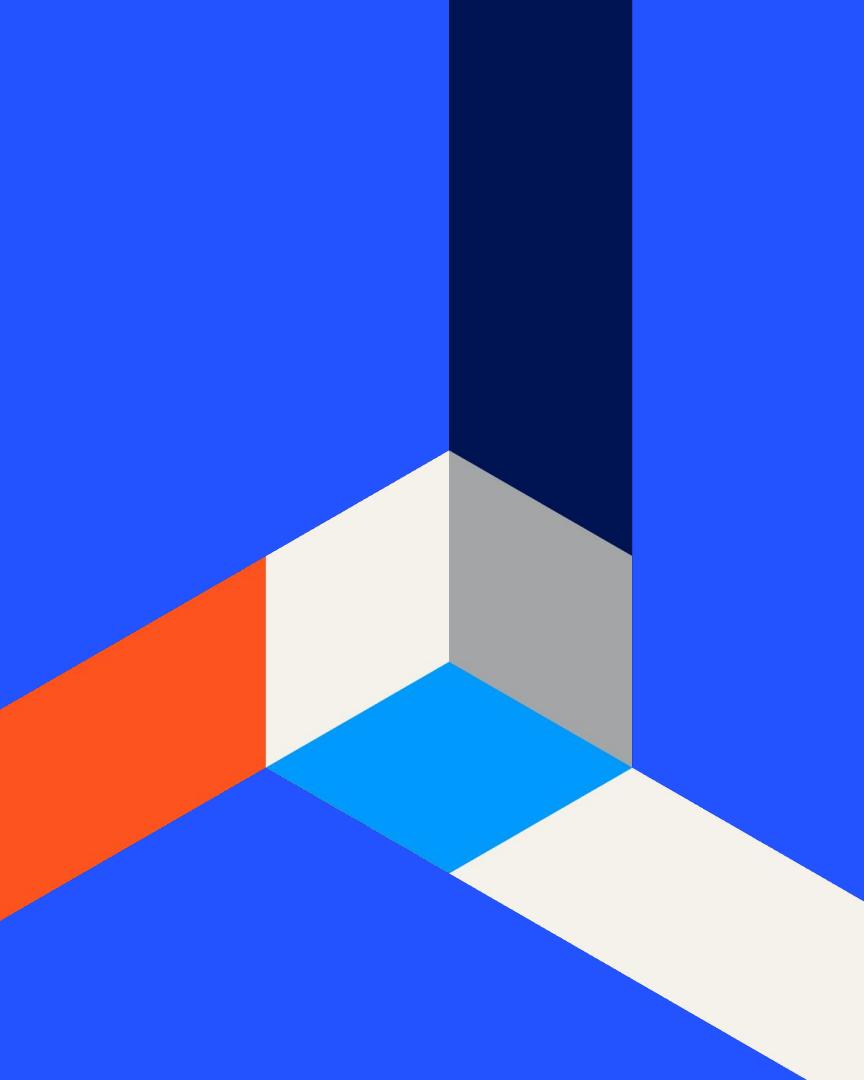
Sanchonet

Ecosystem mapping - DAs to represent

Essential cardano

Cardano ecosystem map by rootdata: <https://www.rootdata.com/EcosystemMap/list/110?n=Cardano>

Ben O'Hanlon discussing Ecosystem mapping:[DRep mapping discussion video](#)



Post workshop survey



Thank you