



**GITCOIN**

**/// Towards a Pluralism Passport  
Built from DeSoc Legos \\**



**FRAUD DETECTION  
& DEFENSE**



# Agenda

1. Vision & Objectives
2. Methodology
3. Analysis
4. Discussion

## **The Vision**

Build a widely adopted, modular  
Pluralism Passport protocol that  
creates a flourishing ecosystem of  
network effects around  
Decentralized Society.



# Objectives

- Gather on-chain data about GR14 contributors
- See which types of on-chain credentials correlate with high trust & Sybil-like behaviors (ie, ways of “closing the gap”)
- Identify grant preferences of certain communities as well as grants that yield cooperation across social distance
- Propose ideas for on-chain Passport stamps for GR15
- Build a novel dataset for future analysis projects



We started with basic info about the **628,052** transactions processed during GR14

	628049	628051
<b>contribution_id</b>	2161655	2161653
<b>checkout_type</b>	eth_zksync	eth_polygon
<b>grant_id</b>	5013	5688
<b>is_squelched</b>	False	True
<b>trust_bonus</b>	0.5	0.5
<b>raw_amount_in_token</b>	0.0006	1.0
<b>amount_in_token</b>	0.0006	1.0
<b>amount_to_gitcoin_in_token</b>	0.00003	0.05
<b>token</b>	ETH	DAI
<b>amount_in_usdt</b>	1.079032	1.0
<b>created_on</b>	2022-06-09 00:01:29.421685+00:00	2022-06-09 00:00:30.127718+00:00
<b>modified_on</b>	2022-06-09 00:10:40.124871+00:00	2022-06-09 00:10:41.355795+00:00
<b>address</b>	0xd42517076762ca0caae225633837d1ec75338af8	0x2c07a2ac29541b9124da12836729d6305494d6f0

We filtered out some whales (contributions over \$10K) to arrive at **57,513** unique wallet addresses

address	isSquelched	trustscore	qfScore	numDonations	numGrants	sumUSD	numTokens	setTokens	setGrants
0xc4670b15b4a837d7eb6cd7130fbc4612c535638f	0.0	0.50	185.654971	10	6	8223.092606	2	{WETH, ETH}	{5090, 12, 5007, 3994, 5884, 6042}
0xaade48a14c24bc8e190ff994a560eaeead209c78	0.0	1.45	272.982213	9	9	8400.000000	1	{DAI}	{4832, 258, 12, 13, 5613, 5039, 6128, 24, 5468}
0x6b83270726342e02a11e755e8cc35275712122ec	0.0	1.50	100.000000	1	1	10000.000000	1	{DAI}	{4493}
0x2ac67c73600439fb0b11d27dc3ccaf6a7bb6bac2	1.0	0.50	100.000000	2	1	10000.000000	1	{USDC}	{6163}

We also created a Quadratic Funder Score to reward "going wide" over "going deep"

$$QuadraticFunderScore = \left( \sum_{i=1}^n \sqrt{c_i} \right)$$

address	isSquelched	trustscore	qfScore	numDonations	numGrants	sumUSD	numTokens	setTokens	setGrants
0xc4670b15b4a837d7eb6cd7130fbc4612c535638f	0.0	0.50	185.654971	10	6	8223.092606	2	{WETH, ETH}	{5090, 12, 5007, 3994, 5884, 6042}
0xaade48a14c24bc8e190ff994a560eaeead209c78	0.0	1.45	272.982213	9	9	8400.000000	1	{DAI}	{4832, 258, 12, 13, 5613, 5039, 6128, 24, 5468}
0x6b83270726342e02a11e755e8cc35275712122ec	0.0	1.50	100.000000	1	1	10000.000000	1	{DAI}	{4493}
0x2ac67c73600439fb0b11d27dc3ccaf6a7bb6bac2	1.0	0.50	100.000000	2	1	10000.000000	1	{USDC}	{6163}








## Sidenote: We need to dig deeper into cases where FDD + Passport + qfScores aren't in alignment. There are many.

address	isSquelched	trustscore	qfScore	numDonations	numGrants	sumUSD	numTokens	setTokens	setGrants
0x0000006d14ce3cf81449c3ba1f26108df0a4de8b	0.0	0.50	2.784157	2	2	5.436171	1	{'ETH'}	{12, 3591}
0x000000b4732a3b10a39a0cdfc5465e16ce31bc6c	1.0	1.35	11.225948	5	5	25.204383	1	{'ETH'}	{37, 3591, 4268, 4083, 25}
0x00021a4a232bf9be1350c86200227f1e4a62ad11	1.0	0.50	14.211156	16	14	14.463602	1	{'ETH'}	{1632, 4450, 6020, 37, 3591, 137, 5130, 12, 13...}
0x0004ff718f0b2fbf051ee6e5c8854ef5baf03a1	0.0	0.90	1.223607	2	2	1.050000	1	{'USDC'}	{12, 5967}
0x000bf914ca924b2c449b0e0b3126bf137473caca	1.0	0.50	45.825995	40	39	54.514581	1	{'ETH'}	{258, 3591, 5511, 137, 12, 13, 4493, 5007, 449...}



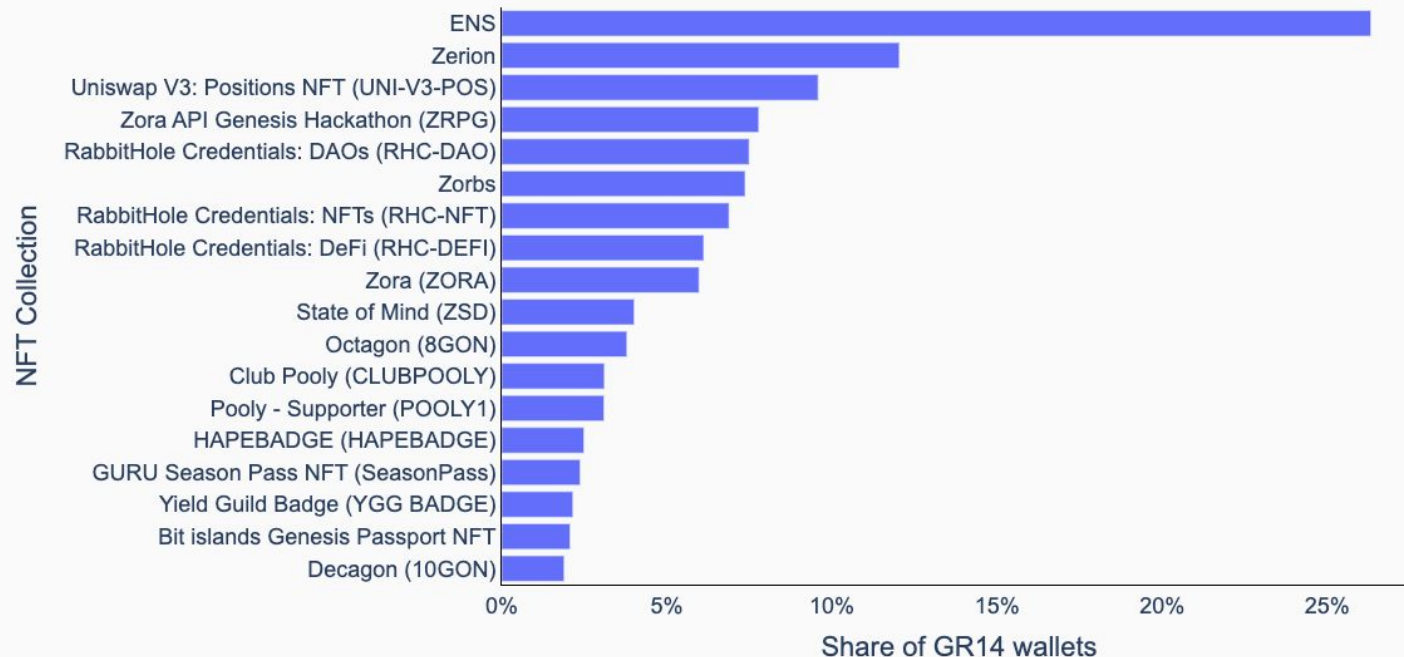


## Next, for each wallet address, we pulled **over 36K** on-chain data points from five subgraphs

	<b>Zora</b> ETH NFTs	<b>15,803 collections</b> (+566,923 NFTs)	<b>50% (29K)</b> of GR14 wallets have an NFT
	<b>POAP</b> xDAI only	<b>17,422 events</b> (+510,380 POAPs)	<b>34% (20k)</b> of GR14 wallets have a POAP
	<b>Snapshot</b> DAO votes	<b>3,107 spaces</b> (+1,048,454 votes)	<b>47% (27k)</b> of GR14 wallets have voted
	<b>Lens</b> Profiles	<b>2 fields</b> (followers/ing)	<b>17% (10k)</b> of GR14 wallets have a .lens
	<b>PoH</b> Profiles	<b>1 field</b> (status)	<b>0.4% (215)</b> of GR14 wallets have profiles

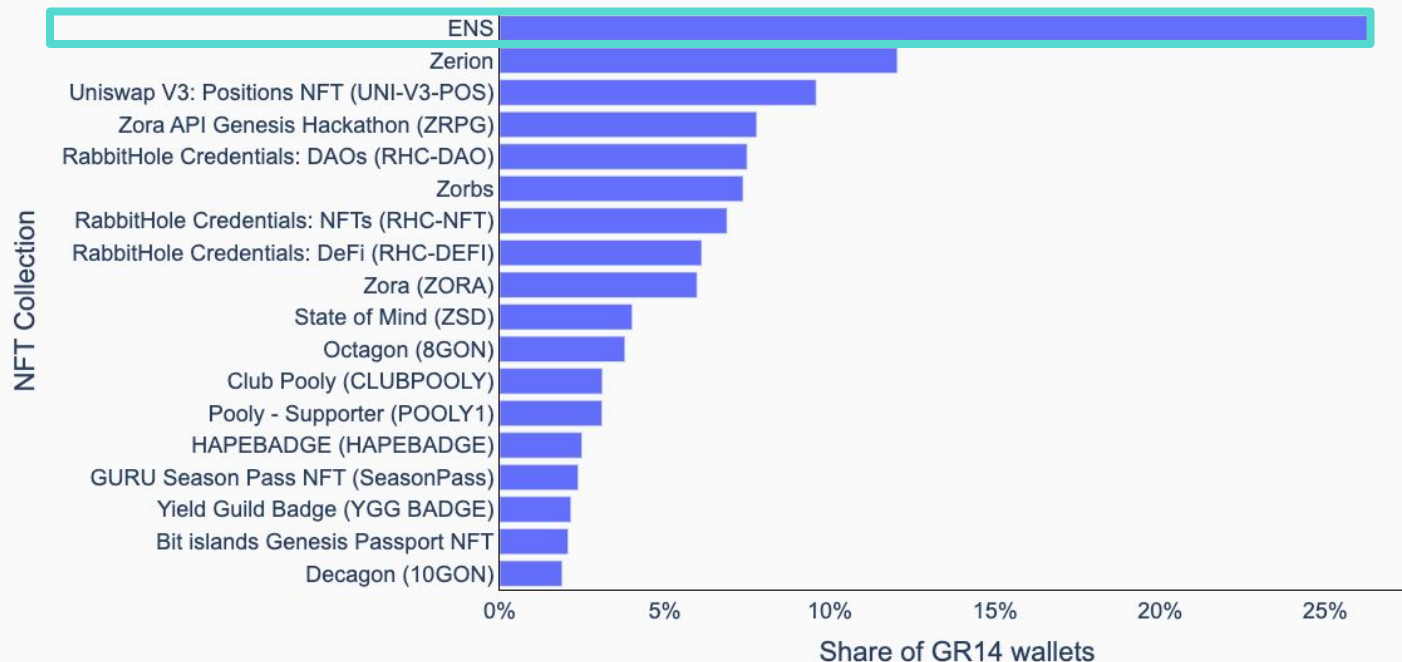


## 50% of wallets have at least one NFT in them



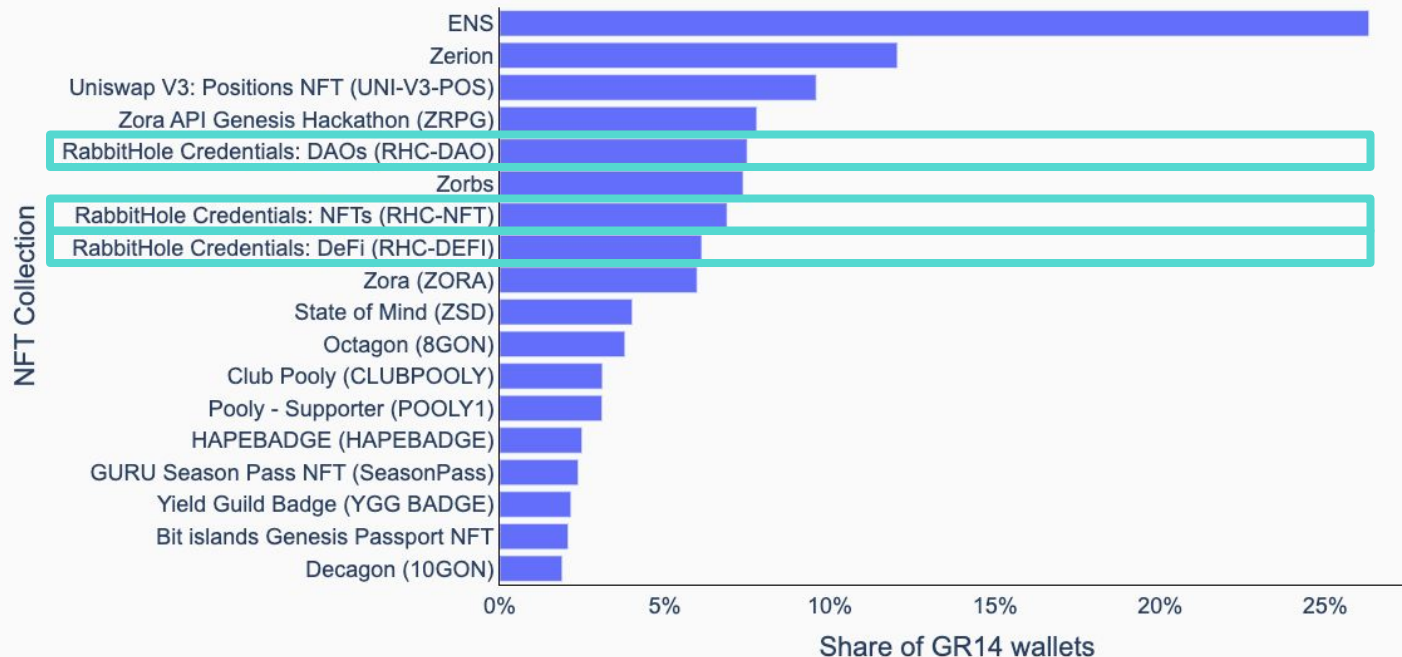


## ENS is the most popular – held by 26% of wallets



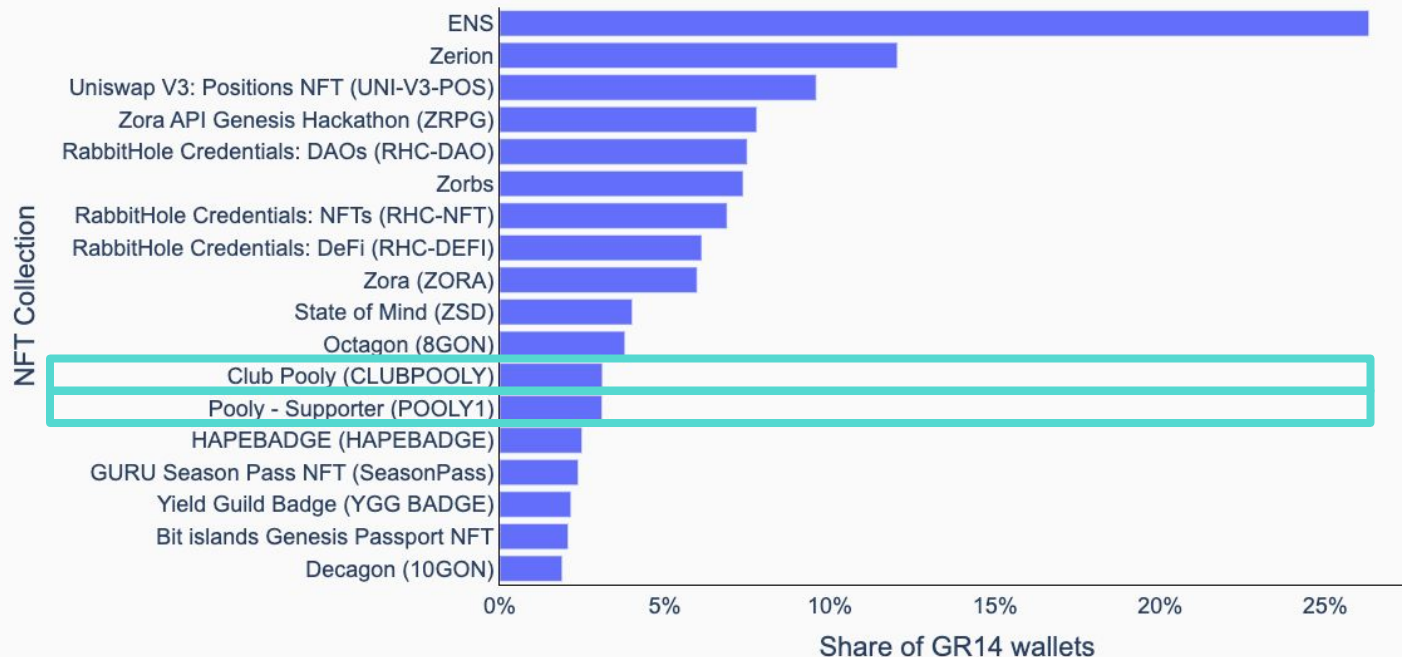


# RabbitHole trio is popular – and takes time & gas to earn





## Pooly NFTs also have a high cost of forgery (>0.1 ETH)

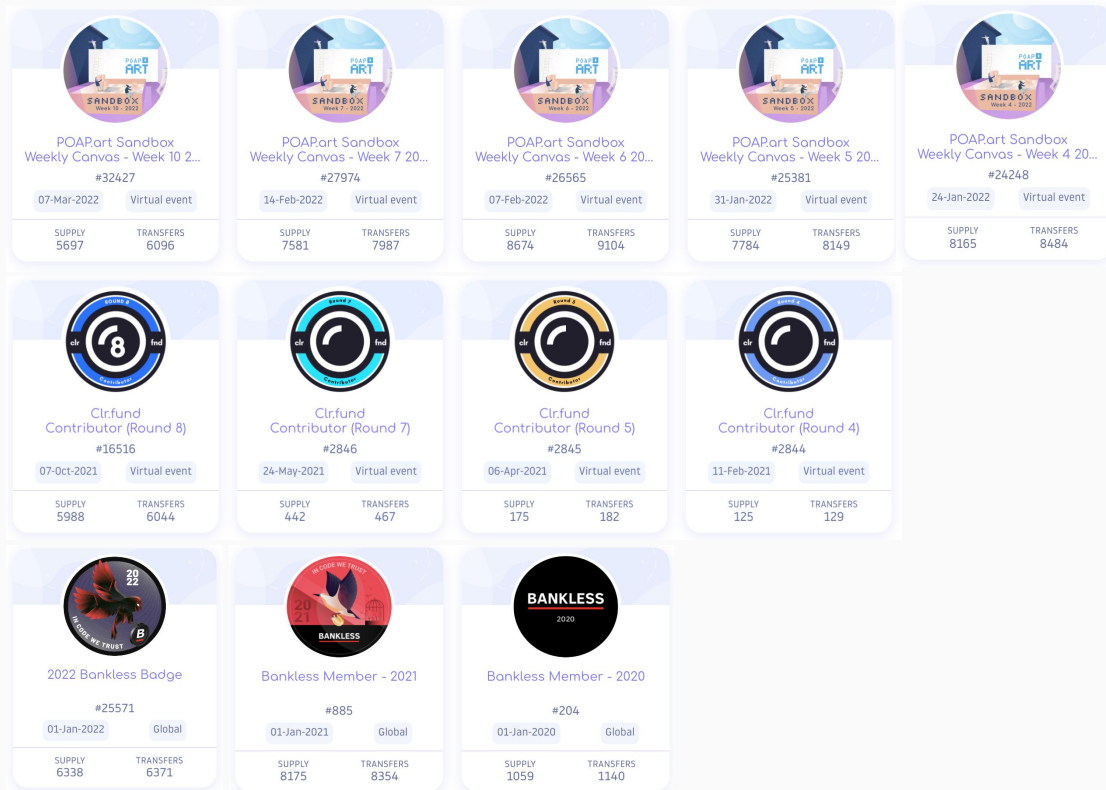




## Pooly owners tend to be good contributors too






Name	Num. Wallets	Avg. Funding (USD)	Avg. Squelch Rate	Avg. Trust Bonus	Avg. QF Score
<b>ENS</b>	15184	45.756704	0.216989	0.924236	20.205932
<b>Zerion</b>	6937	31.641708	0.209799	0.949896	18.276032
<b>Uniswap V3: Positions NFT (UNI-V3-POS)</b>	5524	47.844943	0.189257	1.049345	22.750852
<b>Zora API Genesis Hackathon (ZRPG)</b>	4533	28.336064	0.233946	1.037283	18.725267
<b>RabbitHole Credentials: DAOs (RHC-DAO)</b>	4355	32.822726	0.235008	1.080595	20.719565
<b>Zorbs</b>	4278	44.815334	0.188759	1.037334	21.218173
<b>RabbitHole Credentials: NFTs (RHC-NFT)</b>	4000	34.688774	0.221607	1.112017	22.112380
<b>RabbitHole Credentials: DeFi (RHC-DEFI)</b>	3554	37.156891	0.217236	1.124447	23.250796
<b>Zora (ZORA)</b>	3466	35.251277	0.239163	1.031796	20.122893
<b>State of Mind (ZSD)</b>	2337	41.474204	0.220768	1.031939	22.242731
<b>Octagon (8GON)</b>	2212	36.325453	0.227511	0.994066	20.828809
<b>Club Pooly (CLUBPOOLY)</b>	1765	76.443479	0.150965	0.929345	27.249605
<b>Pooly - Supporter (POOLY1)</b>	1759	73.267741	0.152048	0.931009	26.896088





# 34% of wallets have at least one POAP in them









# 4% of wallets have at least 3 POAP.art Sandbox POAPs

 <p>POAPart Sandbox Weekly Canvas - Week 10 20... #32427</p> <p>07-Mar-2022 Virtual event</p> <p>SUPPLY 5697 TRANSFERS 6096</p>	 <p>POAPart Sandbox Weekly Canvas - Week 7 20... #27974</p> <p>14-Feb-2022 Virtual event</p> <p>SUPPLY 7581 TRANSFERS 7987</p>	 <p>POAPart Sandbox Weekly Canvas - Week 6 20... #26565</p> <p>07-Feb-2022 Virtual event</p> <p>SUPPLY 8674 TRANSFERS 9104</p>	 <p>POAPart Sandbox Weekly Canvas - Week 5 20... #25381</p> <p>31-Jan-2022 Virtual event</p> <p>SUPPLY 7784 TRANSFERS 8149</p>	 <p>POAPart Sandbox Weekly Canvas - Week 4 20... #24248</p> <p>24-Jan-2022 Virtual event</p> <p>SUPPLY 8165 TRANSFERS 8484</p>
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 <p>Clrfund Contributor (Round 8) #16516</p> <p>07-Oct-2021 Virtual event</p> <p>SUPPLY 5988 TRANSFERS 6044</p>	 <p>Clrfund Contributor (Round 7) #2846</p> <p>24-May-2021 Virtual event</p> <p>SUPPLY 442 TRANSFERS 467</p>	 <p>Clrfund Contributor (Round 5) #2845</p> <p>06-Apr-2021 Virtual event</p> <p>SUPPLY 175 TRANSFERS 182</p>	 <p>Clrfund Contributor (Round 4) #2844</p> <p>11-Feb-2021 Virtual event</p> <p>SUPPLY 125 TRANSFERS 129</p>
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 <p>2022 Bankless Badge #25571</p> <p>01-Jan-2022 Global</p> <p>SUPPLY 6338 TRANSFERS 6371</p>	 <p>Bankless Member - 2021 #885</p> <p>01-Jan-2021 Global</p> <p>SUPPLY 8175 TRANSFERS 8354</p>	 <p>Bankless Member - 2020 #204</p> <p>01-Jan-2020 Global</p> <p>SUPPLY 1059 TRANSFERS 1140</p>
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## Welcome to POAP.art.

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Join us at [poap.art/discord](https://poap.art/discord)

Open 0    Soon 0    Closed 45





There are no canvas to show at this time. Stay tuned!






These have no cost, but you need to show up regularly to get em

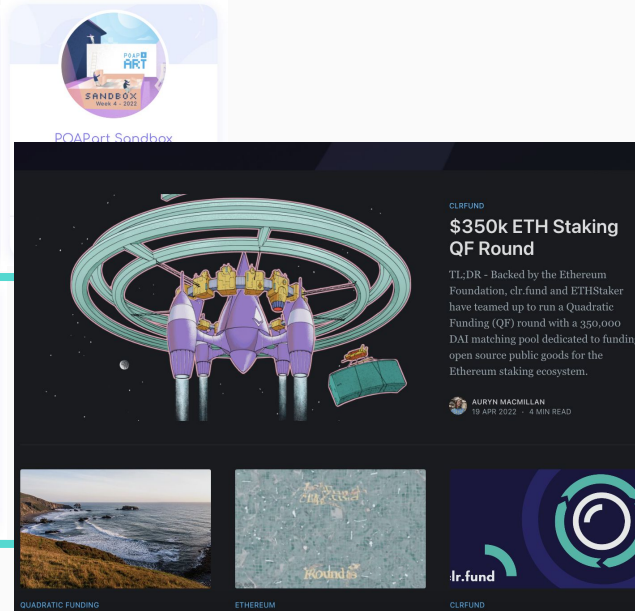


# 2% of wallets have at least one **clr.fund** POAP in them

 <p>POAPart Sandbox Weekly Canvas - Week 10 2022 #32427</p> <p>07-Mar-2022 Virtual event</p> <p>SUPPLY 5697 TRANSFERS 6096</p>	 <p>POAPart Sandbox Weekly Canvas - Week 7 2022 #27974</p> <p>14-Feb-2022 Virtual event</p> <p>SUPPLY 7581 TRANSFERS 7987</p>	 <p>POAPart Sandbox Weekly Canvas - Week 6 2022 #26565</p> <p>07-Feb-2022 Virtual event</p> <p>SUPPLY 8674 TRANSFERS 9104</p>	 <p>POAPart Sandbox Weekly Canvas - Week 5 2022 #25381</p> <p>31-Jan-2022 Virtual event</p> <p>SUPPLY 7784 TRANSFERS 8149</p>
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 <p>Clr.fund Contributor (Round 8) #16516</p> <p>07-Oct-2021 Virtual event</p> <p>SUPPLY 5988 TRANSFERS 6044</p>	 <p>Clr.fund Contributor (Round 7) #2846</p> <p>24-May-2021 Virtual event</p> <p>SUPPLY 442 TRANSFERS 467</p>	 <p>Clr.fund Contributor (Round 5) #2845</p> <p>06-Apr-2021 Virtual event</p> <p>SUPPLY 175 TRANSFERS 182</p>	 <p>Clr.fund Contributor (Round 4) #2844</p> <p>11-Feb-2021 Virtual event</p> <p>SUPPLY 125 TRANSFERS 129</p>
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**\$350k ETH Staking QF Round**

TL;DR - Backed by the Ethereum Foundation, clr.fund and ETHStaker have teamed up to run a Quadratic Funding (QF) round with a 350,000 DAI matching pool dedicated to funding open source public goods for the Ethereum staking ecosystem.

AURYN MACMILLAN  
19 APR 2022 · 4 MIN READ

Signals value-alignment and that you've spent money

# 1% of wallets have at least one Bankless Badge POAP

 POAPart Sandbox Weekly Canvas - Week 10 2022 #32427 07-Mar-2022 Virtual event SUPPLY 5697 TRANSFERS 6096	 POAPart Sandbox Weekly Canvas - Week 7 2022 #27974 14-Feb-2022 Virtual event SUPPLY 7581 TRANSFERS 7987	 POAPart Sandbox Weekly Canvas - Week 6 2022 #26565 07-Feb-2022 Virtual event SUPPLY 8674 TRANSFERS 9104	 POAPart Sandbox Weekly Canvas - Week 5 2022 #25381 31-Jan-2022 Virtual event SUPPLY 7781 TRANSFERS 8104	 POAPart Sandbox Weekly Canvas - Week 4 2022 #24248 24-Jan-2022 Virtual event SUPPLY 7781 TRANSFERS 8104
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 2022 Bankless Badge #25571 01-Jan-2022 Global SUPPLY 6338 TRANSFERS 6371	 Bankless Member - 2021 #885 01-Jan-2021 Global SUPPLY 8175 TRANSFERS 8354	 Bankless Member - 2020 #204 01-Jan-2020 Global SUPPLY 1059 TRANSFERS 1140
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**RECOMMENDED**

**PREMIUM**  
Full Newsletter, Podcasts, Community, & Member Token

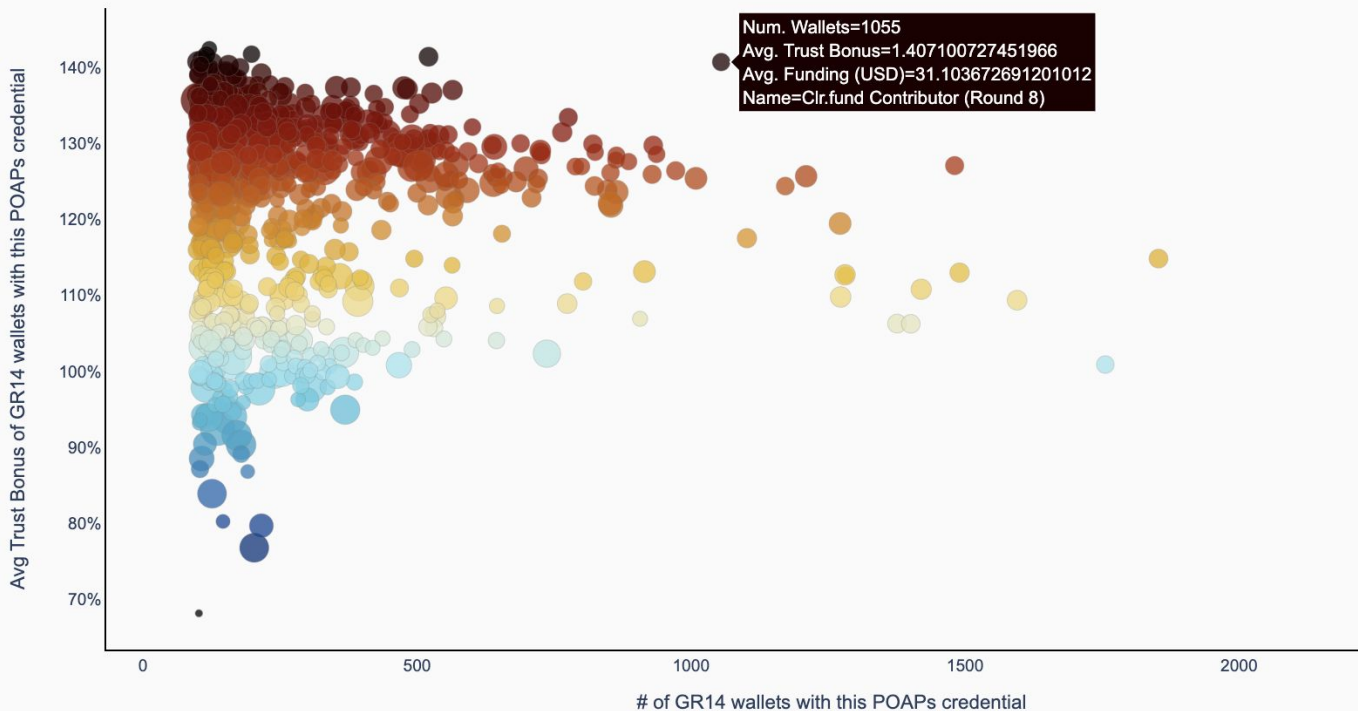
**\$22**  
(per month)

- ✓ Daily Bankless newsletter w/ articles & recap
- ✓ Weekly Metaversal newsletter to track the NFT market
- ✓ Full Market Opportunity report on Mondays
- ✓ 5 x Tuesday Tactical level-ups per month
- ✓ Public podcast feed
- ✓ Premium podcast feed w/ episode Debriefs
- ✓ Alpha Leak emails to alert you to the big opportunities
- ✓ Private chatroom w/ RSA, David, and 1,500 experts
- ✓ Bankless Token for airdrops, raffles, and unlocks

These cost (fiat) money

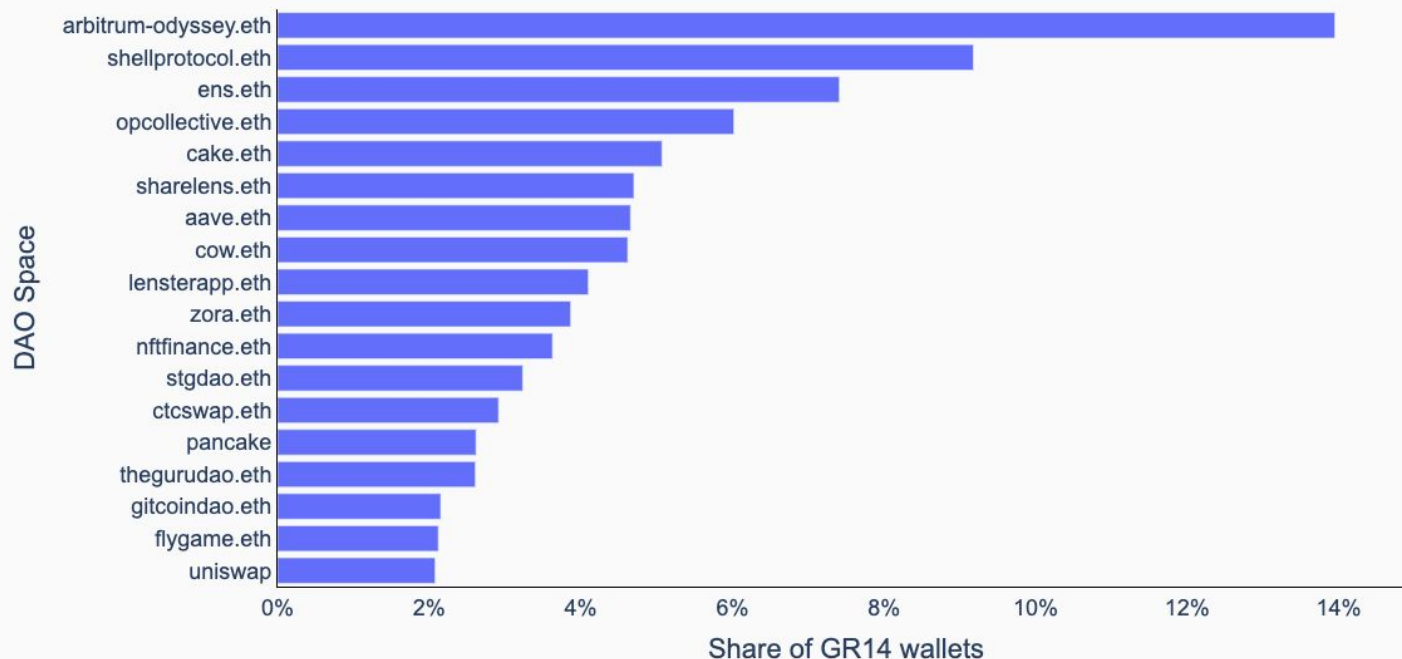


# POAPs like **clr.fund** are very difficult to forge



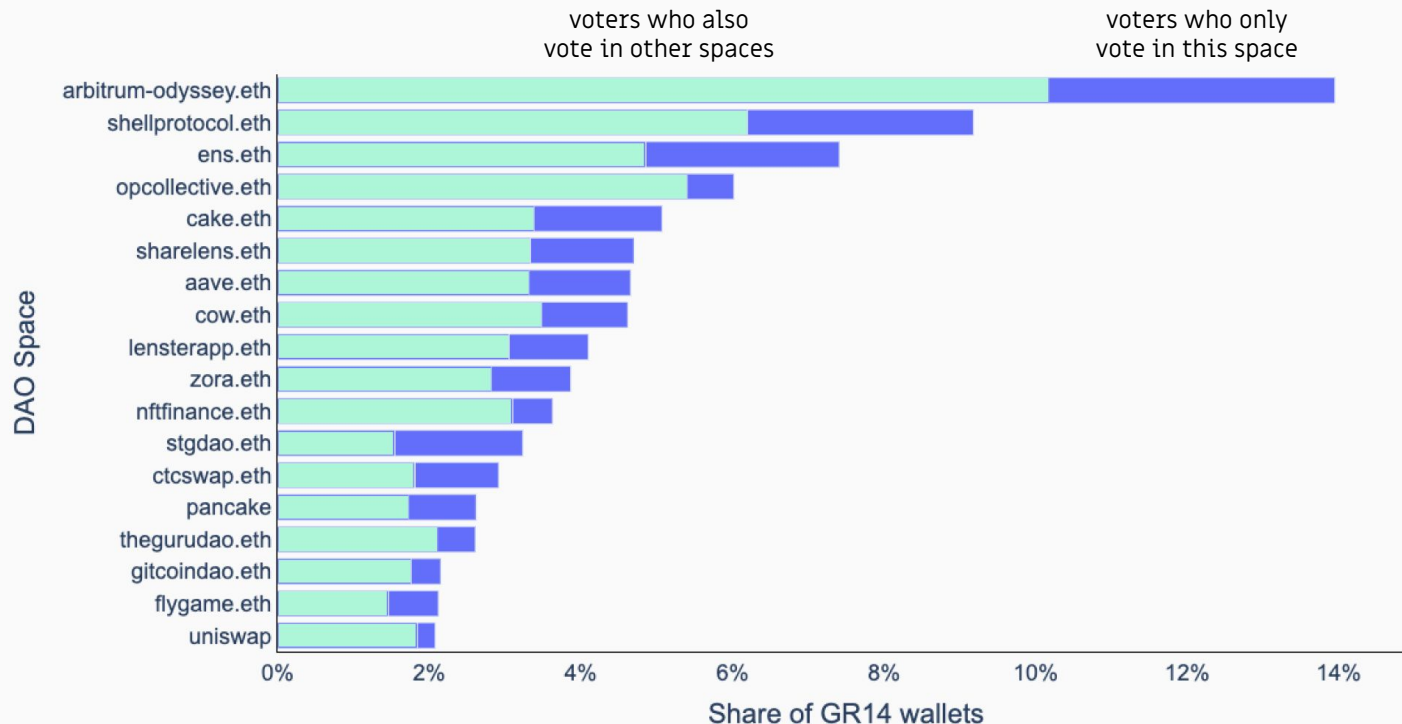


# 47% of wallets have voted in at least one Snapshot space





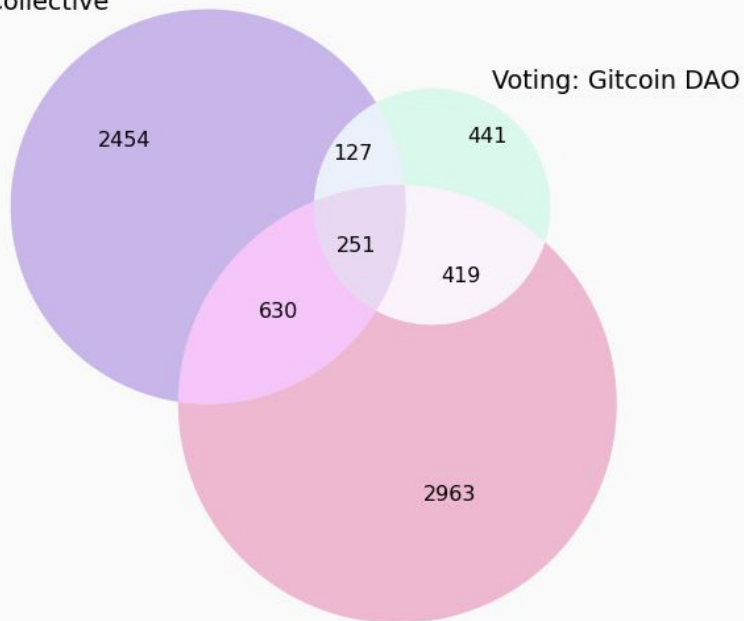
# Many voters are active in **more than one Snapshot** space





## We can look deeper at overlapping DAO affiliations

Voting: Optimism Collective

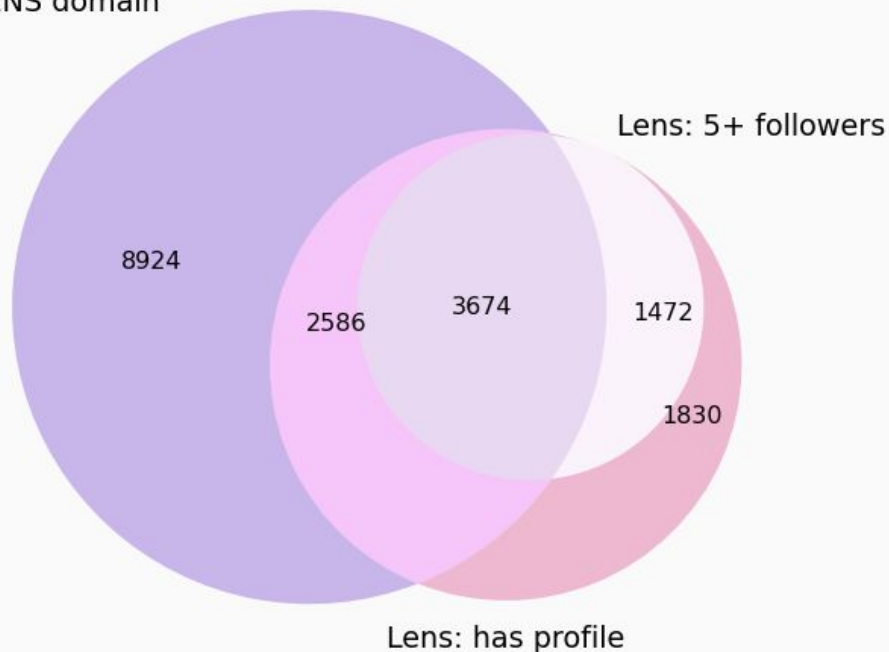


Voting: ENS



## The majority of **Lens users** have an ENS and 5+ followers

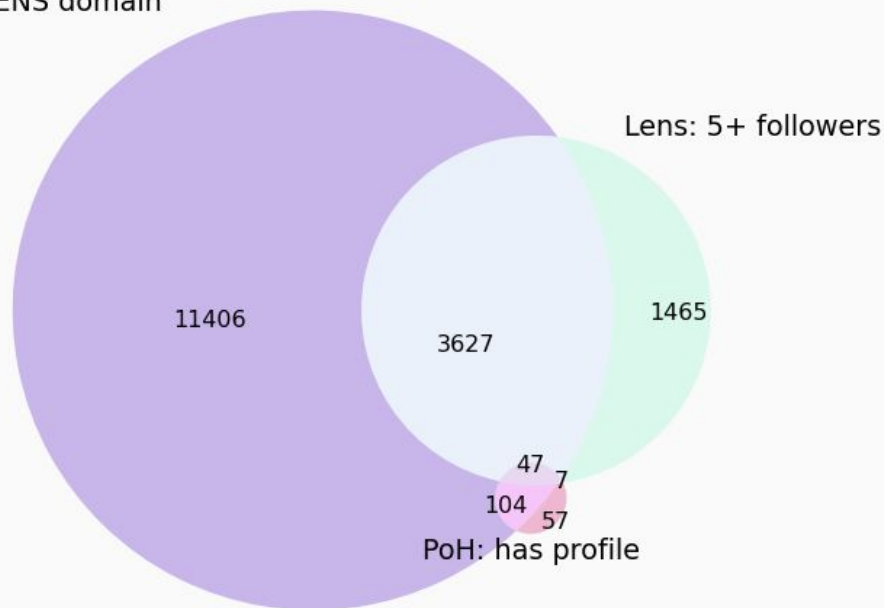
NFTs: ENS domain





## Surprisingly, there is less overlap with Proof of Humanity

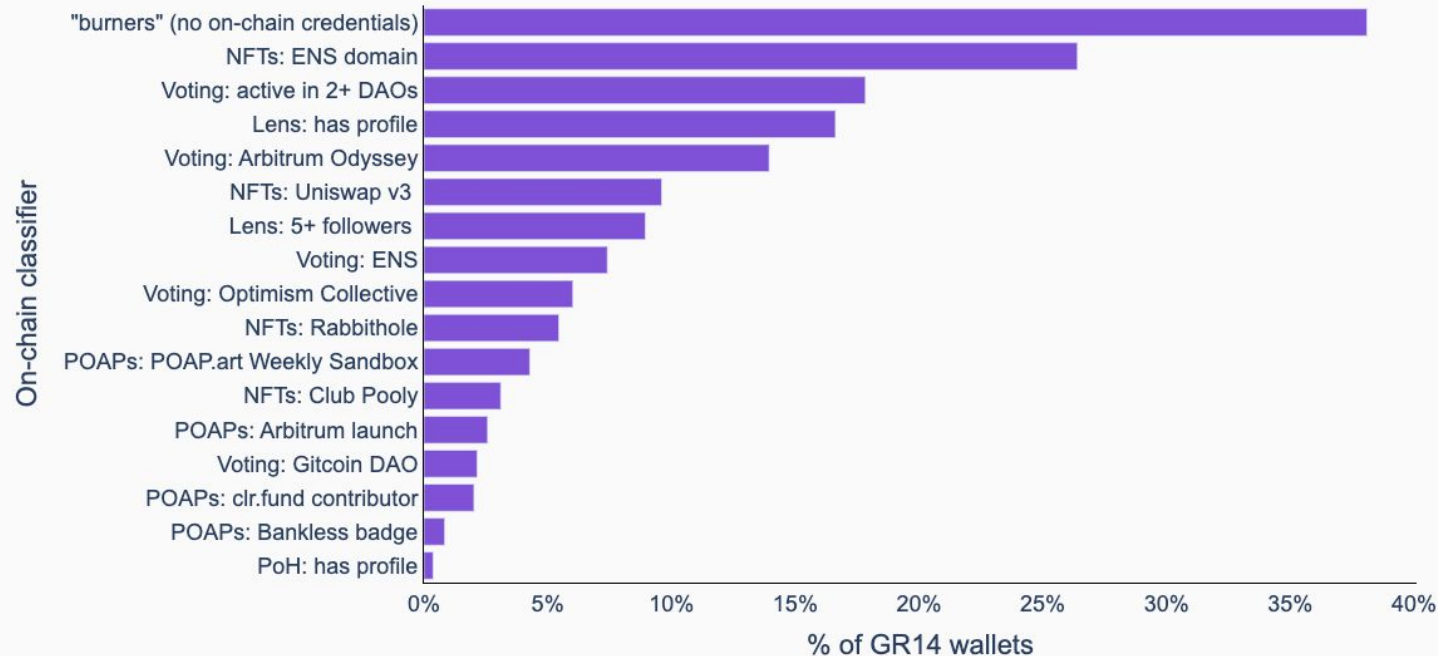
NFTs: ENS domain





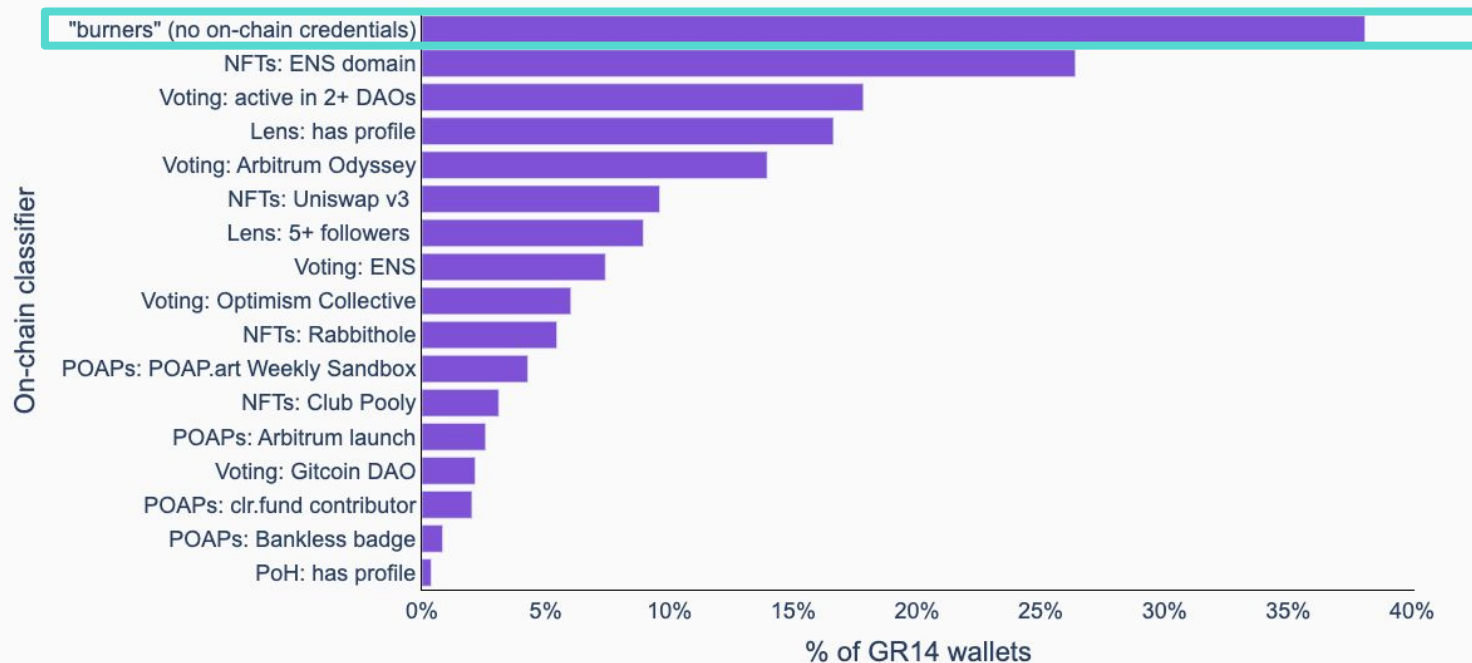


## Zooming out: here's a breakdown of 17 on-chain classifiers





# The 17th classifier represents the 38% of wallets that have no on-chain credentials ("burners")





## We can analyze how classifiers perform in terms of Sybil and trust metrics

	Name	Num. Wallets	Avg. Funding (USD)	Avg. Squelch Rate	Avg. Trust Bonus	Avg. QF Score
0	"burners" (no on-chain credentials)	21911	16.619661	0.492046	0.596284	7.965748
1	NFTs: ENS domain	15184	45.756704	0.216989	0.924236	20.205932
2	Voting: active in 2+ DAOs	10258	39.968572	0.201033	1.014848	19.092265
3	Lens: has profile	9562	41.477795	0.195579	0.957668	19.398618
4	Voting: Arbitrum Odyssey	8022	30.230218	0.186961	0.961222	16.842301
5	NFTs: Uniswap v3	5524	47.844943	0.189257	1.049345	22.750852
6	Lens: 5+ followers	5146	40.074567	0.187589	1.022993	20.307678
7	Voting: ENS	4263	62.225760	0.120670	1.151038	23.889258
8	Voting: Optimism Collective	3462	27.356651	0.324384	0.991848	17.216893
9	NFTs: RabbitHole	3136	37.006812	0.219978	1.140169	23.737616
10	POAPs: POAPart Weekly Sandbox	2461	36.769135	0.195228	1.193738	22.386012
11	NFTs: Club Pooly	1786	76.253463	0.150310	0.930708	27.248031
12	POAPs: Arbitrum launch	1481	33.380033	0.185759	1.270868	20.805876
13	Voting: Gitcoin DAO	1238	46.707427	0.179569	1.306473	24.467881
14	POAPs: clr.fund contributor	1164	31.021925	0.225774	1.408819	20.678144
15	POAPs: Bankless badge	483	86.010477	0.059943	0.945035	24.402247
16	PoH: has profile	215	64.385514	0.120930	1.175891	23.896983



## The “burners” have high squelch rate + low Passport Trust Bonus + low QF Score ... but are they Sybils?

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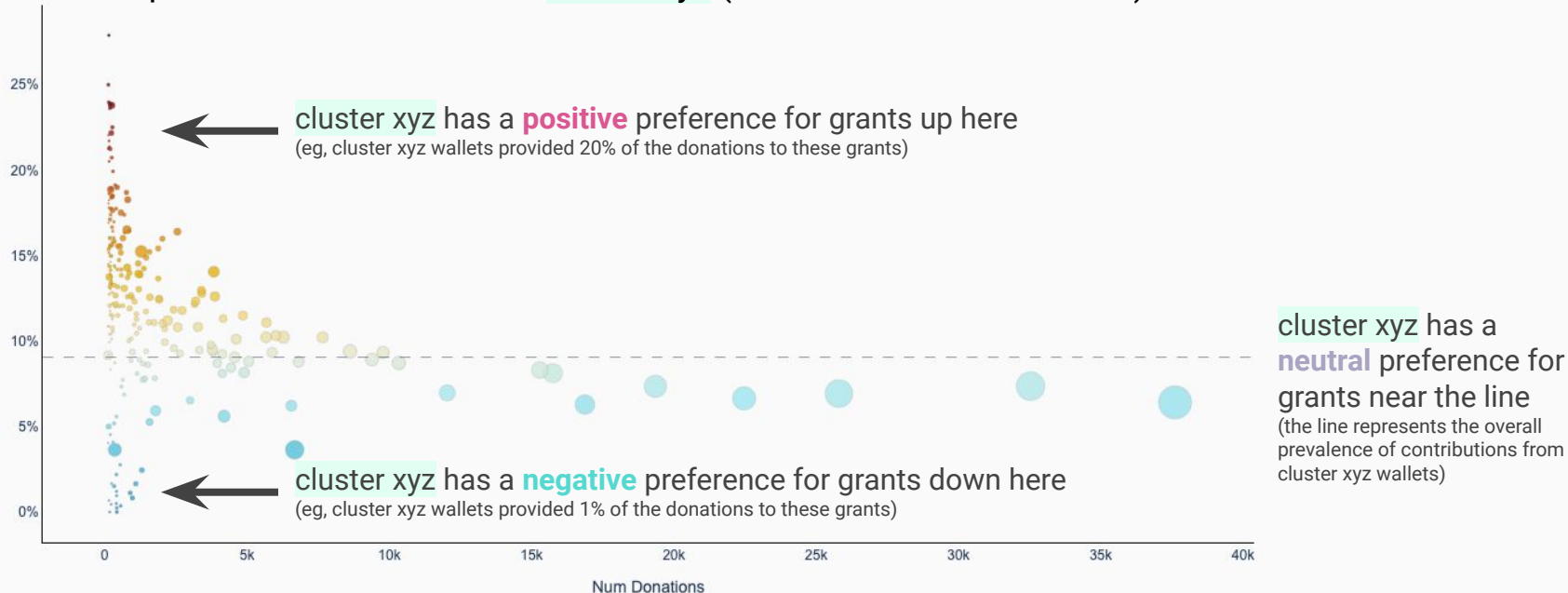
## Meanwhile, Bankless POAPs owners have low squelch rate + high Passport Trust Bonus + high QF Score

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10	POAPs: POAPart Weekly Sandbox	2461	36.769135	0.195228	1.193738	22.386012
11	NFTs: Club Pooly	1786	76.253463	0.150310	0.930708	27.248031
12	POAPs: Arbitrum launch	1481	33.380033	0.185759	1.270868	20.805876
13	Voting: Gitcoin DAO	1238	46.707427	0.179569	1.306473	24.467881
14	POAPs: clr.fund contributor	1164	31.021925	0.225774	1.408819	20.678144
15	POAPs: Bankless badge	483	86.010477	0.059943	0.945035	24.402247
16	PoH: has profile	215	64.385514	0.120930	1.175891	23.896983



## And we can look at grant preferences by cluster ...

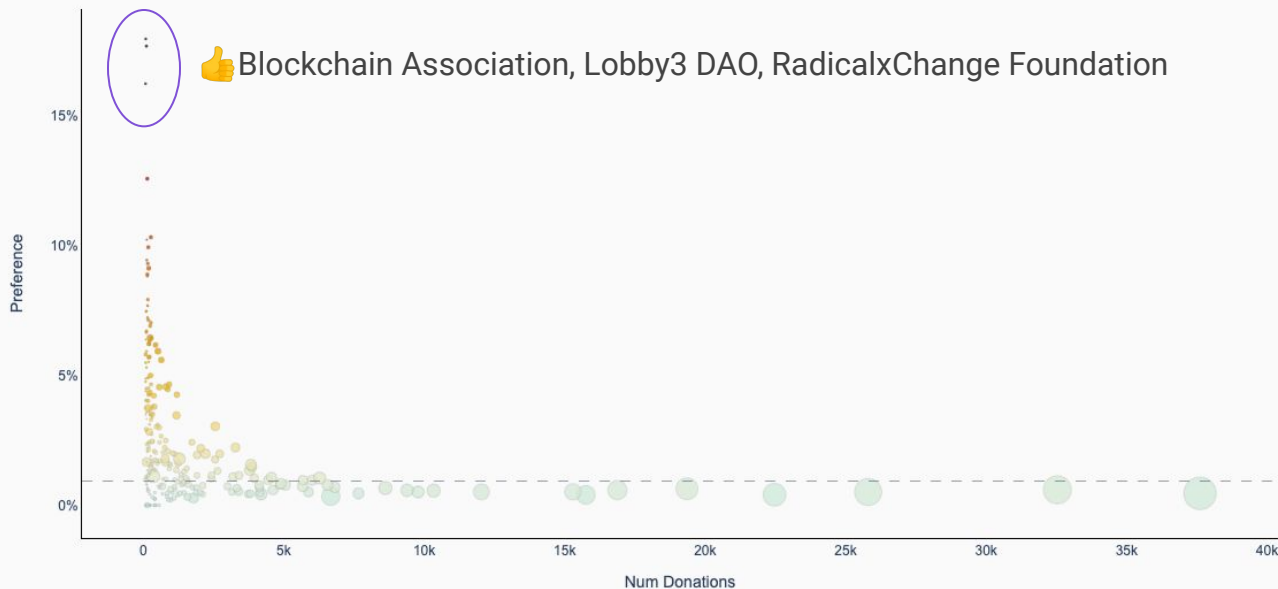
Grants preferences for wallets in cluster xyz (relative to all other wallets)





# Bankless subscribers have several clear preferences

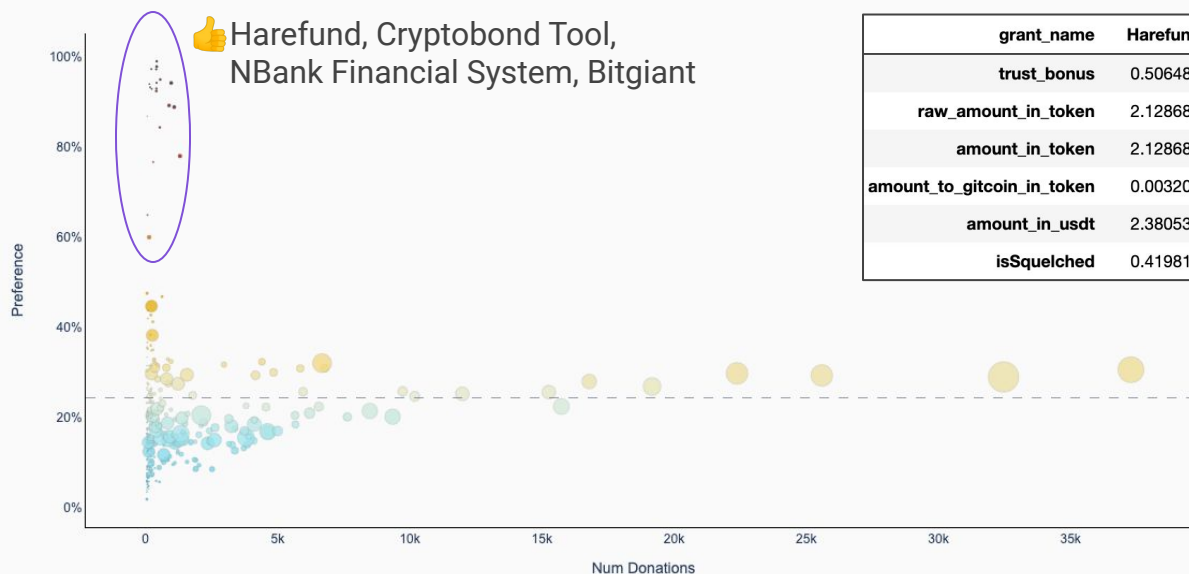
Grants preferences for wallets with Bankless badge POAPs in them





# Grants preferred by large numbers of wallets with no-chain activity look a lot like Sybil attacks

Grants preferences for wallets that have no on-chain activity



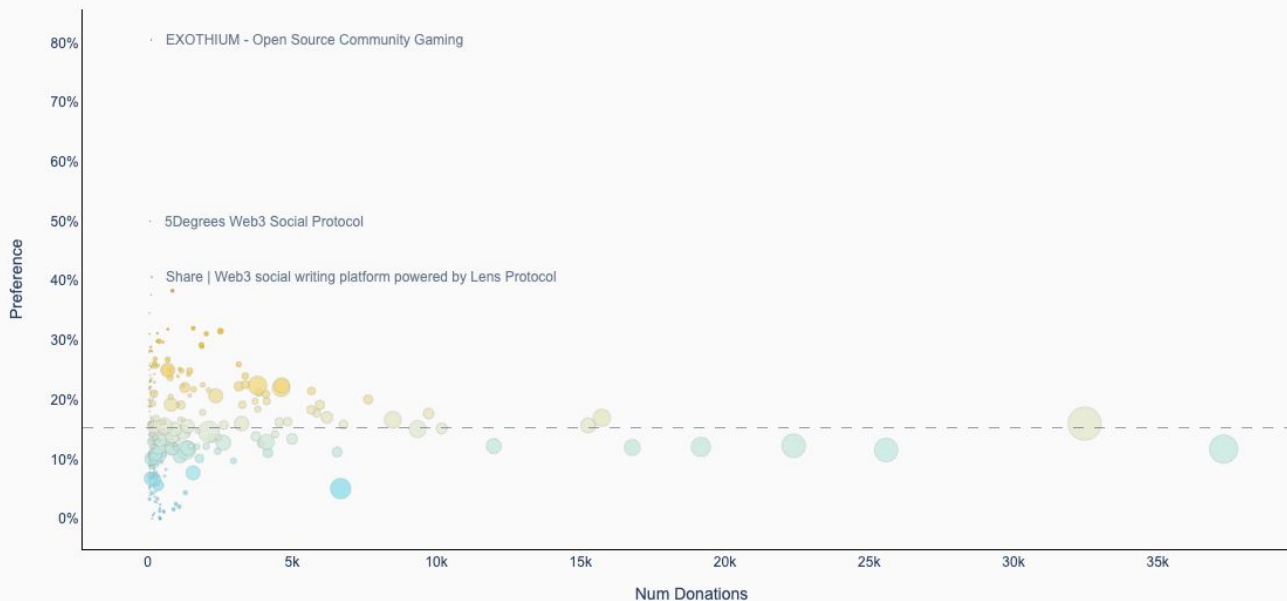
grant_name	Harefund	Cryptobond Tool	Bitgiant	NBank Financial System
trust_bonus	0.506486	0.507981	0.533573	0.517634
raw_amount_in_token	2.128681	2.650014	2.273983	1.798713
amount_in_token	2.128681	2.650014	2.273983	1.798713
amount_to_gitcoin_in_token	0.003200	0.005587	0.010822	0.004057
amount_in_usdt	2.380537	3.082944	2.434669	2.543325
isSquelched	0.419811	0.448357	0.364476	0.392857





# Lens provides interesting signals as well

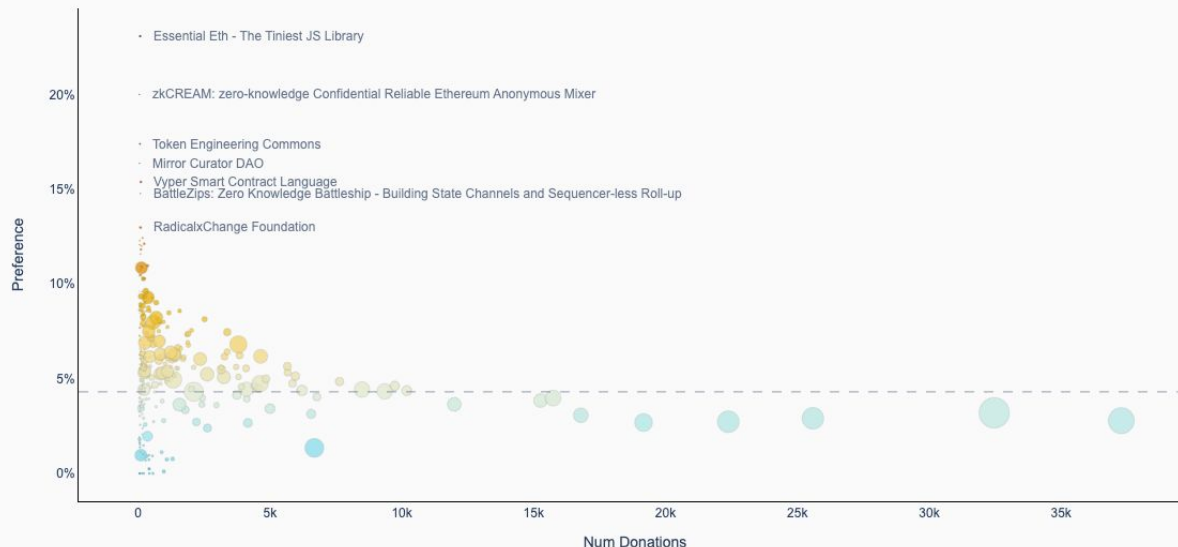
Grants preferences for wallets that have **Lens profiles**





# Gitcoiners like open source, zks, RadicalxChange

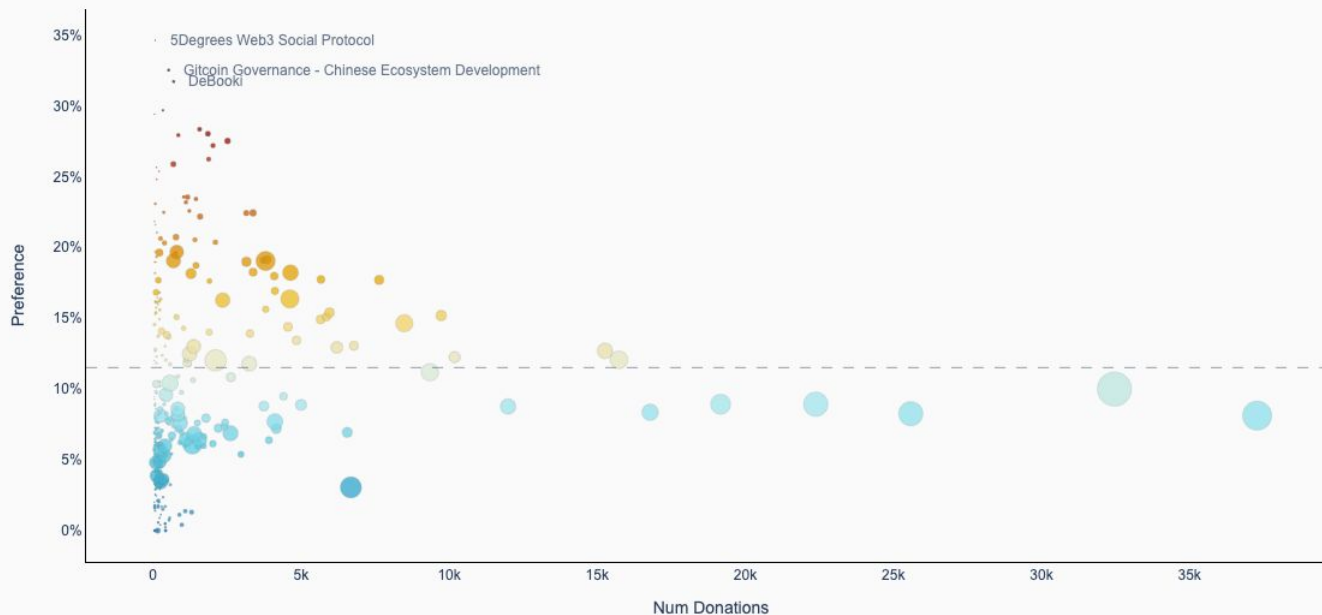
Grants preferences for wallets that vote in the **GitcoinDAO Snapshot**





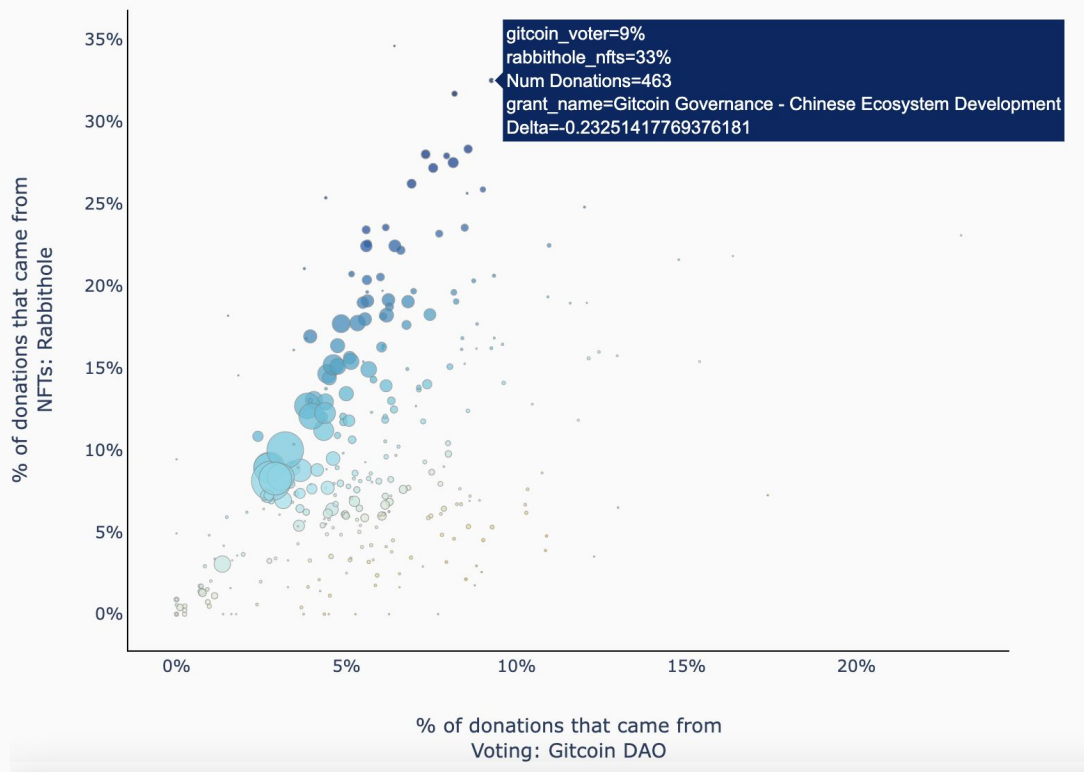
# RabbitHole 🤝 Gitcoin 🤝 Chinese community

Grants preferences for wallets that have RabbitHole NFTs





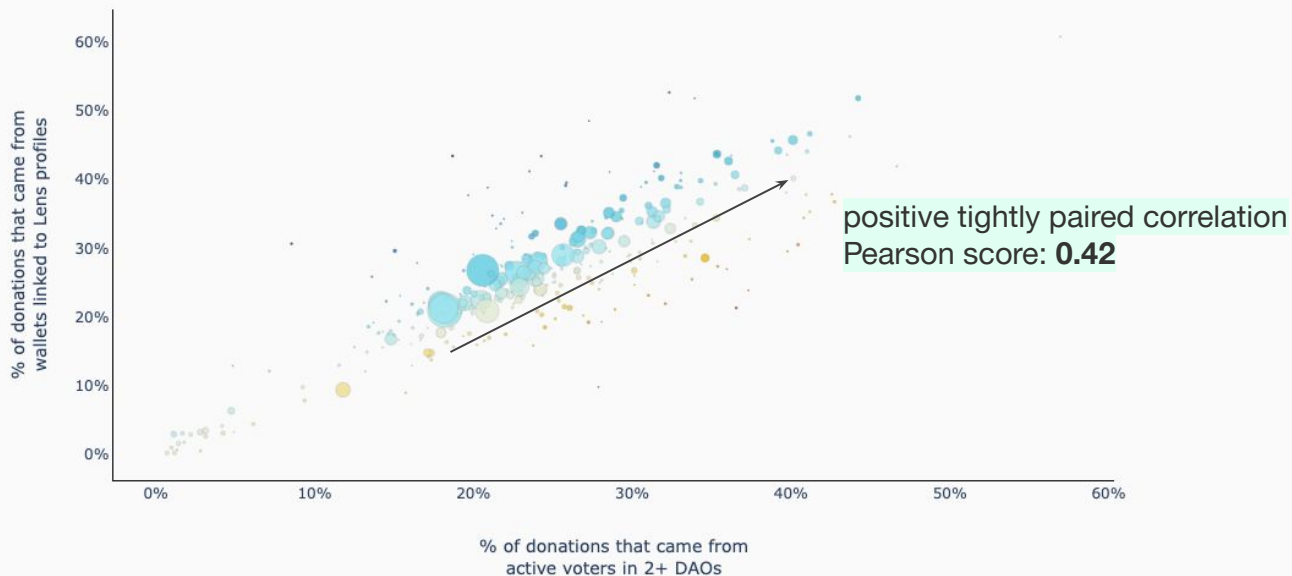
## We can also look at shared preferences across communities





# Lens and active Snapshot voters have highly correlated grant preferences

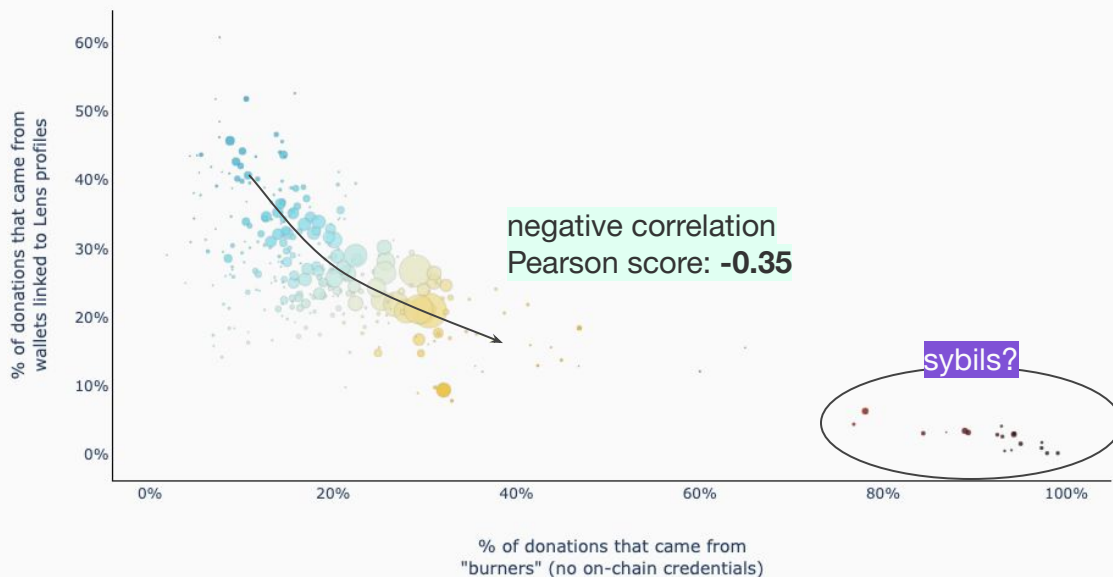
GR14 preferences of active voters in 2+ DAOs and wallets linked to Lens profiles





# Whereas the preferences of burners are negatively correlated with other classifiers

GR14 preferences of "burners" (no on-chain credentials) and wallets linked to Lens profiles



# /// Towards a Pluralism Passport Built from DeSoc Legos



Analysis



"burners" (no on-chain credentials)	1.00	0.47	-0.19	-0.14	-0.26	-0.07	-0.11	-0.13	-0.17	0.37	-0.22	-0.12	-0.20	-0.32	0.35	-0.25	-0.05
NFTs: ENS domain	-0.47	1.00	0.31	0.19	0.35	0.11	0.16	0.17	0.21	0.39	0.43	0.15	0.20	0.28	0.40	0.32	0.06
NFTs: Rabbithole	-0.19	0.31	1.00	0.13	0.73	0.01	0.25	0.24	0.25	0.32	0.25	0.17	0.25	0.24	0.46	0.43	0.04
NFTs: Club Pooly	-0.14	0.19	0.13	1.00	0.18	0.17	0.04	0.06	0.06	0.17	0.17	0.06	0.09	0.11	0.31	0.21	0.05
NFTs: Uniswap v3	-0.26	0.35	0.73	0.18	1.00	0.07	0.23	0.22	0.22	0.36	0.32	0.20	0.22	0.25	0.43	0.37	0.04
POAPs: Bankless badge	-0.07	0.11	0.01	0.17	0.07	1.00	0.01	0.02	0.01	0.08	0.16	0.04	-0.00	0.02	0.10	0.05	0.07
POAPs: cir.fund contributor	-0.11	0.16	0.25	0.04	0.23	0.01	1.00	0.33	0.33	0.24	0.29	0.26	0.19	0.16	0.20	0.21	0.03
POAPs: Arbitrum launch	-0.13	0.17	0.24	0.06	0.22	0.02	0.33	1.00	0.34	0.25	0.28	0.22	0.20	0.20	0.22	0.22	0.01
POAPs: POAPart Weekly Sandbox	-0.17	0.21	0.25	0.06	0.22	0.01	0.33	0.34	1.00	0.30	0.21	0.18	0.27	0.23	0.26	0.27	0.02
Voting: active in 2+ DAOs	-0.37	0.39	0.32	0.17	0.36	0.08	0.24	0.25	0.30	1.00	0.35	0.25	0.48	0.58	0.40	0.34	0.05
Voting: ENS	-0.22	0.43	0.25	0.17	0.32	0.16	0.29	0.28	0.21	0.35	1.00	0.26	0.17	0.22	0.28	0.24	0.08
Voting: Gitcoin DAO	-0.12	0.15	0.17	0.06	0.20	0.04	0.26	0.22	0.18	0.25	0.26	1.00	0.15	0.14	0.14	0.13	0.06
Voting: Optimism Collective	-0.20	0.20	0.25	0.09	0.22	-0.00	0.19	0.20	0.27	0.48	0.17	0.15	1.00	0.29	0.24	0.24	0.00
Voting: Arbitrum Odyssey	-0.32	0.28	0.24	0.11	0.25	0.02	0.16	0.20	0.23	0.58	0.22	0.14	0.29	1.00	0.30	0.25	0.01
Lens: has profile	-0.35	0.40	0.46	0.31	0.43	0.10	0.20	0.22	0.26	0.40	0.28	0.14	0.24	0.30	1.00	0.70	0.05
Lens: 5+ followers	-0.25	0.32	0.43	0.21	0.37	0.05	0.21	0.22	0.27	0.34	0.24	0.13	0.24	0.25	0.70	1.00	0.03
POH: has profile	-0.05	0.06	0.04	0.05	0.04	0.07	0.03	0.01	0.02	0.05	0.08	0.06	0.00	0.01	0.05	0.03	1.00



## Takeaways

1. On-chain activity can help us **close the gap** between Passport and Sybil Attack Defense
2. We should **flag grants that get >80% of donations from "burner" wallets** as likely Sybil attacks
3. We can **boost passport adoption**. There are >6000 wallets with an ENS but only a 0.5 trust bonus.
4. Some new **potential Passport partners**: Snapshot (18% vote in 2+ DAOs) & Lens (17% have profiles)
5. Some new **high cost of forgery Passport partners**: RabbitHole, Pooly, clr.fund, Bankless
6. We can **protocolize and enlist the community** in this type of analysis!





# Modeling pairwise grants round matching based on “artificial” soulbound journals

## Simple Match

$$\text{Simple Match} \sim (\sqrt{A} + \sqrt{S} + \sqrt{B})^2 - (A + S + B)$$

## Single Membership Clustering

$$\text{Cluster Match} \sim (\sqrt{A + S} + \sqrt{B})^2 - A - S - B$$

## Single Membership Offset Match

$$\text{Offset Match} \sim \left( \frac{\sqrt{A} + \sqrt{S}}{\sqrt{2}} + \sqrt{B} \right)^2 - A - S - B$$

## Multiple Membership Clustering

$$\text{Cluster Match} \sim \left( \sqrt{\frac{S}{2} + \frac{A}{2}} + \sqrt{\frac{A}{2} + B} + \sqrt{\frac{S}{2}} \right)^2 - A - B - C$$

$$\text{Cluster Match} \sim \left( \sum_{j=1}^{|\Sigma|} \sqrt{\sum_{i=1}^N \frac{\sigma_j c_i}{T_i}} \right)^2 - \sum_{i=1}^N c_i$$

## Multiple Membership Offset Match

$$\text{Offset Match} \sim \left( \sqrt{\frac{4A}{11}} + \sqrt{\frac{9B}{11}} + \sqrt{\frac{10S}{11}} \right)^2 - A - B - C$$

$$\text{Offset Match} \sim \left( \sum_{i=1}^N \sqrt{\alpha_i c_i} \right)^2 - \sum_{i=1}^N c_i$$

## Pairwise Matching

Pairwise Matching can only be meaningfully defined in the context of multiple projects and a per-pair matching cap,  $M$ . For every pair of agents  $(A, B)$ , if they contribute  $x_{A \rightarrow P}$  and  $x_{B \rightarrow P}$  to the same project  $P$ , they get a subsidy<sup>12</sup>

$$\text{Match}_{AB \rightarrow P} = \frac{2M \sqrt{x_{A \rightarrow P} x_{B \rightarrow P}}}{M + \text{CorrelationScore}_{AB}}$$



Where  $M$  is a parameter of the system and

$$\text{CorrelationScore}_{AB} = \sum_{\text{all projects } P} \sqrt{x_{A \rightarrow P} x_{B \rightarrow P}}$$



## Incorporating identity staking & cost of forgery

# identity-staking > # Cost of Forgery 3


 Owocki  Yesterday at 11:08 AM  
pasting my prompt here

```
cost of forgery = the cost it would take to forge a users identity
in an adversarial world there are different levels of sophistication of adversaries
we want to protect against (script kiddies => organized crime => nation states).
its a specrum.

so if a user connects twitter (+ gitcoin governance decides twitter has a $.10 cost
of forgery)
and a user connects POH (+ gitcoin governance decides POH has a $100 cost of
forgery)
and a user connects brightID (+ gitcoin governance decides brightid has a $10 cost
of forgery)
then the total cost of forgery for that users identity is $110.10

once i as a consumer of the cost of forgery know that the cost of forgery for this
user is $110.10, i give that user up to $110 worth of sybil resistant rewards. so
gitcoin can give $110 worth of matching. rabbithole can give $110 worth of rewards.
POAP can give $110 worth of POAP gas fees.

our KPIs for passport should be to increase the total total cost of forgery of the
whole system. the total cost of forgery for the whole system is the upper limit on
how big of a sybil resistant economy that can be bootstrapped on the back of
passport.
staking is powerful because we can easily scale a users cost of forgery from $100 to
$10k or more depending on how much GTC a user has.
```

 1

Fin.