



New Applications for Quadratic Funding

Progress, barriers, & transcendence

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BitcoinDAO



@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?

[TL;DW]

(if you can't miss happy hour)



QF has proven
niche communi

(QF = gud)

t primarily in
advancements

As adoption

(Scale = hard)

re apparent

(Innovation + experimentation
= transcendence)



Section 1

WTF is QF?

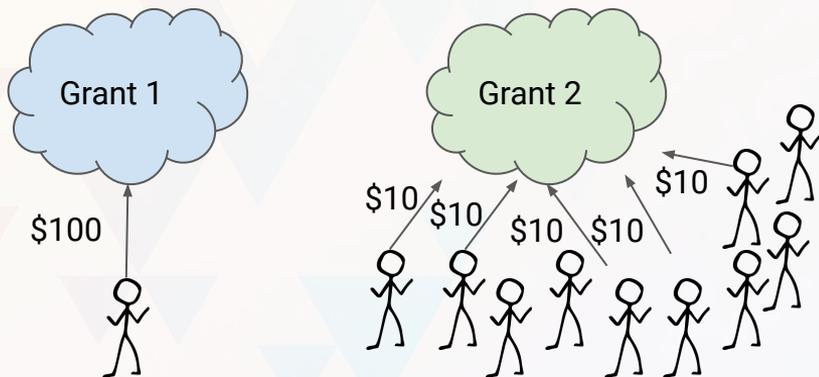
(spoiler alert)

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

Why Quadratic Funding?

wtfisqf.com

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

E. Glen Weyl

Microsoft Research, glenweyl@microsoft.com

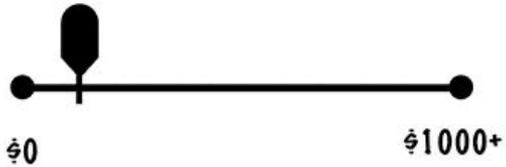
We propose a design for philanthropic or publicly-funded seeding to allow (near) optimal provision of a decentralized, self-organizing ecosystem of public goods. The concept extends ideas from Quadratic Voting to a funding mechanism for endogenous community formation. Citizens make public goods contributions 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

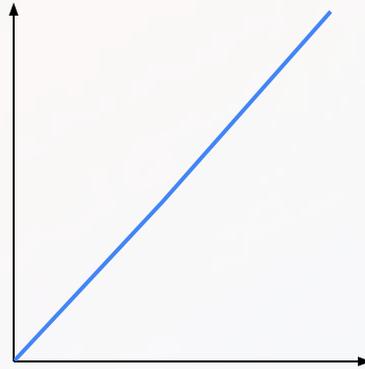


Preferences of the many outweigh the preferences of the few

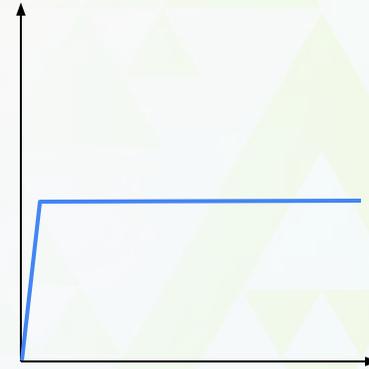
One dollar one vote
(dominated by capital)



Quadratic voting (funding)



One person one vote
(dominated by people)



How much you value a given public good

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	Private Goods Food, clothes, cars, & other consumer goods	Common Goods Fish, timber, coal
Non-Rivalrous	Club Goods Cinemas, private parks, satellite TV	Public goods 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

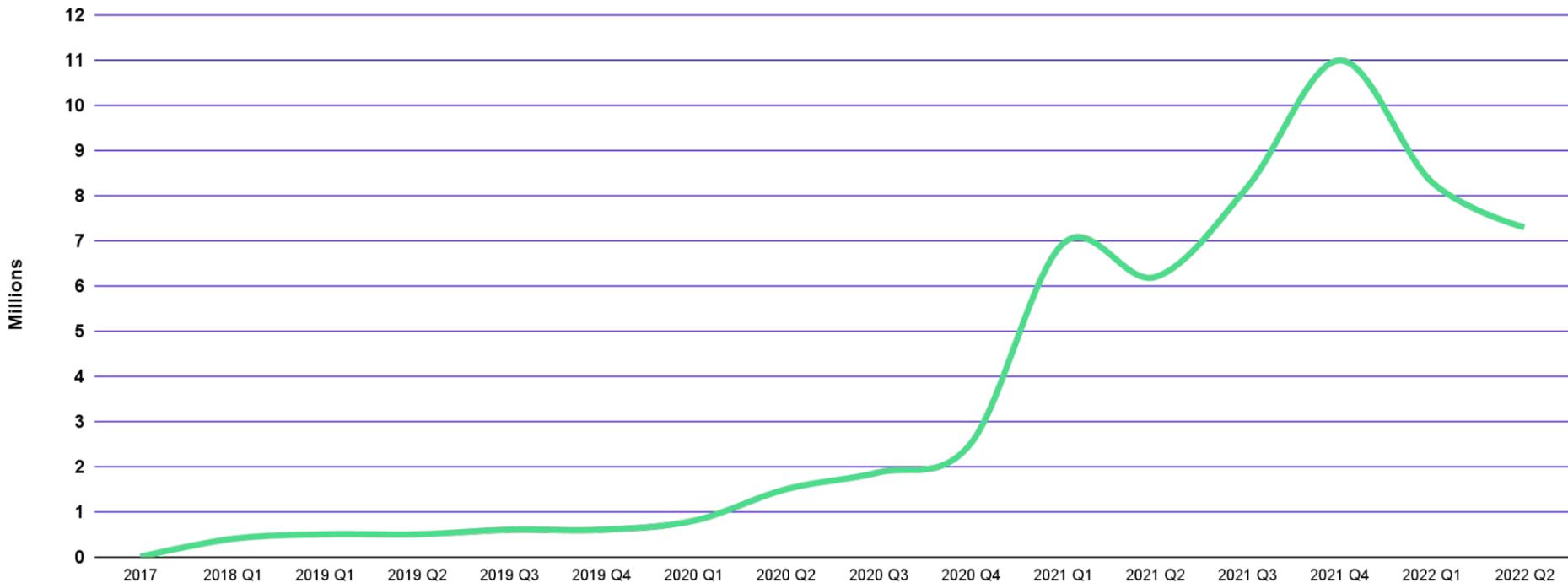
Where we are today



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

\$69.1m in Results

Nice



Gitcoin Grants Growth

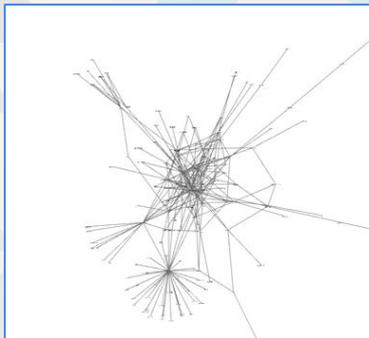
(GR1 / Jan 2019)

200

\$38k

Contributions

Raised



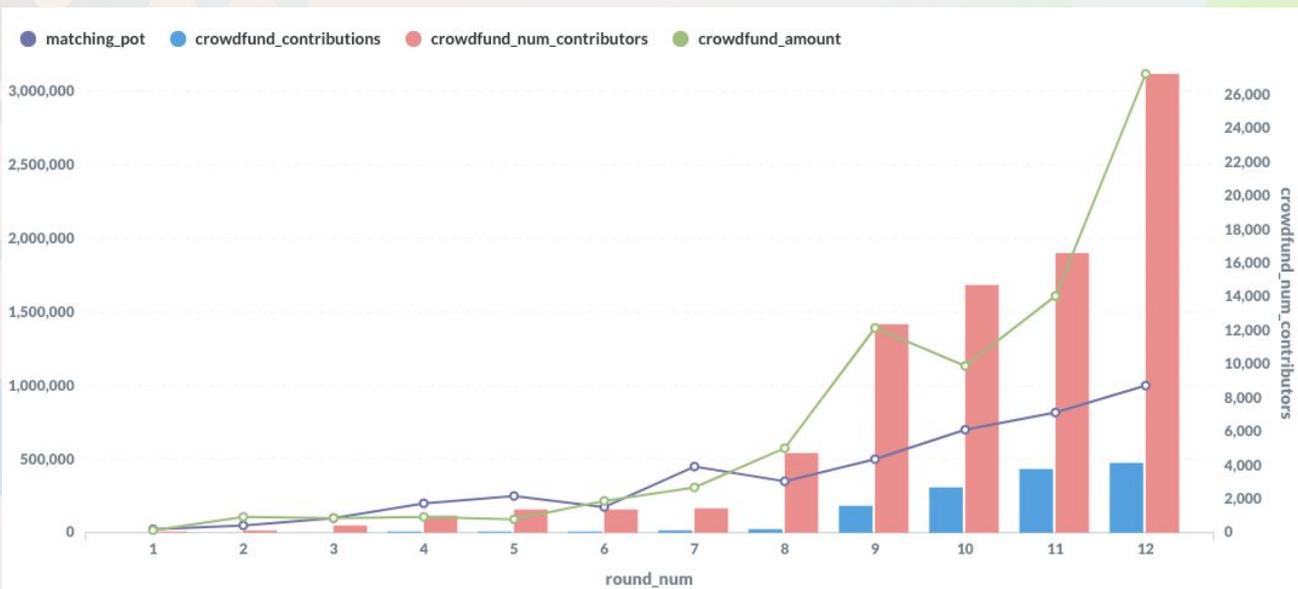
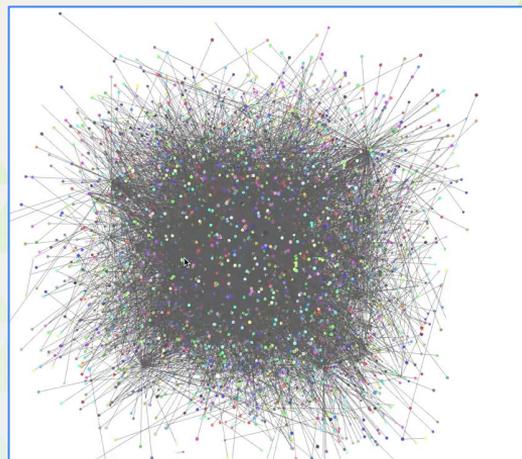
(GR14 / June 2022)

600k

\$5mm

Contributions

Raised



September 07-22, 2022

Round starts at 3pm UTC



GAIS

 GITCOIN



Ecosystem Rounds - Empowering communities to signal preferences



ETH Infra - \$500K
People and projects supporting core Ethereum infrastructure

The banner features a blue background with various icons representing Ethereum infrastructure, including the ETH logo, a gear, and a network diagram.



polygon - \$100K
Projects building on and supporting the Polygon Network

The banner features a purple background with a hexagonal pattern and icons representing the Polygon network, including the Polygon logo and a gear.



ENS - \$42K
Projects supporting the mission of ENS and ENS DAO

The banner features a light blue background with icons representing ENS, including a pineapple, a person's face, and a gear.



Unlock - \$25K
Projects in support of the Unlock community and protocol

The banner features a light orange background with icons representing the Unlock ecosystem, including a beach umbrella, a lifebuoy, and a gear.



Protocol Labs - \$50K
Projects advancing the use of IPFS, Filecoin, and other PL ecosystem projects

The banner features a light blue background with icons representing Protocol Labs projects, including a sun, a van, and a gear.



Subgraph Scholarships - \$50K
Open source projects developing or supporting subgraphs

The banner features a purple background with icons representing Subgraph Scholarships, including a magnifying glass, a gear, and a network diagram.



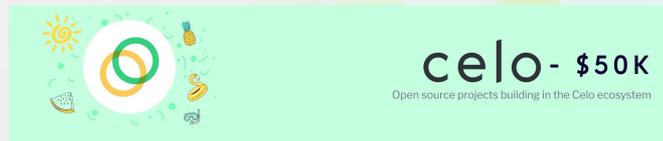
ZK Tech - \$145K
Projects advancing Zero Knowledge tools, libraries, protocols, and communities

The banner features a purple background with icons representing Zero Knowledge projects, including a gear, a network diagram, and a person's face.



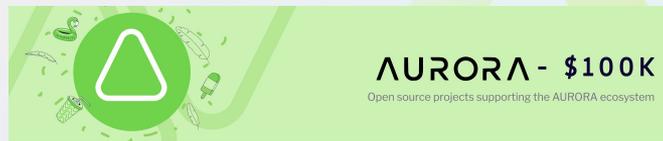
Open Gaming - \$100K
Projects building web3 gaming tools, infrastructure, and community

The banner features a light pink background with icons representing Open Gaming, including a gear, a person's face, and a network diagram.



celo - \$50K
Open source projects building in the Celo ecosystem

The banner features a light green background with icons representing the Celo ecosystem, including a sun, a gear, and a network diagram.



AURORA - \$100K
Open source projects supporting the AURORA ecosystem

The banner features a light green background with icons representing the Aurora ecosystem, including a gear, a network diagram, and a person's face.



Loot
Projects advancing the Loot ecosystem, aka the Lootverse

The banner features a light blue background with icons representing the Loot ecosystem, including a hand, a gear, and a network diagram.



Web3 Social - \$50K
Projects advancing the Web3 Social Network movement

The banner features a light blue background with icons representing Web3 Social, including a gear, a network diagram, and a person's face.

Cause Rounds - Breaking QF out of the Web3 Bubble



Climate Solutions - **\$350K**

Projects combating climate change



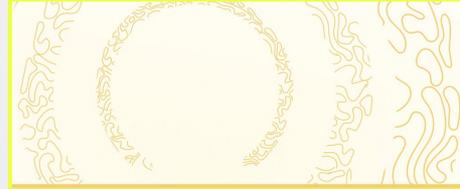
Decentralized Science - **\$500K**

Support projects in decentralized science



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

Public goods projects Diversity, Equity, & Inclusion



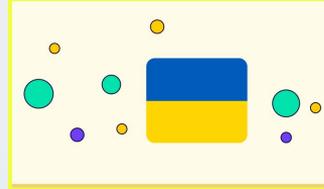
Longevity - **\$500K**

Decentralized projects sustaining longevity



Advocacy - **\$300K**

Public goods projects advocating change in web3



Support for Ukraine 🇺🇦 - **\$700K**

Humanitarian aid to the Ukrainian people

GA13

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](#)



Geographic QF - Regional & Local Rounds



Local round - Restorative Justice for Oakland Youth

Oakland - \$15K



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

a place at the table for everyone



Deva the Devcon Unicorn
@EFDevcon

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.clr.fund

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

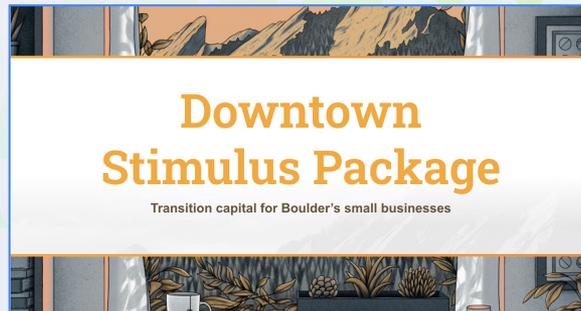


Greater China - \$50K

Open source projects in the Greater China ecosystem

Plancker @Scroll_2XP

@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-eligible ■ 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%



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@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

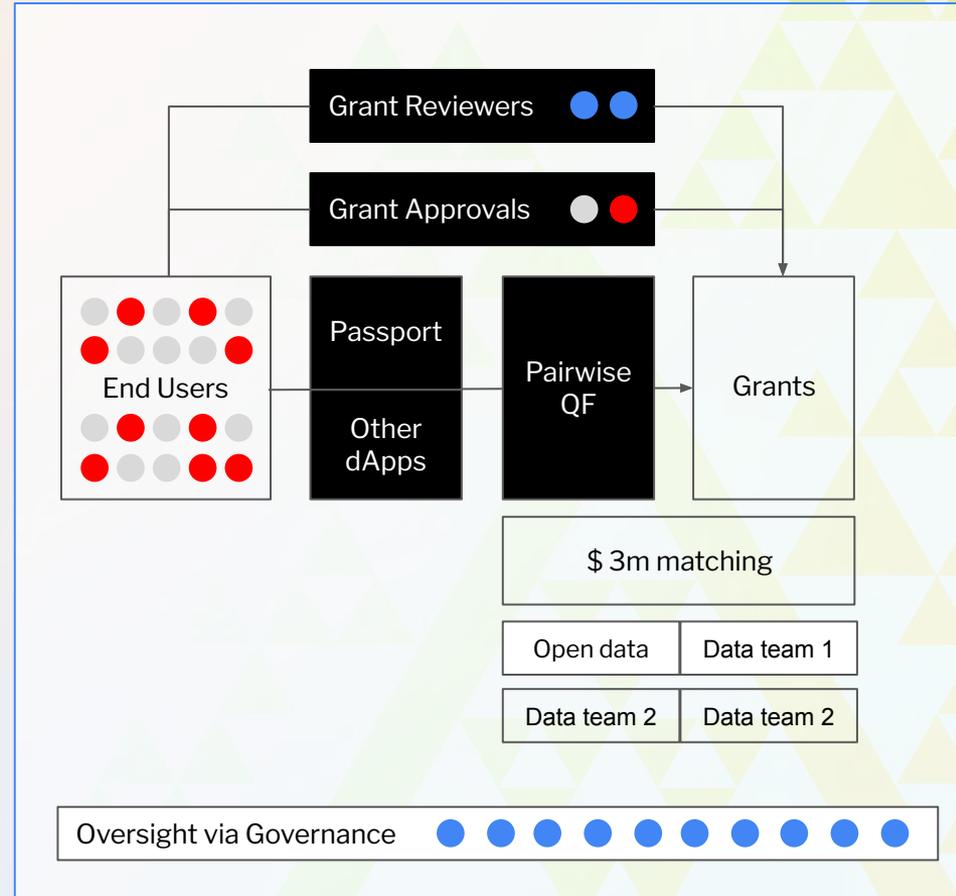
Until now Gitcoin QF rounds have run on a centralized stack

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

Bitcoin Passport - OSS dapp

💡 Privacy preservation → No PII in the passport

🔄 Decentralization → No centralized data storage (Ceramic Network)

💰 Bitcoin Trust Bonus Reader and Scorer

🔧 Open Source SDK; Integrate with your dApp

60,000 passports already created!

Bitcoin 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?



2020: DeFi
2021: NFTs
2022: DAOs
2023: Web3 social networks
2024: TCRs



Are TCRs back?

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

49 Retweets 13 Quote Tweets 189 Likes



.@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



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.

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

	^Sqrt 1 contribution^ Contribution		
	^Sum of all Sqrt^		
	Yellow = matching*		

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?



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@connoroday0

...

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

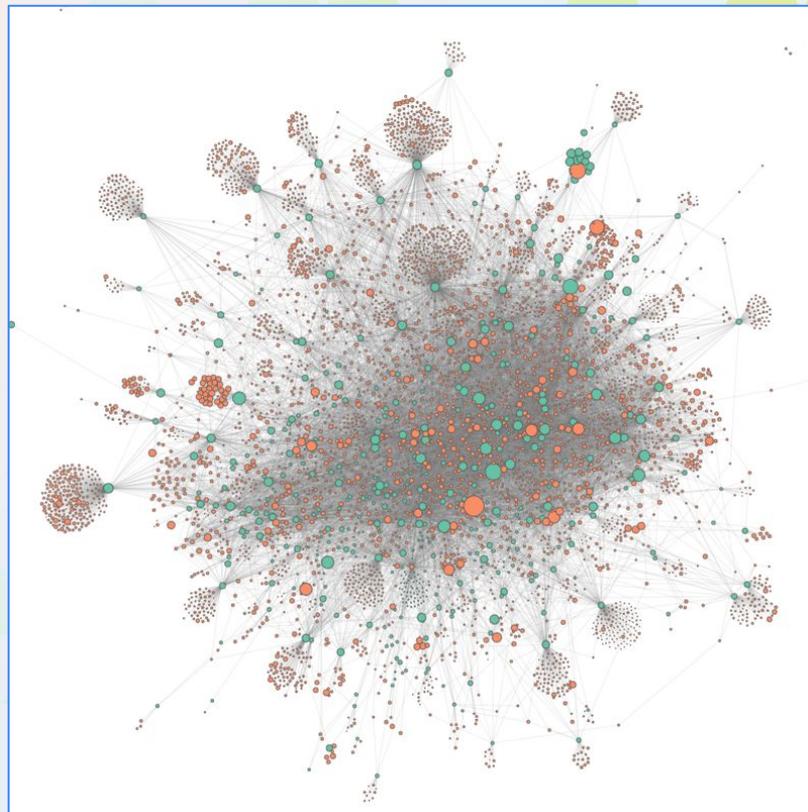
Pairwise Bounding (& extensions)

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

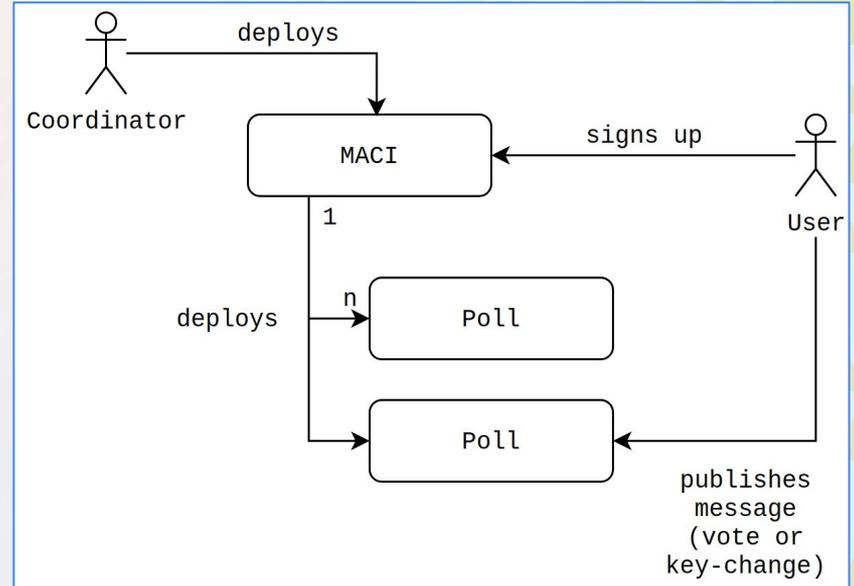


MACI - Privacy by Design

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



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

OP

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
CryptoFees.info	\$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?)



 **Kickback**

Incentivizing event attendance through
crypto economics

Quadratic Voting

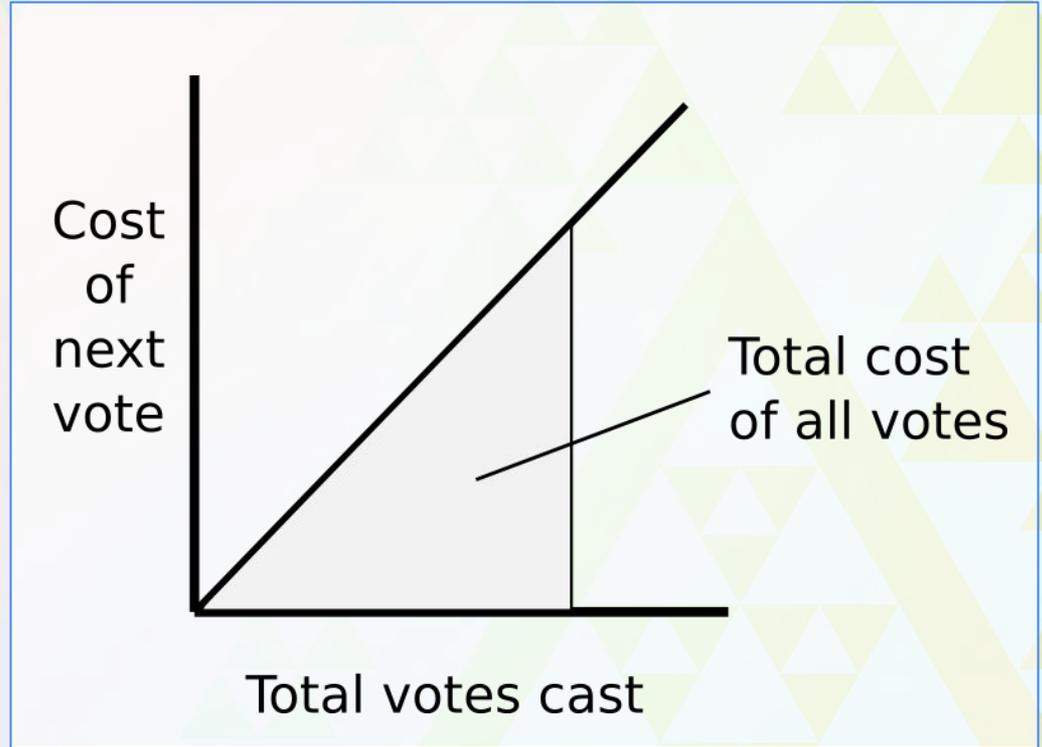
Do we need the F in of QF?

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

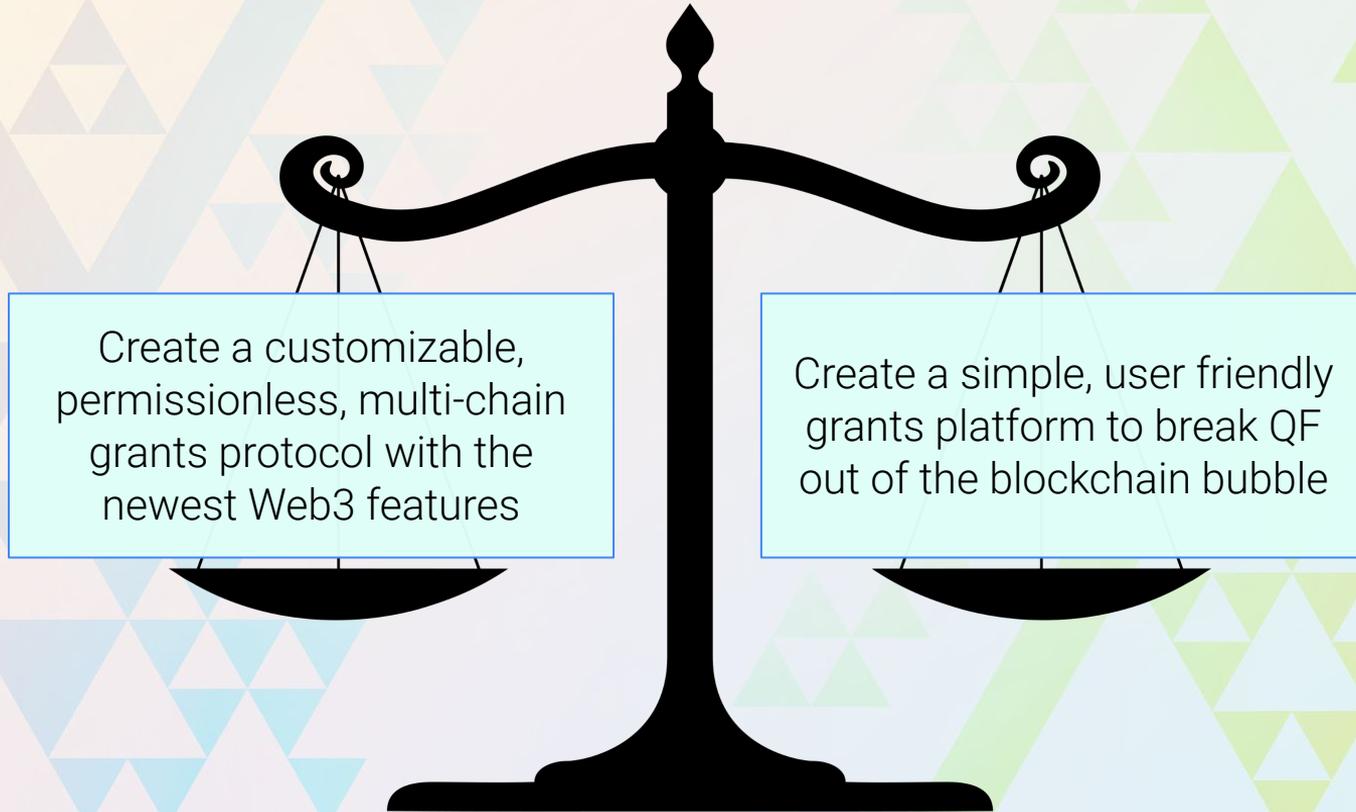




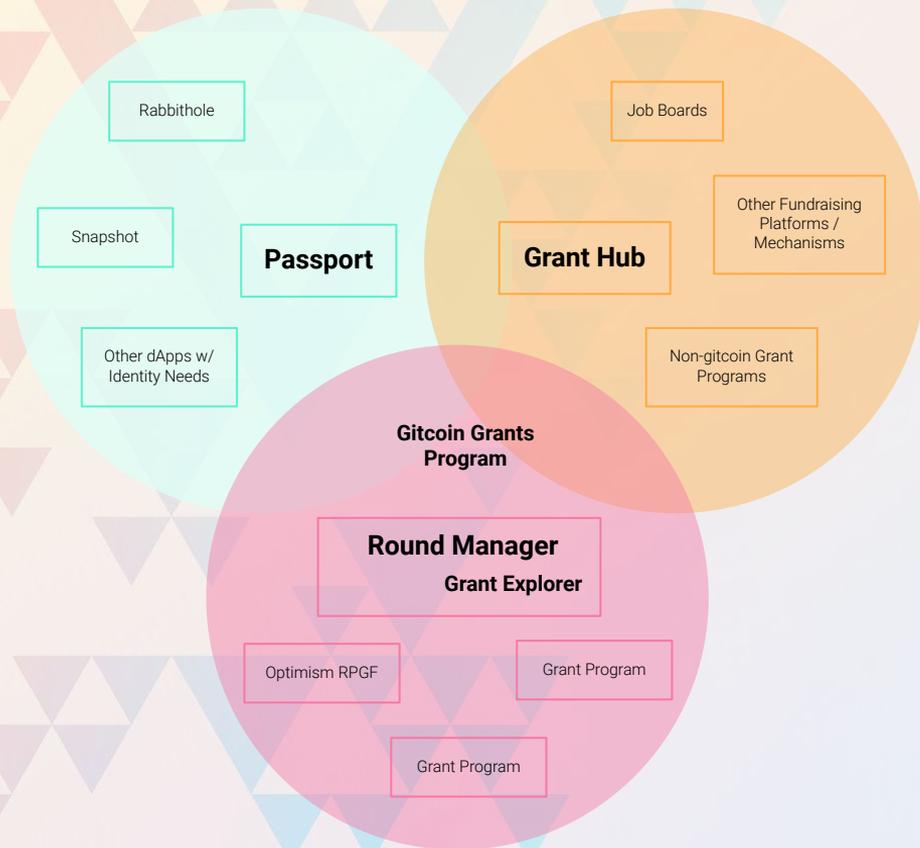
Section 5

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

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



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](#)



GITCOIN

Round Manager

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

[Connect Wallet](#)



Build by the
GITCOIN
COMMUNITY



Choose your own adventure

Bitcoin Grants Protocol

GRANTS 1.0

Monolith

GRANTS PROTOCOL

Ecosystem

MACI QF

Pairwise
QF

Retro
Public
Goods

Conviction
Voting

Proof of
Impact

Platform

Grants registry

Other grants platforms/protocols

Main Bitcoin
Round

Side
Rounds

CLR
Fund

Retro
PG

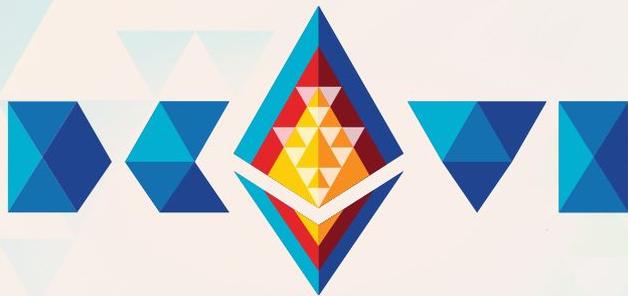
EF ESP

Governance

Ratify
Round
Params

Sybil
Prevention

Grants
Curation



Thank you!

Connor O' Day

GitcoinDAO

connor@gitcoin.co



@connoroday0

