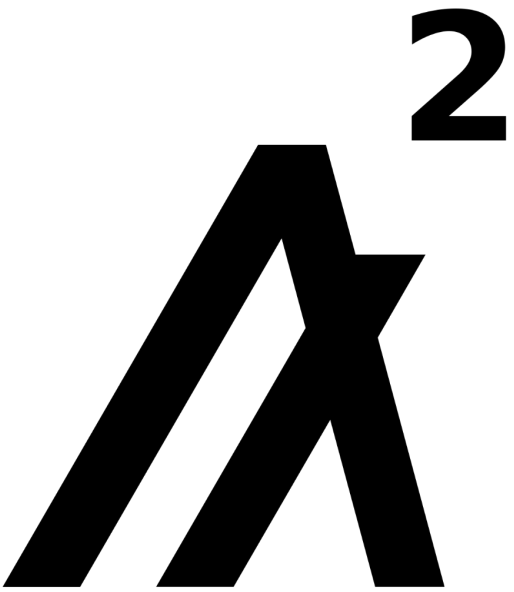
Quadratic Funding for the Algorand ecosystem

Project evaluation result



Date: 07/09/2022

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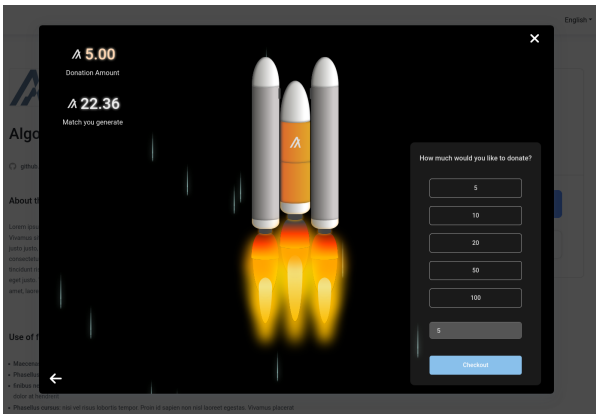
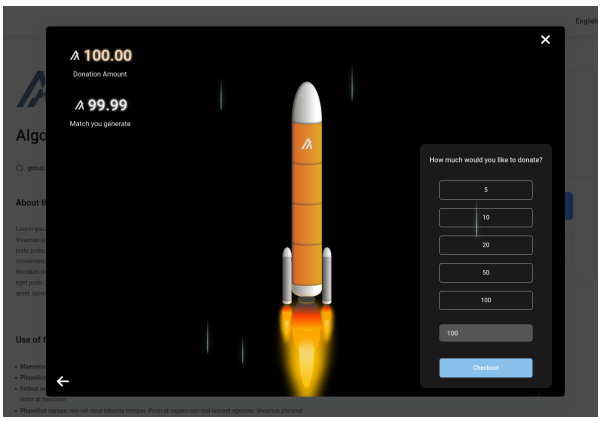
Section 1. Executive Summary

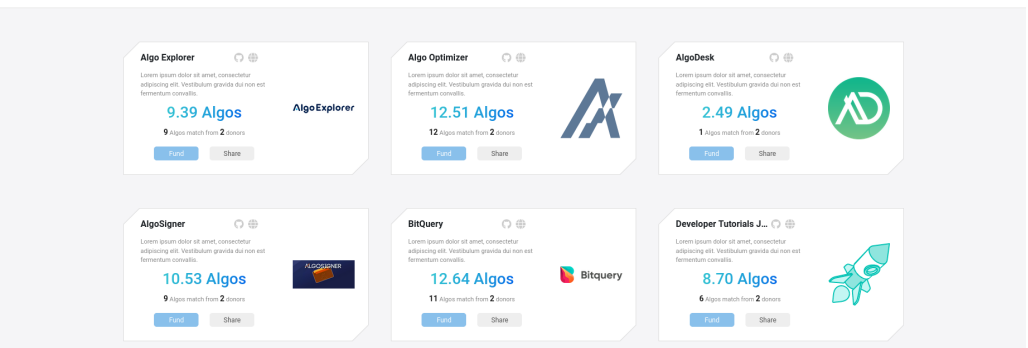
The open source *Quadratic Funding* tool developed under this project radically improves the way projects can be funded in the Algorand community and fosters the establishment of the open, public and permissionless Algorand blockchain.

Quadratic Funding has been called the "mathematically optimal way to fund an ecosystem in a democratic way." It prioritizes a large number of smaller backers over a small number of wealthy donors. As this concept is not very easy to grasp, we created a visual representation within the developed tool. In the example below, if many users donate a small amount - say 5 ALGO, it is matched by a large amount per user: 22.36 ALGO is more than 4 times the amount initially donated! It is visualized by a small rocket, supported by two powerful boosters. However, when only a single user would contribute, the boosters decrease in relative size. A single donation of 100 ALGO would for example only lead to a match of 99.99 ALGO.





An example of a successful Quadratic Funding use case is Gitcoin. Gitcoin created a vibrant community where even smaller donors can actually create an enormous impact on the public goods funded, via a $3 million matching fund that is made available on a quarterly basis. By enabling Algorand to create a similarly informed donor community, the Quadratic Funding platform can serve as a stepping stone for new projects, allowing them to prove traction in the form of community approval before reaching product-market fit. Thereby also enhancing the effectiveness of existing grants platforms. We have created an easy-to-use interface to easily make an informed decision about public goods to support which can already be accessed via testnet: https://matchfund.app/.



We have given special attention to achieving transparency and public verifiability of the application's operations. This is where the Algorand blockchain comes in, which serves as a perfect base layer to commit information to. This is done in a privacy-preserving manner through the use of encryption, ensuring that the amounts which donors give are not revealed to the outside world. Another important factor is the need for unique identity verifications, which currently happen through third party OAuth-based service providers.

Now that the software is written including backend and frontend and connection to the Algorand blockchain it is time to build and realize a Quadratic Funding community for the Algorand ecosystem. We sincerely hope that this platform can democratize the funding for Algogrand projects in the future.

Section 2. The big problem: public goods funding

The open source *Quadratic Funding* tool developed under this project radically improves the way projects are funded in the Algorand community and fosters the establishment of the open, public and permissionless Algorand blockchain.

Grants awarded by the Algorand Foundation and the Algorand community more broadly are in principle meant to be spent in a way which creates the most value for the Algorand network and to offset free-riding. It should go to the projects which best foster the establishment of an open, public and permissionless blockchain.

There are several grants and bounty programs operated by the Algorand Foundation which allow for financing projects. As these programs do not include any direct community feedback, it is hard to evaluate the following:

- **How much value does the community get from the work? Will they use it?** Little effort is done to explicitly engage or grow the community in the process of raising the grant. There is a risk that grants end up going towards projects on a first-come-first-serve basis, or on the basis of certain superficial characteristics, instead of to the projects which add the most value to Algorand.
- **How much skin in the game do projects and evaluators have?** There is no well-defined path which requires projects to invest resources (either time or money) which will raise their chances of getting a grant. Grant evaluators have no personal incentive to lower grants to the minimum required to achieve a particular goal. Contrast this to an investment deal, whereby applicants have to agree to give up shares of their enterprise and investors expect some form of profit maximization. As a result, a variety of work might be financed which might have also happened if the grants program was not available.
- **To what extent are decisions legitimate according to the community?** Despite a historical or legal mandate to make funding decisions, some form of control or transparency is required to continue to receive the support from any community.

To overcome these issues, time and effort has to be devoted to manual and laborious evaluation and communication. Because the foundation is trying to take decisions on behalf of a community it fundamentally suffers from the principal-agent problem[1] and keeping this problem under control may only get more difficult over time as leadership and culture changes, and as more people try to access the same resources. To offset these issues, the Algorand Foundation and Algorand's founder Silvio Micali have already communicated their goal to decentralise Algorand's governance.[2] Although the new governance mechanism which went into force on September 30th 2021 provides a good basis, it is designed to gather democratic input only on a relatively small set of large decisions.

[1] https://en.wikipedia.org/wiki/Principal%E2%80%93agent_problem
[2] https://algorand.foundation/governance/proposal

Section 3. Solution

We developed an alternative open source democratic crowdfunding platform. At the heart of the platform is the algorithm known as *Liberal Radicalism* or *Quadratic Funding*.[3]

Quadratic Funding is a hybrid between pure crowdfunding and centralized grants funding. Similar to the crowdfunding platform Kickstarter,[4] you can submit projects and accept donations. The crucial difference is that a matching fund, financed by stakeholders such as the Algorand Foundation, matches people's donations.

While there are many crowdfunding and voting schemes with different trade-offs, Quadratic Funding was specifically designed to help a community determine what projects deliver the most value. As donations are a valuable signal, all parties have skin in the game: donors spend money and projects spend resources to recruit more donors. This scheme helps to finance *public goods* and avoids the economic *principal-agent* problem. Invented in 2018, it has seen steady adoption and received recognition from renowned economists.

The **matchfund** operates in such a way that if everyone donates selfishly to the projects which they care about, the projects which globally provide the most value will be rewarded the most. The match is calculated using the following formula:

$$match = 1/f \left(\left(\sum_{i=1}^{n} \sqrt{c_i} \right)^2 - \left(\sum_{i=1}^{n} c_i \right) \right)$$

where c_i is the contribution of a donor and f is a scaling factor.

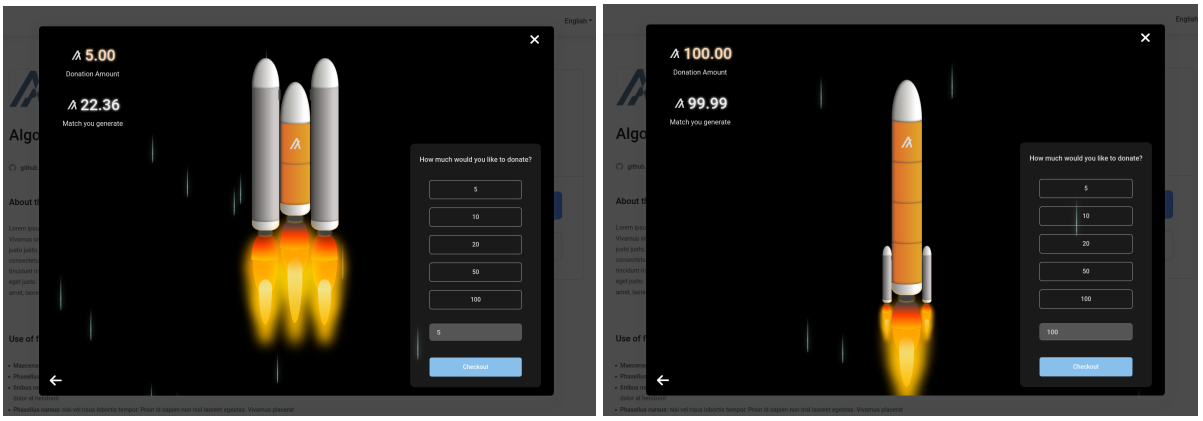
Below is an example to highlight the mechanism. Let's say there is a matchfund of 100 ALGO to divide between two projects. Project 1 receives four small donations while project 2 receives one big donation, and the match is scaled down with factor 1.46 to ensure only 100 ALGO is matched in total. You see the match for project 1 is more than four times as big!

[3] https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3243656
For more background you can check out: https://vitalik.ca/general/2019/12/07/quadratic.html
For an empirical evaluation, see: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3702318

[4] While standard crowdfunding like Kickstarter solves the free rider problem, as people only contribute if and only if a certain target is reached, it does not help a community determine what projects deliver the most value.They use a mechanism called an assurance contract: https://en.wikipedia.org/wiki/Assurance_contract

	Donations to project 1	Donations to project 2
Donor A	10	35
Donor B	10	5
Donor C	10	0
Donor D	10	0
Match	82[5]	18[6]
Total funds received	122	58

Below is a graphical representation of the general matching algorithm as implemented in the developed tool, which helps to visualize that a project receiving a small donation received a match (in the form of big booster rockets), while a single large contribution does not get a match (receiving only very small boosters) The match fund therefore ensures that even small contributors can have a big impact on the amount funded.



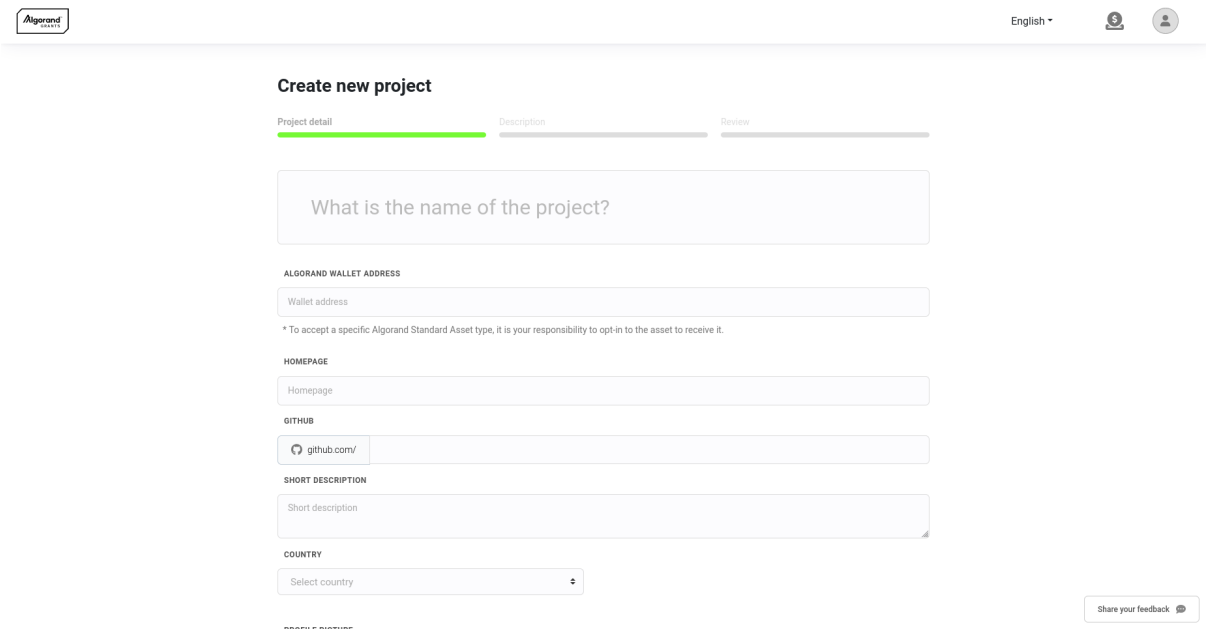
The base mechanism can be extended in many ways, by for example prioritizing the matching of donations from respected people in the community, or people who provide the most proof that they have a unique identity. This effectively outsources evaluations traditionally done by the Algorand Foundation to a curated group of trusted experts and the entire Algorand community.

[5] 1/1.46 * (160 - 40)
[6] 1/1.46 * (66.46 - 40)

Section 4. Project evaluation

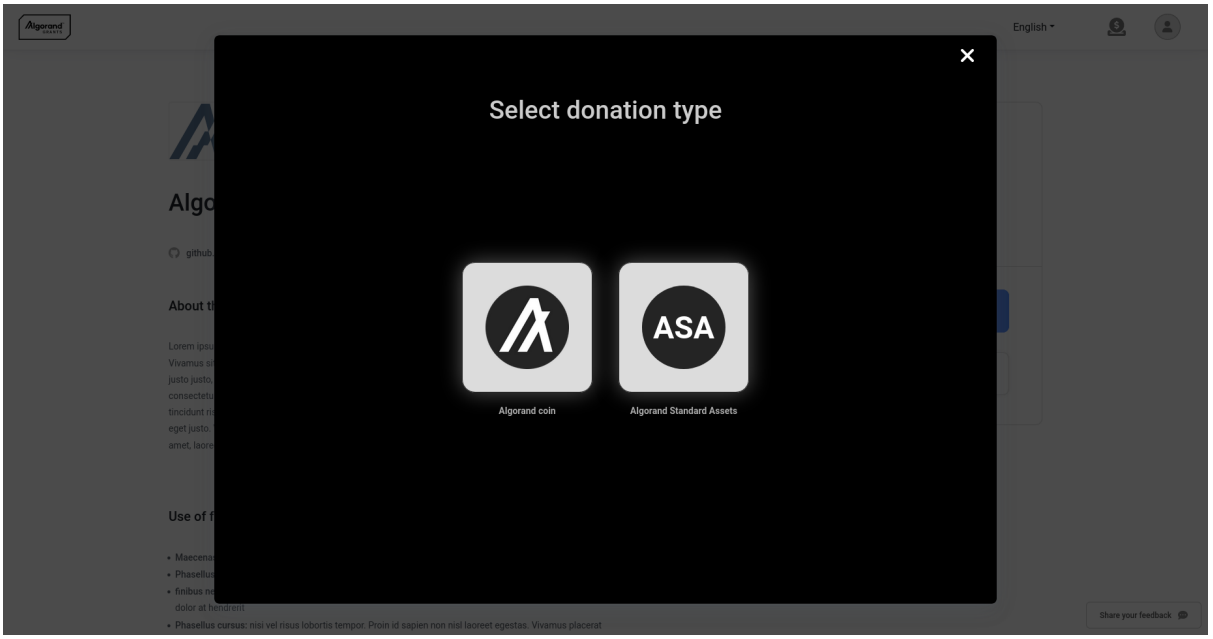
The platform is currently live on testnet and accessible via https://matchfund.app.[7] We have created a user friendly and well-documented tool, which is based on the excellent clean style of the Algorand Foundation website. In order for the platform to be managed by non-technical users, we included administration functionality. Already moderators and regular users can test the platform by creating an account.

After signing in a user can create a new project via web form.

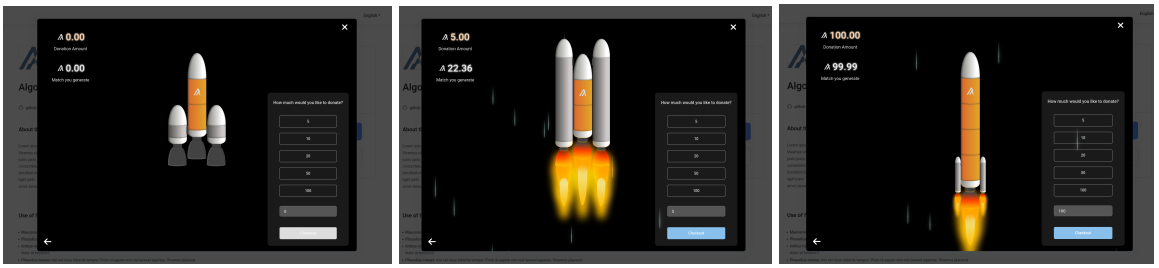


In case the user wants to make a donation, it can simply go to the main page and scroll through the different projects listed. By clicking on one of the projects, the user can find more information about the project in order to make an informed decision about donating or not. In case a user decides to donate, it can either do so via ALGO or ASA.

[7] https://github.com/algo-matchfund



As explained in the previous section, when a user decides to donate with e.g. ALGO, it will be redirected to the donation webform. In the image below you can see that if no amount is selected the rocket is not prepared for lift off, but in case a low amount is donated, the rocket is supported by enormous boosters. This symbolizes the impact the smaller backers can have on a project. For wealthier donors, the booster becomes smaller and refers to the relatively smaller influence they have on the decision making process.



In this way, the developed platform will help to democratize the project funding process within the Algorand community.

Section 5. Future expansion beyond the scope of this project

The impact of the developed platform goes beyond improving the way projects are funded in the Algorand community. The funding platform can expand in functionality as described below.

Trustless financial flows
Financial flows can be fully run through a smart contract, allowing for trustless matching of donations. Given the volatile history of smart contract bugs, decentralization of the financial flows has to go hand in hand with a thorough review and a security audit. The challenges include (1) assessing donor identities on-chain, potentially via oracles (2) allowing the matching fund to raise funds from a variety of Staking tools, organizations and individuals like Purestake, RockX, Voyage and Frontier (3) on-chain evaluation of all the fraud-prevention factors indicated in Task 2.

Voting
There are various democratic tools for deliberation (https://pol.is) and voting (https://www.qvote.co.uk/) to gather more granular input from the community.

Expansion to fund new target groups
The platform can be used to help many communities and governments to allocate funding in a more democratic way. However, by dog-fooding[8] the system from day 1, the best results will be achieved. Specific examples for future expansion include:

- City and municipality participatory budgeting[9] schemes, from Amsterdam[10] to San Francisco. Projects like Citycoins[11] have already raised millions of dollars for cities to distribute in a democratic way. Over time, the border between governments and cryptocurrencies will blur more and more. The more democratically legitimate the funding mechanism, the more likely it will achieve adoption to the non-crypto world. The matching fund can then be financed by governmental institutions.
- Public information goods such as open source software, online education and news. These types of goods all run the risk of underfunding since the internet age started due to the zero marginal cost of copying them. The matching fund can be financed by private foundations such as the Bill & Melinda Gates Foundation. There is a thriving constellation of donation-based information and education projects which need better financing arrangements, including organizations such as Wikipedia, Our World in Data and a plethora of online blogs.[12]

Other matchfunds could be set up either completely independently from each other, but there is also a valuable opportunity to let donations 'trickle down' through a nested matching fund.[13] In this setup, any particular beneficiary of the parent matchfund, could be a child

[8] https://en.wikipedia.org/wiki/Eating_your_own_dog_food
[9] https://en.wikipedia.org/wiki/Participatory_budgeting
[10] https://buurtbudget.amsterdam.nl/oud-west
[11] https://www.citycoins.co/
[12] https://refined.blog/
[13] https://forum.clr.fund/t/future-proposal-nested-matching-pools/29

matchfund of its own for a particular use case or category, thereby leveraging the network effects of the entire system. By tracking the payment streams from other matchfunds (to prevent fraud/double counting), this can scale to a worldwide platform for public goods funding.

Section 6. Conclusion

We have developed a Quadratic Funding platform for the Algorand community in order to democratize the way projects are funded within the Algorand community. The platform gives smaller backers the opportunity to have a bigger impact on the funding process as compared to a regular funding process. We are pleased that the project can now be accessed via https://matchfund.app.

Now that the software is written including backend and frontend and connection to the Algorand blockchain it is time to build and realize a Quadratic Funding community for the Algorand ecosystem. We sincerely hope that this platform can democratize the funding for Algogrand projects in the future.