

# Delphi Digital

## Public Releases

Having discussed what the underfunded public goods problem is and why it matters in part 1, we now turn our attention to solutions to this problem. We begin by describing existing solutions, why they fall short as well as how crypto can expand the design space and shorten the iteration cycle for new social technologies, yielding better solutions. In this piece, we focus on governance and quadratic funding as two examples of potentially interesting solutions currently being trialed which could eventually be expanded to address societal problems.

## Coordination, Public Goods and Crypto (Part 2)

Jose Maria Macedo · Friday, November 27th, 2020

In [Part 1 of this series](#), we discussed how all important challenges facing humanity can be broken down to coordination problems. We focused specifically on a particular type of coordination problem which we call “The Underfunded Public Good” problem, but which is also variously known as the “free rider” or “collective action” problem. We explored what this issue entails, why it emerges and how it affects both society on a macro scale as well as how it manifests in the crypto industry specifically.

In this piece, we will discuss solutions to this problem. We will begin by providing brief context on the problem as well as on existing solutions and why they fail. We will then describe some of crypto’s potential answers to this problem and how they could be expanded to address societal problems.

### Existing Solutions To The Public Good Issue

**To state the public goods problem simply: there are things that we all agree we want but that nevertheless remain underfunded.** These so-called public goods are non-excludable and non-rivalrous. As a result, they possess a marginal cost that is below their average cost and thus should charge a price that, if collected, will not cover the costs of creating it in the first place. It cannot therefore be provided via market mechanisms and instead requires subsidies.

As with all coordination problems, humans have invented powerful social technologies to address the underfunded public goods problem. These technologies are social because rather than being objectively true, they depend on everyone’s subjective collective belief in them. But do not mistake their subjectivity for weakness, the survivors have passed an evolutionary survival of the fittest game in that groups of

humans who followed them proliferated more than those who didn't.

For instance, religion and other cultural and moral customs promote generosity and incite individuals to be charitable. Over most of history, groups of humans who subscribed to religions proliferated more than those who didn't. However, perhaps the most successful social technology invented thus far is the combination of the modern democratic nation state, coercive taxation and fiat money (initially conceived as a tax liability). The basic idea here is that the state, via the one-person-one-vote system (1p1v), is an embodiment of the will of the people. Citizens delegate some of their rights as well as some of their income to the state which reallocates this to the benefit of the collective.

While it is undoubtedly the best system we've found so far, the problems with it are well documented:

- Lobbying and **regulatory capture** means regulatory agencies come to be dominated by the industries or interests they are charged with regulating.
- The lack of the profit motive and competition in public institutions leads to systemic inefficiency. With no feedback mechanism in the form of profit and a broad, diverse base of constituents, they struggle to identify and serve the interests of their members
- The 1p1v democratic system responds to the will of the majority rather than what creates the greatest aggregate value. Indeed, the democratic system often oppresses minorities of great value. This has been shown formally by Glen Weyl and Vitalik Buterin<sup>1</sup>.

## **Blockchain - An Innovation Platform For Social Technology**

We believe blockchain technology opens up a new design space for social technologies. Unlike the majority of social technologies that came before it, it does not rely on centralized entities to enforce the rules but rather on a system of incentives powered by individuals' rational self-interest. Also unlike previous social technologies, the fabric of blockchain is digital, allowing for far greater efficiency and speed of iteration. **The evolutionary loop of blockchain-based social technologies is thus far shorter than that of its predecessors:** with faster iteration comes more progress. In this author's opinion, *all* blockchain's killer apps involve solving the coordination issues that represents the 'bugs' in our market-based capitalist system.

Initially, these social technologies will be stress tested from withintrilled natively in the blockchain space. DAOs and token-based governance systems will allow human beings to coordinate in order to fund and build the decentralised digital infrastructure of the future. Eventually, the tried and tested governance models will spill out into the real world as more and more organizations become DAOs, with expensive legal contracts becoming SaaS products and time-consuming litigation being handled by prediction markets and decentralised dispute resolution services.

## **The Intrinsic Value of Governance**

Until just a few months ago, I used to believe that governance in and of itself was valueless. To be specific, **I believed that governance was only valuable if the underlying thing being governed was valuable in the traditional finance sense of something that generates long-term defensible cashflows.**

As heretical as this may sound, I've since come to believe governance can be valuable even absent the thing being governed generating any cashflows whatsoever. One case in which this can be clearly seen is that of public goods. **Public goods are valuable to govern despite not generating cashflows because they affect the cashflows of underlying projects that benefit from or leverage the public good in some way.**

There are lots of examples here:

- Open Source - For open source projects, determining the direction of scarce development resources of widely used digital infrastructure is valuable even absent cashflows. For example, even if Metamask never generated a dollar of fees, it's intuitively obvious that their decision of which chain to support next would be a valuable thing to be able to exert influence on. **Many argue this is why tech giants donate so much money to open-source: to influence the platforms used by those developers.**
- Rules of the Game - Determining the rules of the game can also be valuable. For instance, if the Apple App Store's review guidelines were voted on and enforced by tokenholders in a decentralised governance process, this would also clearly be valuable even if the app store itself didn't capture any fees.
  - Social Media - For a more poignant example, determining the news feed algorithm for large social media platforms like FB/IG/Twitter would also be valuable even if these projects didn't generate billions of dollars in ad revenue.
  - Crypto - To use a more crypto-native example, if a front-end like Zapper Finance is eventually used by billions of users around the world, governing what is shown on its front-end will clearly have value even if Zapper itself captures none of it.

The value of governance isn't unique to crypto either. While imperfect, there are proxies in the real world; situations where governance is clearly valuable despite generating no direct cashflows.

As Placeholder pointed out in their excellent [ANT Economics](#) report, the number of US house of representatives seats have stayed fixed since the beginning of the century, yet the amounts of money raised to acquire these seats have gone up astronomically to **\$1.2B** in 2017 alone. Similarly, lobbying is a \$9B dollar industry in the US. As mentioned earlier, the tech giants are known to donate billions of dollars to open source tech despite no cashflows being generated from this.

## Value Capture via Governance

Henry George, the greatest economist no one has heard of, came up with some

interesting mechanisms to quantify and capture the value created by public goods. For instance, a town choosing to invest in its public goods (schools, neighbourhood amenities, parks, etc) should see real estate values in that town rise. In fact, assuming people are perfectly mobile, real estate values should rise by precisely the amount that people value the public good by. Assuming the public good is worth funding, real estate value should increase by more than the cost of it. If this increase can be captured as a tax, it could be used to finance this improvement.

George suggested his self-assessed Harbeger tax as a method of financing this, later expanded on by his student Vickrey. However, with advancements in technology, could blockchain-based governance enable new ways of doing this? To extend the previous metaphor, if tokenholders can determine whether and where a school is built via a decentralised governance process, would the amount they're willing to pay to influence this vote not equal the expected increase in land value? Could governance act as a proxy to the otherwise difficult to capture value of public goods?

### **Combining Quadratic Funding and Governance**

Quadratic funding is a method of funding public goods which makes them nonlinear compared to the outcome achieved by private markets. As Weyl tells us:

*"In a standard linear private market, the funding received by a provider is the sum of the contributions made by the funders. In our "Liberal Radical" (LR) mechanism, the funding received by a provider is the square of the sum of the square roots of the contributions made by the funders. Holding fixed contribution amounts, funding thus grows with the square of the number of members. However, small contributions are heavily subsidized (as these are the most likely to be distorted by free-riding incentives) while large ones are least subsidized, as these are more like private goods. Under the standard selfish, independent, private values, quasi-linear utility framework, our mechanism leads to the utilitarian optimal provision of a self-organizing ecosystem of public goods."*

Gitcoin was the first project to implement quadratic funding in the crypto space via its [Gitcoin Grants](#) programme. Donations by individuals are matched by a central pool (in this case the Ethereum Foundation) according to a quadratic funding formula, **meaning larger numbers of small donations are prioritised over smaller numbers of large donations.**



The logic is elegant. Central funders may want to fund public goods but not know which are worth funding. Individuals may have better information regarding public goods worth funding but are disincentivized from doing so by the free rider problem. Quadratic funding fixes this by incentivizing individuals to act as if they were the collective. In their paper, Weyl and Buterin show this formally, as well as how QF results in higher welfare than both capitalism and 1p1v systems.

**Bitcoin has raised \$6.5M for open-source developers so far and attracted a community of over 47k developers.** While a full discussion of quadratic funding is beyond the scope of this notepaper, **the point to highlight is that a mixture of quadratic funding combined with governance rights for the funders could result in a new model for provisioning public goods at scale.** In addition to getting their donations matched by a central pool, funders would also receive some governance rights in the underlying public goods they fund.

Quadratic Funding would be used as the initial “fair” distribution mechanism for the governance rights in these public goods, with the teams working on them also earning governance rights. As these public goods grow and become more important, so too should the impacts of the decisions they make and thus the value of influencing these decisions.

In the future, we could even imagine a world where Quadratic Funding is built in at the protocol level, with a tax being levied on all users and given to them as a tax credit which they can allocate to public goods projects. This would then be matched by the protocol or foundation. There would thus be a scalable funding and governance model for an ecosystem’s public goods. Users benefit via the value public goods generate for the ecosystem token but also via appreciation in the governance tokens of specific public goods they donate to.

The more naive among us can also imagine this model eventually being expanded to a nation state, where tax revenue is allocated not by centralised bodies but by decentralised communities of individuals directly allocating to the projects they care

about.

Don't get me wrong, the solution I describe here is still a long way's away. Quadratic funding still has its flaws, specifically collusion and fraud as it isn't sybil-resistant until we have some form of on-chain identity. On-chain governance models need to address issues of plutocracy, voter participation and efficiency before they can be used at any large scale. However, what this and other experiments *do* show is the potential for blockchain technology to help us expand the design space for coordination problems, combining features of capitalism and socialism to come up with entirely new solutions. Another example I didn't have time to cover in this piece is Gnosis's Futarchy / conditional token model which we feel could also be used to provision public goods. Given its digital nature and the multitude of experiments going on, we are bullish on the ability of the crypto space to eventually iterate towards better solutions.

*<sup>1</sup>For a more formal mathematical demonstration of the sub-optimality of the 1p1v system in provisioning public goods, see page 7 of "Liberal Radicalism: A Flexible Design For Philanthropic Matching Funds" by Glenn Weyl and Vitalik Buterin*