



# New Applications for Quadratic Funding

Progress, barriers, & transcendence

Connor O'Day

GitcoinDAO



@connoroday0



# Let's take a quick poll...



Who has heard of quadratic funding?

Who here actually understands it?

Who has funded a project in a QF program?

Who only did it because you thought you might get an airdrop in the future?

[ TLDW ]

(if you can't miss happy hour)



QF has proven  
niche communities primarily in  
(QF = good) advancements

As adoption (Scale = hard) are apparent

(Innovation + experimentation  
= transcendence)



Section 1

# WTF is QF?

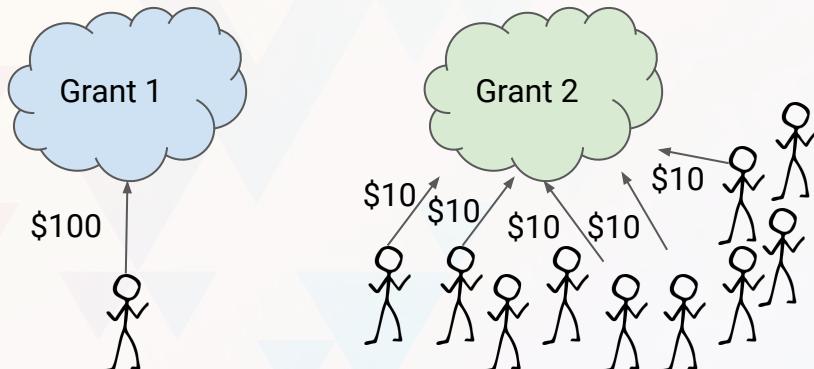
(spoiler alert)

$$v_i^p \left( \left( \sum_j \sqrt{c_j^p} \right)^2 \right) - c_i^p$$

# Why Quadratic Funding?

[wtfisqf.com](http://wtfisqf.com)

Quadratic Funding is the mathematically optimal way to fund **public(?) goods** in a **democratic(?)** community



- ◆ 1:1 matching: both get \$100
- ◆ QF matching: Grant 1 gets \$20, Grant 2 gets \$180

## A Flexible Design for Funding Public Goods

Vitalik Buterin  
Ethereum Foundation

Zoë Hitzig  
Harvard University, [zhitzig@g.harvard.edu](mailto:zhitzig@g.harvard.edu)

E. Glen Weyl  
Microsoft Research, [glenweyl@microsoft.com](mailto:glenweyl@microsoft.com)

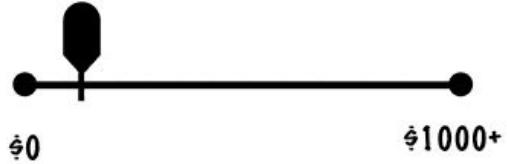
We propose a design for philanthropic or publicly-funded seeding to allow (near) optimal provision of a decentralized, self-organizing ecosystem of public goods. The concept extends ideas from Quadratic Voting to a funding mechanism for endogenous community formation. Citizens make public goods contributions to projects of value to them. The amount received by the project is (proportional to) the square of the sum of the square roots of contributions received. Under the “standard model” this mechanism yields first best public goods provision. Variations can limit the cost, help protect against collusion and aid coordination. We discuss applications to campaign finance, and highlight directions for future analysis and experimentation.

*Key words:* public goods, free rider problem, mechanism design

## QF Multiplies Matching

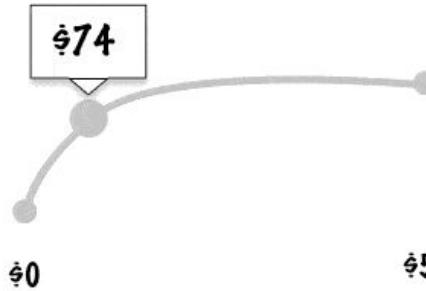
Your donation:

\$10



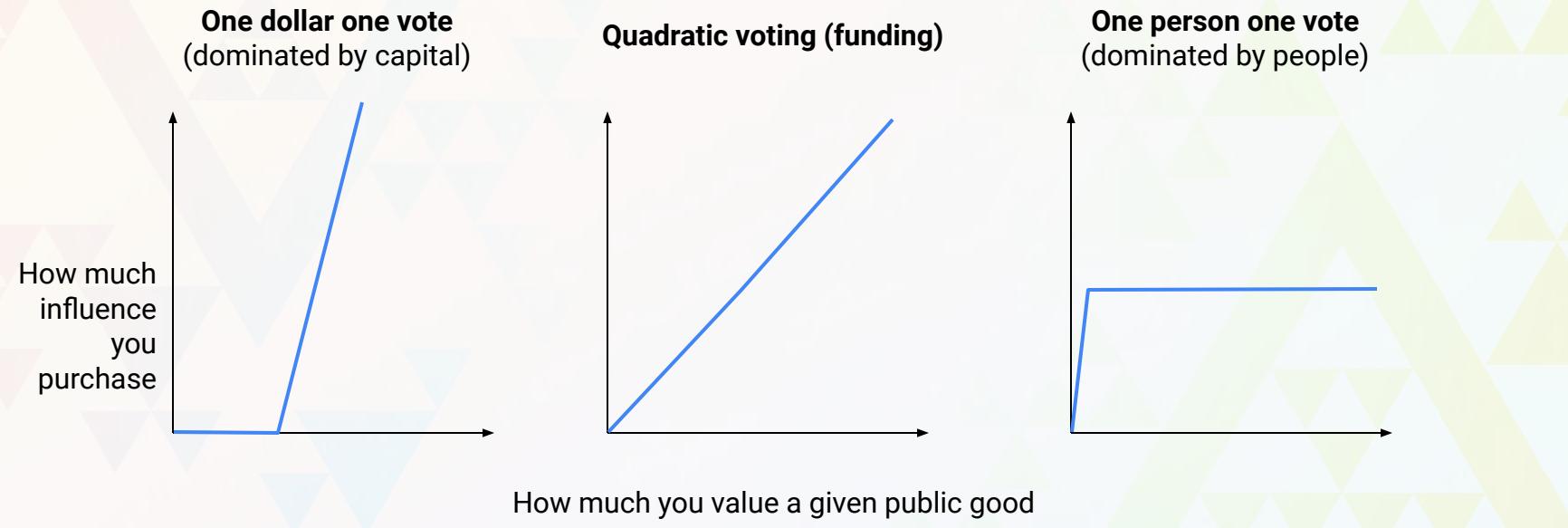
Estimated Matched:

\$74



\$5000

# Preferences of the many outweigh the preferences of the few



# Quadratic Funding & Public Goods

Proposed as means to fund Public Goods  
Use cases in practice have mainly focused  
on this (like Open Source Software)

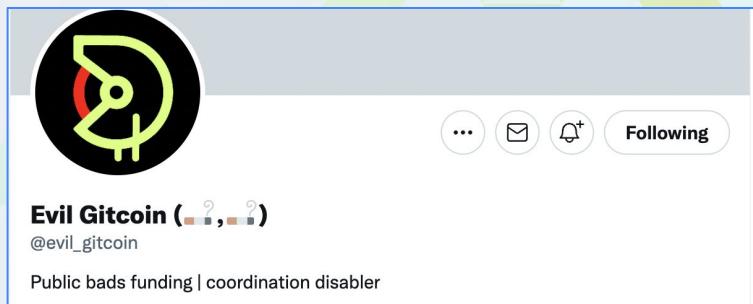
QF has promising utility in more areas than  
what we traditionally think of as “public goods”  
This classification system is expanding

	Excludable	Non-Excludable
Rivalrous	<b>Private Goods</b> Food, clothes, cars, & other consumer goods	<b>Common Goods</b> Fish, timber, coal
Non-Rivalrous	<b>Club Goods</b> Cinemas, private parks, satellite TV	<b>Public goods</b> Clean air, open source software, privacy



Scott Moore [ceresstation.eth]   
@notscottmoore

...  
what if we defined public goods not by their excludability but by the extent to which they produce positive externalities



...   Following

Evil Gitcoin (, )  
@evil\_gitcoin

Public bads funding | coordination disabler



## Section 2

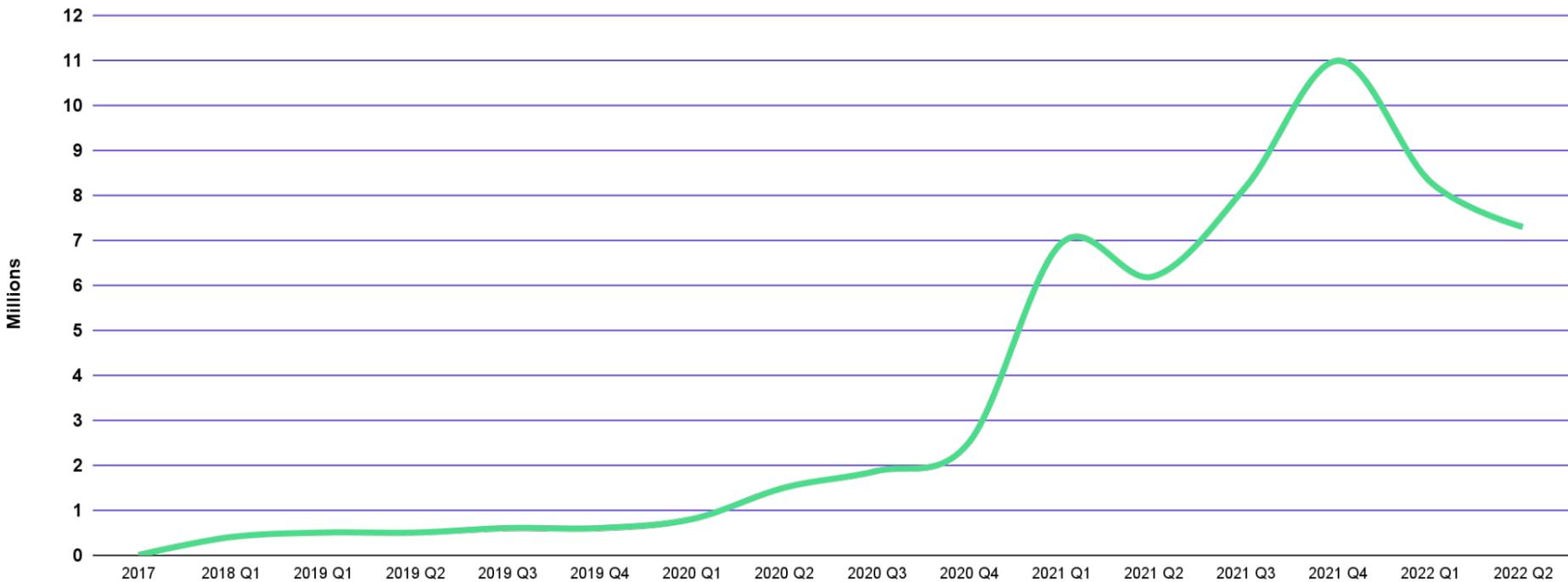
# Where we are today



\$69,139,898 of Funding for Open Source Software

\$69.1m in Results

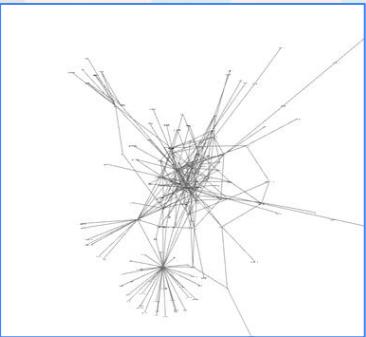
Nice



# Gitcoin Grants Growth

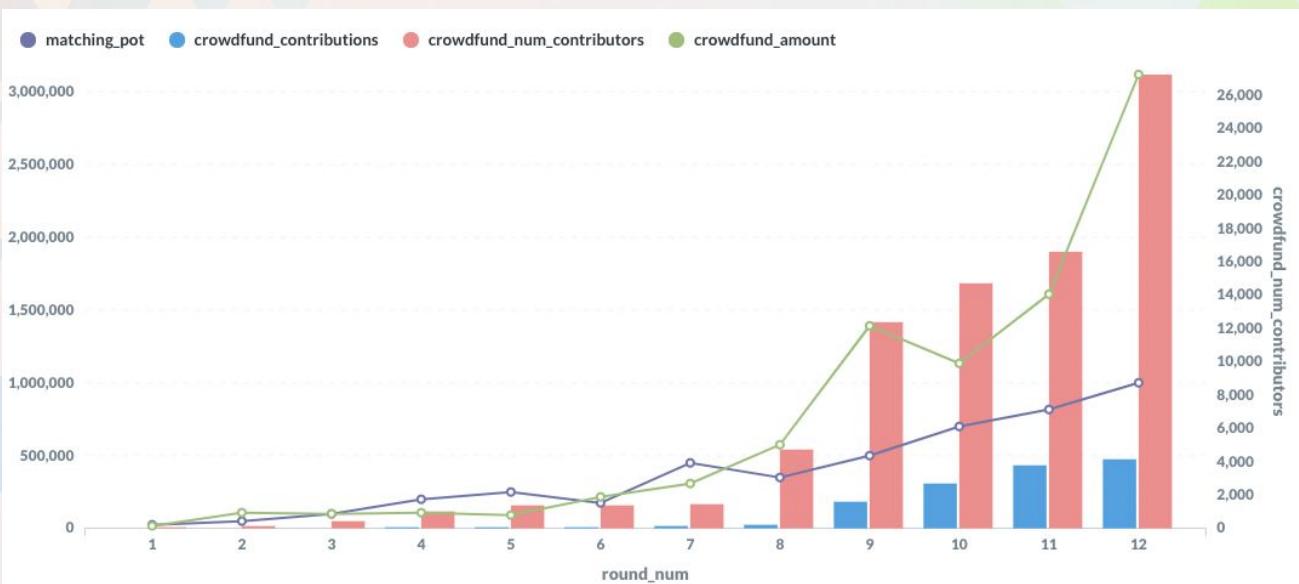
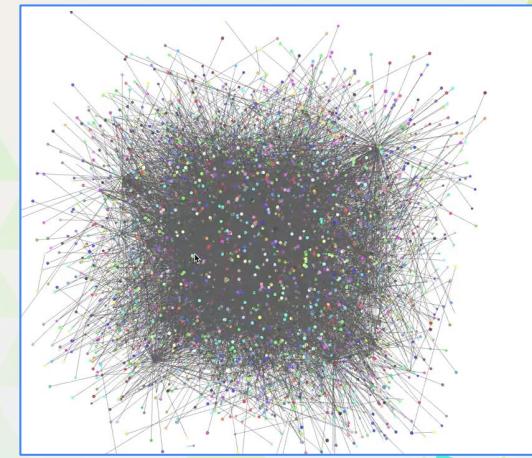
(GR1 / Jan 2019)

200 Contributions      \$38k Raised



(GR14 / June 2022)

600k Contributions      \$5mm Raised

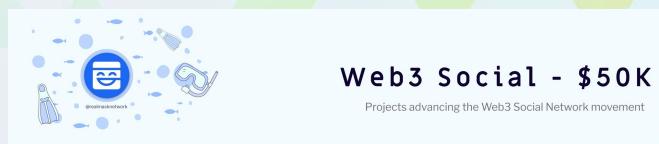
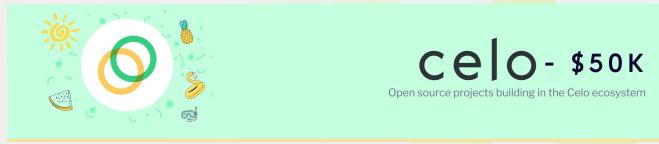
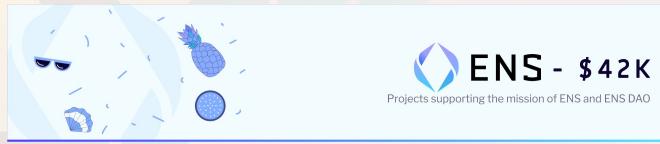


# September 07-22, 2022

Round starts at 3pm UTC



# Ecosystem Rounds - Empowering communities to signal preferences



# Cause Rounds - Breaking QF out of the Web3 Bubble



## Climate Solutions - \$350K

Projects combating climate change



## Decentralized Science - \$500K

Support projects in decentralized science



## Diversity, Equity, & Inclusion - \$150K

Public goods projects Diversity, Equity, & Inclusion



## Longevity - \$500K

Decentralized projects sustaining longevity



## Advocacy - \$300K

Public goods projects advocating change in web3

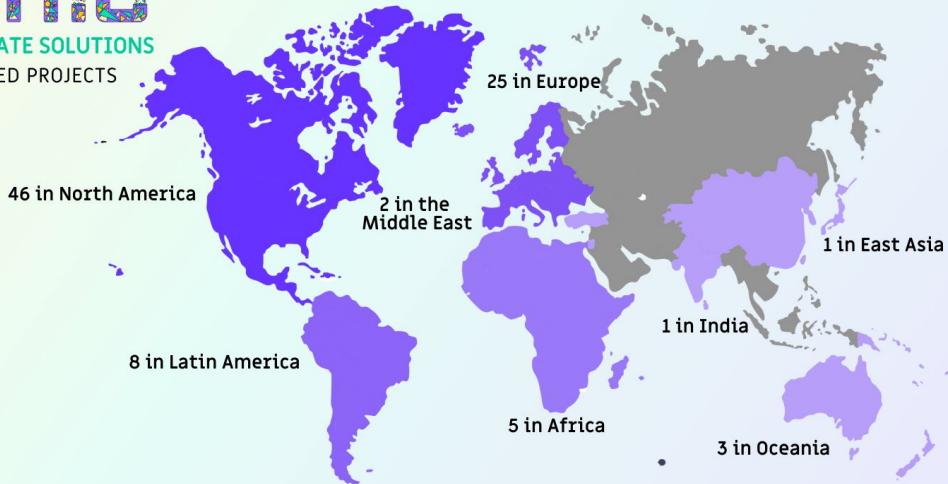


## Support for Ukraine 🇺🇦 - \$700K

Humanitarian aid to the Ukrainian people

# GR13

CLIMATE SOLUTIONS  
FUNDED PROJECTS



AYOWECCA UGANDA For Climate Change  
@ayowecca\_uganda

...

Hon.Member of Parliament for Tororo municipality & Representative of #climatechange in @Parliament\_Ug plants #bamboo at the river banks in Tororo as he takes #ClimateAction to fight #climatecrisis  
@KagutaMuseveni @JanetMuseveni @GretaThunberg @ReFiSpring @regensunite @GitcoinDAO



0:41 36 views

# Geographic QF - Regional & Local Rounds

The Hidden Genius Project  
by oakcommunity  
Last Update: 1 week ago | SybilScore™: 0.9355 | RiskScore™: 0.0000 ☆  
Grants Round GR14 - Main, Oakland Local Chains: ♦  
**\$214** raised from 31 contributors  
Est. Matching [\\$915](#)

Community Kitchens  
by oakcommunity  
Last Update: 1 week ago | SybilScore™: 1.4545 | RiskScore™: 0.0000 ☆  
Grants Round GR14 - Main, Oakland Local Chains: ♦  
**\$167** raised from 11 contributors  
Est. Matching [\\$253](#)

Deva the Devcon Unicorn  
@EFDdevcon

Introducing a quadratic funding round during Devcon organized by the LatAm community to support local projects! 🌎

If you are a project in LatAm looking for funding, sign up today!

Brought to you by: [@ETHColombia](#) [@ETHLatam](#) [@EthereumHN](#) [@clrfund](#)

[ethcolombia.clrfund](#)

4:58 PM · Sep 26, 2022 · Twitter for iPhone

Greater China - \$50K  
Open source projects in the Greater China ecosystem

Plancker  
@PlanckerDAO

Downtown Stimulus Package  
Transition capital for Boulder's small businesses



Section 3

# Growing pains

# This is what a sybil attack looks like..



don't let it happen to you!

# Mitigating Sybil Attacks & Fraud

Infinite game of **Red Team** vs. **Blue team**

## Sybil Sybil Sybil

Sybil attacks are increasing with adoption

Airdrop farmers

Self donors

Collusion

## Fraudulent Grants

Impersonations

Emulations

**The solution? Identity!**



### GR15 Fraud Report

Grants FDD sybil grant-eligibili fraud-defense gr15



### Squelching (Reactive Mitigation)

Overall

	GR11	GR12	GR13	GR14	GR15
Total Sybil Donors Squelched	853	8100	2071	16073	9176
Total Donors	16597	27260	16651	44736	39758
% of total Donors Squelched	5.14%	29.71%	12.44%	35.93%	23.08%
Total Sybil Donations	29300	115000	23,951	167988	155683
Total Donations	441644	482293	306898	600869	465267
% of donations that are sybil	6.63%	23.84%	7.80%	27.96%	33.46%
\$ Value of Sybil Donations		\$710,139	\$68,060	\$337,143	\$225,380
Total \$ Value of all Donations	\$1,620,800	\$3,214,587	\$1,462,659	\$1,735,349	\$1,306,724
% of total donation \$ from sybil	0.00%	22.09%	4.65%	19.43%	17.25%



coday.Eth 🌱🤖❤️  
@connoroday0

...

The plan?

Get airdrop farmers to donate to [@gitcoin](#) grants while improving Sybil attack detection in order to accelerate the adoption of decentralized identity, convert degens to regens, and fund public goods without them meaning to



# Gitcoin Grants 1.0

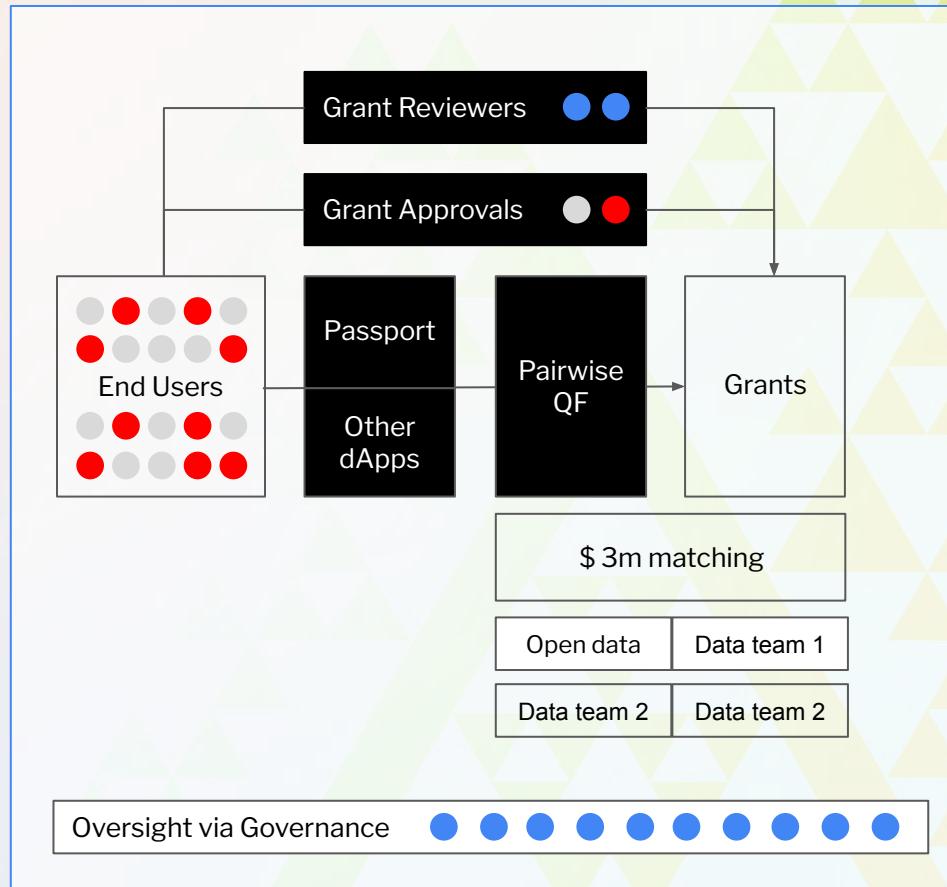
Until now Gitcoin QF rounds have run on a centralized stack

Necessary to prevent fraud/Sybil attacks, but:

- High bandwidth requirements
- Centralized decision making
- Humans prone to error

The path towards decentralization includes:

- A permissionless protocol
- Resilient identity systems
- Community curation
- Self serve product features



## New primitives and tooling

### Decentralized identity

Without reliable identity systems, permissionless QF platforms will never work at scale

### Gitcoin Passport - OSS dapp

- 💡 Privacy preservation → No PII in the passport

- ↗ Decentralization → No centralized data storage (Ceramic Network)

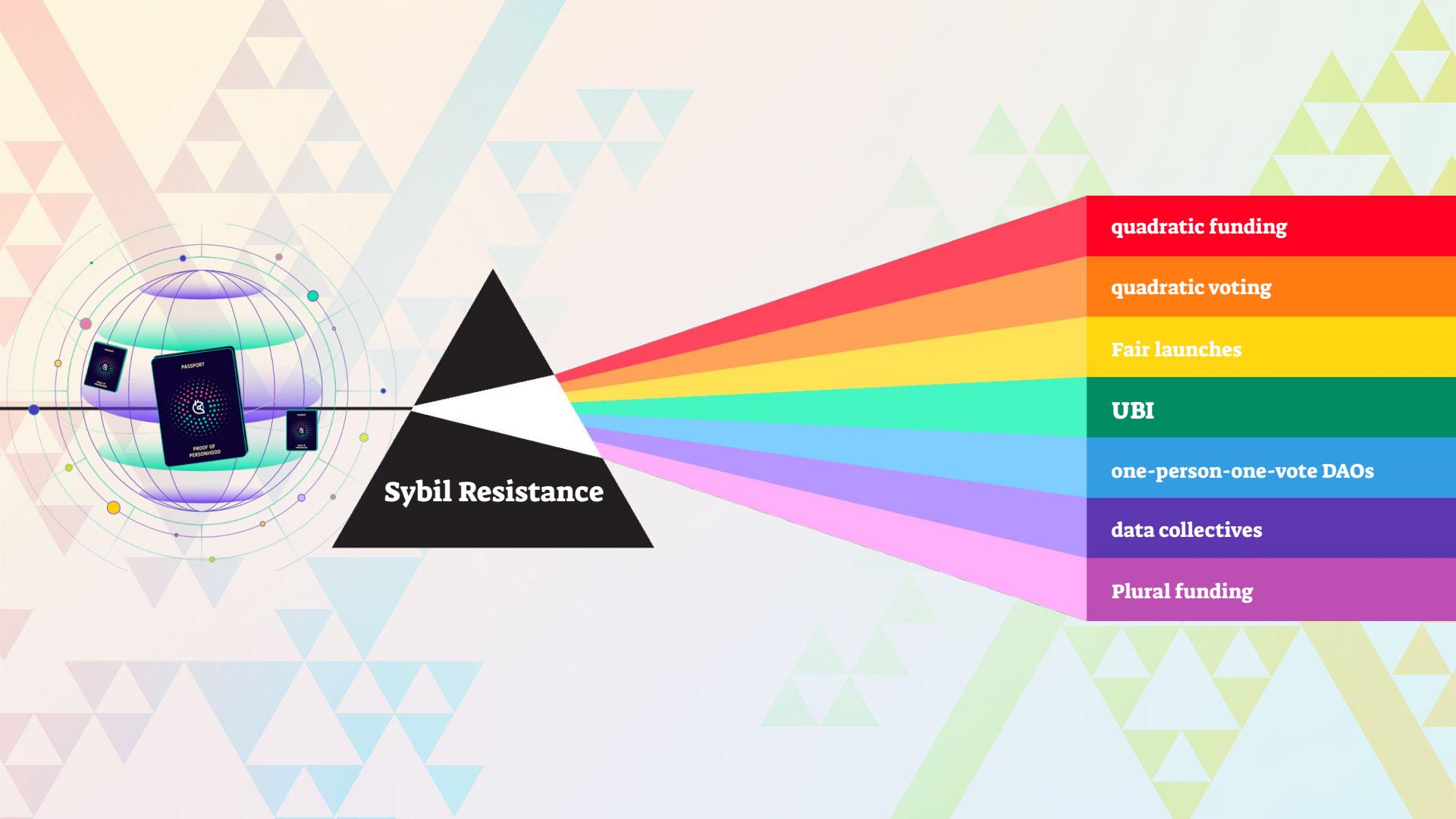
- 💰 Gitcoin Trust Bonus Reader and Scorer

- 🛠️ Open Source SDK; Integrate with your dApp

**60,000 passports already created!**

## Gitcoin Passport





## Sybil Resistance

quadratic funding

quadratic voting

Fair launches

UBI

one-person-one-vote DAOs

data collectives

Plural funding

# New primitives and tooling

## Incentivized community curation

Staking on identities, grants, reputation, can gamify protocol defense, penalize fraud and bad actors

## Token Curated Registries

Popularized in 2017 (A.D.), TCRs are trusted lists maintained by communities via an incentivized voting game

Leverage the “Wisdom of the Crowd”

Aligns incentives among token holders

## TCRs making a comeback?



Eric

@ericturnr

Are TCRs back?



Ian

@ianDAOs

2020: DeFi

2021: NFTs

2022: DAOs

2023: Web3 social networks

2024: TCRs

12:03 AM · Oct 3, 2022 · Twitter for iPhone

49 Retweets 13 Quote Tweets 189 Likes

 CoinDesk  @CoinDesk · Oct 3

.@a16z has led a \$40 million funding round for Web3 protocol Golden, which will reward users with tokens for submitting accurate data.

@BrandyBetz reports  
[trib.al/t3Og6Pz](http://trib.al/t3Og6Pz)



Hudson Jameson

@hudsonjameson

...

Confession time: I don't know what the following phrases are and have just been nodding my head whenever someone talks about them:

- Quant (as in the job)
- DeSci (found out earlier tonight)
- Gang Gang (I don't know if this is a phrase or verb or what)
- TCRs (irrelevant now?)

12:14 AM · Oct 6, 2022 · Twitter Web App

Or not?



Section 4

# New flavors of QF

FUND THE RAINBOW.



TASTE THE RAINBOW.

$$v_i^p \left( \left( \sum_j \sqrt{c_j^p} \right)^2 \right) - c_i^p$$

	<sup>^Sqrt 1 contribution^</sup> Contribution		
	<sup>^Sum of all Sqrt^</sup>		
	<b>Yellow = matching*</b>		

QF in practice strays from the “pure” math

And that's ok :)

\*Fixed matching pool **and** fixed time limit = matches scale based on saturation

- Trust verification & bonuses
- Matching caps
- Pairwise Bounding
- Overlapping rounds

What is optimal?



It's only real Quadratic Funding if it comes from the  $[Vip((\sum_j \sqrt{cpj})^2) - Cpi]$  region of France. Otherwise, it's just sparkling coordination

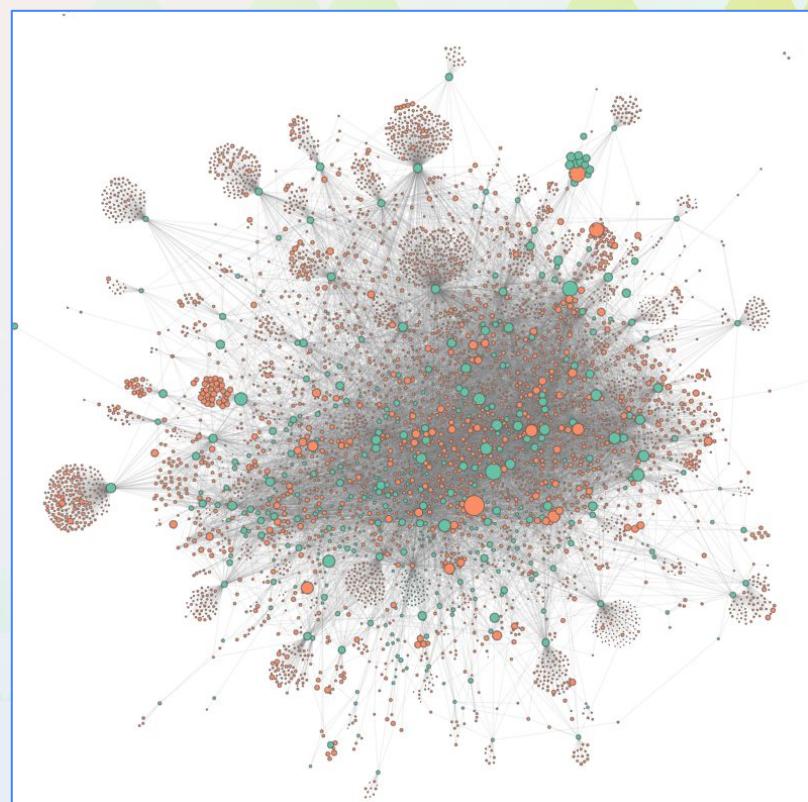
# Pairwise Bounding (& extensions)

A deterrent mechanism based on patterns between users to protect against Sybil attacks/collusion

Less correlated pool of donors = **more matching**

More correlated pool of donors = **less matching**

**Plural pairwise QF:** incorporating social distance to encourage outgroup collaboration with SBTs/DID

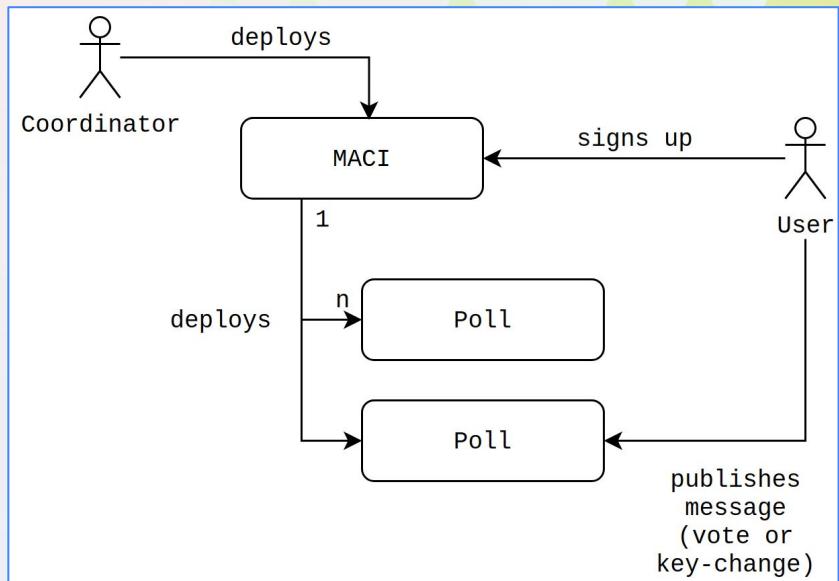


# MACI - Privacy by Design

## Minimal Anti-Collusion Infrastructure

MACI voting (or funding) is private, helping to avoid collusion and vote buying

When applied to QF, MACI ensures users cannot prove how they donated



Source - [Release Announcement: MACI 1.0](#)

# Retroactive Public Goods Funding

Expert driven, proportional to past value generated

In practice, “whitelisted”, QV not QF

Providing OSS projects an exit incentivizes new initial funding sources

**Exciting Gitcoin <>> Optimism collab in the works!**

**Do you reward past work in regular QF rounds?**



## Optimism retro round 1

Ethersjs	\$51,345
go-ethereum	\$45,232
EthGlobal	\$42,787
Hardhat	\$41,565
WalletConnect	\$40,342
Solidity	\$40,342
Goerli	\$35,452
Erigon	\$34,230
Hive	\$31,785
DappTools	\$30,562
BuidlGuidl	\$28,117
solidity-coverage	\$24,450
Kovan	\$24,450
Etherscan	\$24,450
Giveth	\$24,450
blst - BLS12-381 Signatures (Supranational)	\$23,227
<a href="#">CryptoFees.info</a>	\$22,005
Rotki	\$22,005
Proof of Humanity	\$22,005
Ipsilon	\$20,782
Prettier solidity (library for IDEs)	\$20,782
js-ethereum-cryptography (JS library)	\$19,560
Frame	\$18,337
OVM security research	\$17,115
hardhat-deploy	\$17,115

# Dominance Assurance Contracts

## Mitigating the free rider problem for public goods

**Assurance Contract** - if a threshold (\$ raised or # of donors) is not met, donors are refunded

**Dominance Assurance Contract** - if threshold is not met, refunds include an additional bonus

A DAC could be structured so if it is funded, the project owner retains some profit

Win - win for donors: Public good gets funded, or they earn a profit (dominant strategy?)



# Quadratic Voting

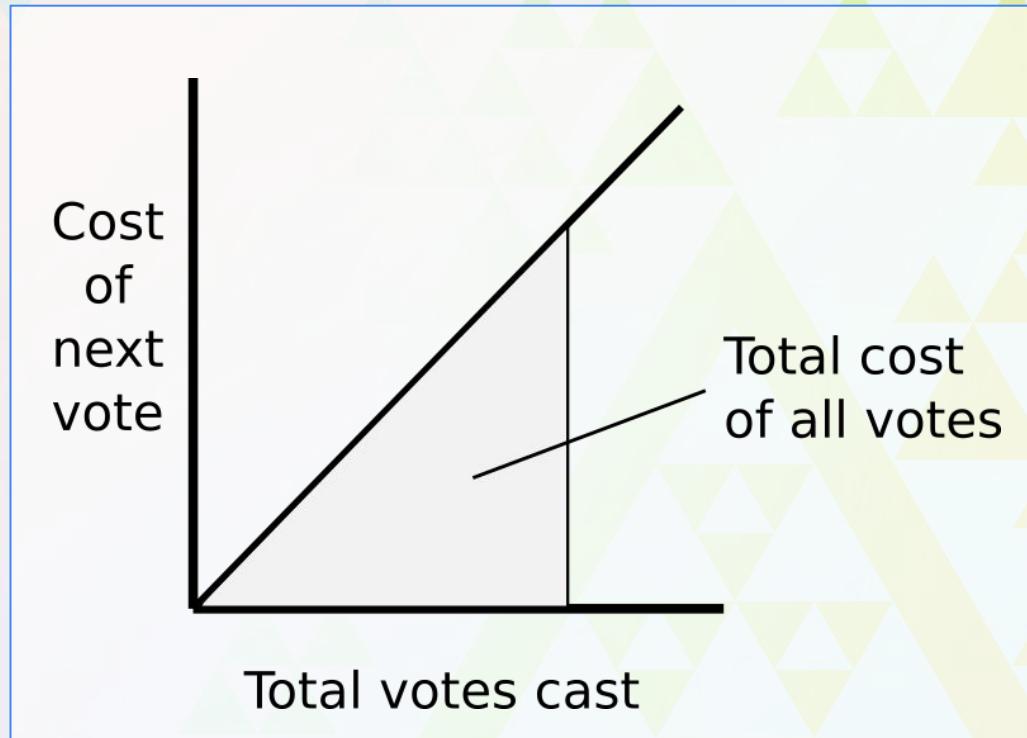
## Do we need the F in of QF?

QV, the predecessor to QF, may better serve the needs of some communities

Needs strong Sybil protection or whitelists/permissions

More useful for single choice decisions

Lacks the QF benefit of raising additional funds via user contributions

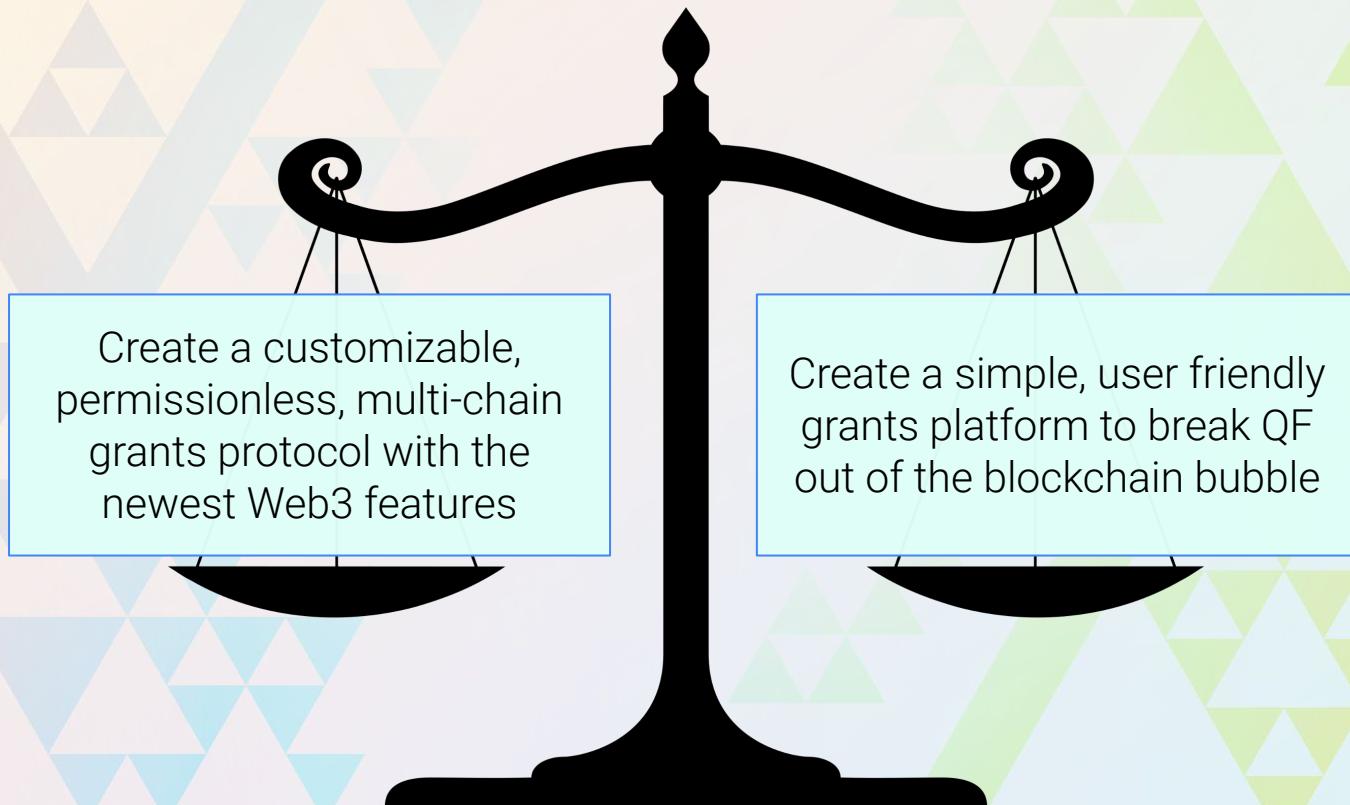




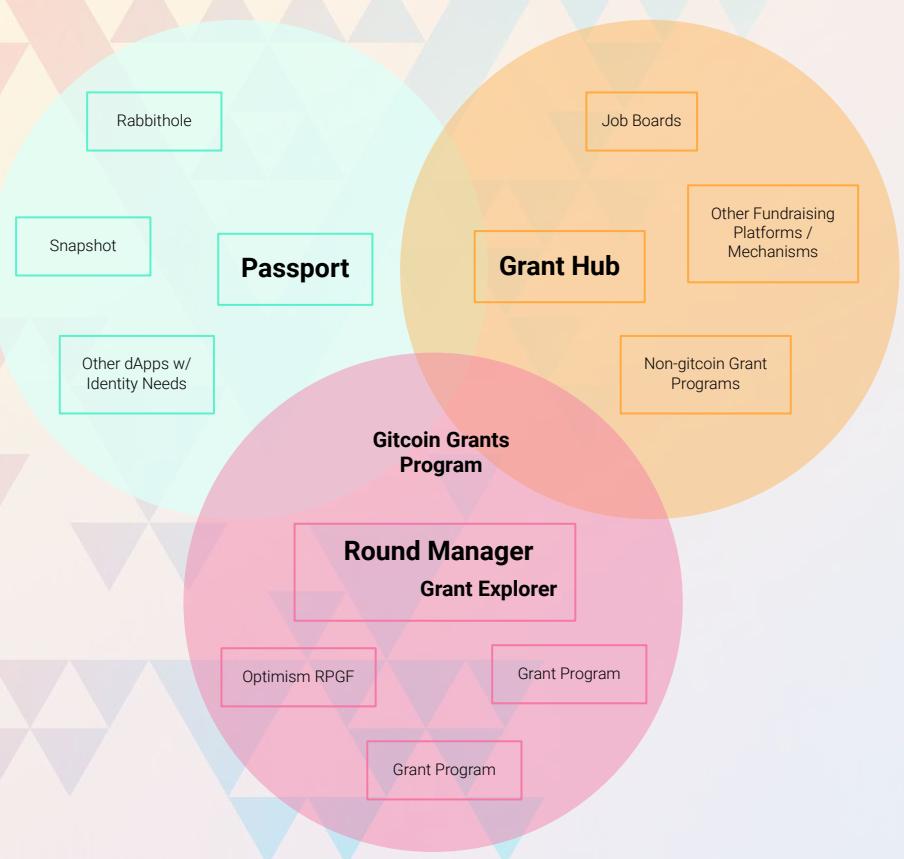
Section 5

# What's next?

# Balancing the scales of scalability



# The Gitcoin Grants Protocol



Permissionless  
Modular  
Decentralized

=

communities can rapidly test  
different public goods funding  
mechanisms

# We envision...

project owners using the Grants Hub to kickstart their project's existence and then as a vehicle for growth



Grant Hub

## Bring your project to life

Build and fund your projects all in one place -- from creating a project to applying for grants to creating impact with your project starting today!

[Connect Wallet](#)



hundreds of funding programs running at any time, designed and operated in a self-sovereign way by the communities they serve



## Round Manager

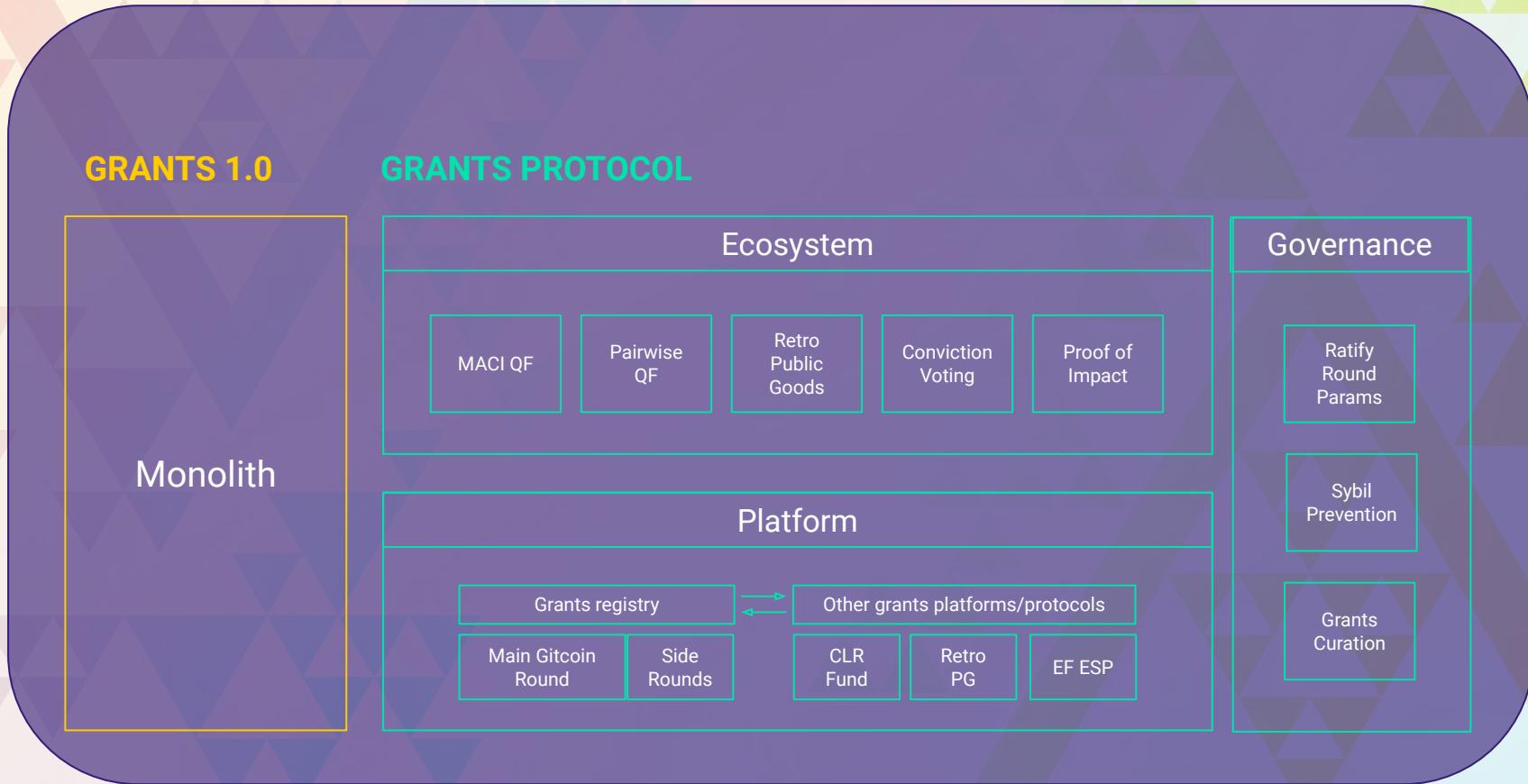
As a round operator you can manage high-impact grant programs and distribute funds across different rounds and voting mechanisms.

[Connect Wallet](#)



# Choose your own adventure

Gitcoin Grants Protocol





# Thank you!

Connor O'Day

GitcoinDAO

[connor@gitcoin.co](mailto:connor@gitcoin.co)



@connoroday0

