Protocol for self-governance in blockchain-enabled charitable organizations

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***Abstract*—The Blockchain technology has made a major breakthrough in various domains since its inception, namely in the financial sector where the popularization of Bitcoin has truly revolutionized the way we perform transactions. In a world ever so connected and in an era of globalization, the buzz of Bitcoin has brought to light the advantages of its underlying technology. In this context, one of many fields that could truly benefit from the Blockchain is philanthropy. Indeed, by enhancing the transparency of costs and reducing the fees of international transactions, more funds can reach the people in need more efficiently and rapidly while bringing more trust into the process. However, new technologies retrofitted to concepts that have existed long before the industrial age can present some limitations. In this paper, we tackle one of many issues that arises with respect to governance in blockchain-enabled charity organizations and propose a novel protocol for allocating voting tokens and funds and vetting projects. The protocol proposed could be fitted to any charity organization to run in a truly trustless setting while being resistant to corruption.**

***Index Terms*—accountability, blockchain, charity, distributed ledger, governance, organization, philanthropy, transparency, trustless**

I. Introduction

The first part of this paper will provide an in depth review of how charitable organizations function today, and how they are currently using or envision using Blockchain technologies in the future. Blockchain has already proven it's value as a great monetary tool that provides an extremely low cost was to transfer funds. The rise of new use cases of Blockchain such as DeFi decentralized apps goes to show that there remains new and interesting ideas to explore with Blockchain. The second part of the paper will focus on how the key components of a charitable organization can be implemented in a trustless environment. This paper will set out the base structure that is required to run a decentralized autonomous organization as a charity.

II. Charity in its conventional form

A. Today

Charity has been around for centuries and has not evolved much since [1]. People wanting to donate some goods or money would either do it directly to the people in need such as beggars in the street or to organizations that then use those funds to help the people in need. The mechanisms that were present centuries ago have remained identical to the ones currently available. Today's charitable organizations face tremendous opportunity to grow and increase their impact. Charitable foundations are not equally spread across the world since 90% of the world's foundations are headquartered in the 25 highest-income countries [2], with Switzerland being the leader in this ranking with over 2,000 foundations per million capita. Over 90% of these charities are independent or family-owned foundations[2].

One of the biggest challenges that philanthropic organizations face today is finding an equilibrium between the transparency of their financial assets and the desire to safeguard their privacy and security [2] as well as the anonymity of its donors.

Most philanthropic foundations run some internal programs to use the funds in proportions exhibited on fig.1. It is interesting to notice that a large fraction of charities provide grants and in-kind gifts.

Nearly all of the 111,000 philanthropic institutions that The Global Philanthropic report surveyed had a governing body [2]. The donor usually does not have a word to say on how his donated funds will be spent. Technologies such as Blockchain can propose alternatives that afford more control and transparency to the donors.

B. Tomorrow

According to the Charity Aid Foundation [3] there are 2.4 billion people that are set to join the world's middle class by 2030. If the world's middle class donated just 0.5% of their

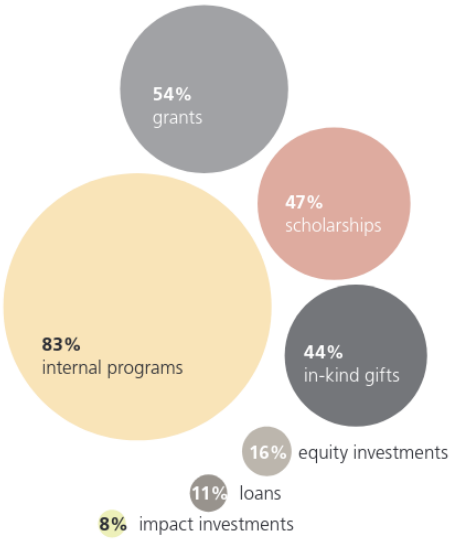

Fig. 1. "Of 699 foundations in 12 countries and Hong Kong, the majority engage in internal programming as a means of conducting philanthropy. Other common practices include grants, scholarships, and in-kind gifts."[2] The activities are not mutually exclusive.

income per year, which is less than the amount that the typical U.K household donates, philanthropic organization would have the task to distribute USD 319 billion. This would be a massive increase from the current philanthropic expenditures that are estimated to be around USD 150 billion per year.

Blockchain is one new technology that could revolutionize this rapidly growing sector. It could provide charities untapped opportunities to get their donors more engaged with their contributions.

III. Literature Review of Charity Blockchain

The academic literature on the application of distributed ledgers in philanthropy is incipient. Already at this stage, however, we observe an ideological battle developing between the *idealists* – those that champion the public blockchain, open to all, based on consensus – and the *pragmatists* – the ones that instead advocate for private or permissioned blockchains with closed membership. Following our research, one finds a more sizeable body of evidence corroborating the *pragmatist* position, but a golden thread weaves them together: both the *idealists* and the *pragmatists* strive for a reality in which the promise of the trustless blockchain delivers scalable social change.

In this section we will elaborate the status quo of this debate by elaborating on the arguments that are brought up in favor and against the use of Blockchain technology in the philanthropic sector. This study tries to be as detached as possible, but the reader is cautioned of the bias endemic to the reviewed literature which happens to be produced by academics, consultants and journalists – the main galvanizers of the blockchain hype [4]. At the end of the section we expose some of the open questions encountered being asked in the literature.

A. Strategic analysis

In a recent study on the sustainable development of NPOs with Blockchain technology [5], Shin et al identify sustainable development strategies for NPOs that increase donation, reduce cost, enhance transparency, and improve governance structure. The investigated use cases that leverage donations through cryptocurrencies are: BitGive, Alibaba (Ant Love), AidChain, Greenpeace and the IXO foundation. What these use cases have in common is that they accept donations in cryptocurrency – either directly or through a transformation into a donor coin (ex. AidCoin).

Shin et al [5], argue that the added value of a blockchain compared to a database management system is in its capability to support sustainable growth of NPOs by increasing donations through *enhanced governance*. Two development strategies are identified, having two types of charitable foundations in mind:

I. Pursued by **large international** organizations through DLTs [1], the strategy aims to ***increase operational efficiency*** and transparency rather than the contributions. For example: UNICEF [6], the UN World Food Programme.

II. Pursued by **small NPOs** that focus on ***increasing the donation amounts*** by tapping into the market of cryptocurrency donors. The use cases listed above: BitGive, Greenpeace and AidChain are all employing DLTs with this objective.

B. Operational Efficiency

A salient example of a charity that has successfully pursued the ***operational efficiency*** strategy [5] is the Jordan refugee camp that runs on a blockchain [7]. In 2009, the UN WFP (World Food Programme) has changed its humanitarian model from food delivery to paying for food in order to feed more people, improve the local economies and increase transparency. While the logistic problem of food delivery has vanished, another one has resurfaced: getting refugees without government identity documents or a bank account into a financial and legal system. A digital wallet could be a means towards regaining their legal identities and building a rudimentary credit history. It is important that these new records be transferable when leaving the camp and opening a bank account in another region.

Working within the *self-sovereign identity* framework [8], the UN WFP has implemented a permissioned variant of the Ethereum Blockchain. Digital wallets are accessed with iris scanning (through a *fuzzy extractor* from biometric data [9]), are created in a matter of seconds for incoming refugees and allow the WFP to tally up the purchases and make bulk payments to the participant stores in local currency [7].

By employing this ***operationally efficient*** strategy, the UN WFP has achieved a 98% reduction in fees with local and regional banks.

The *idealists* question this *pragmatic* blockchain. To them, the main challenge remains on the one hand in opening up the

[1]DLT - Distributed Ledges Technologies

blockchain to local mom-and-pop stores that are not controled by WFP and, on the other hand, to organisations other than the UN WFP that essentially controls the digital wallets.

C. Increasing donation amounts

Jayasinghe et al propose a model for philanthropy on the Blockchain [10]. Their model explores the possibility of donations in both fiat currency and Bitcoin for a community living in a challenging geographical environment with limited internet availability. Its intended application is financial aid distribution in offline geographical environments such as war zones, disaster areas and economically deprived areas.

The application of DLTs is motivated by the following conditions:

- Conventional internet-based money transfer may not be possible.
- Physical cash handling and transportation may be fraught with danger.
- Publicly available audit trail may be needed.
- Transaction costs through conventional means of money transfer are high.

The solution engineered for a setting with the above restrictions consists of a digital wallet that is operated on the GSM network through SMS and the Blockchain solution is developed with Pay To Script Hash (P2SH)[11] transactions and the RootStock sidechain[2].

While their model [10] allows for different "granularity" of donations: either per specific project or a central Bitcoin address, one of the main limitations is in the poor security of the GSM network in developing countries. The encryption algorithms A5/1 and A5/2 of the GSM network are extremely vulnerable to man-in-the-middle attacks [12] and may be the only allowed encryption methods on GSM antennas in policed regions that choose trading privacy for security and defense interests.

Sikka [13] is a real-life implementation of this model. Meaning 'coin' in Nepali, Sikka is a digital assets transfer platform built by the World Vision International Nepal Innovation Lab in Kathmandu. Sikka implements digital wallets linked to a mobile phone number that store Sikka tokens and can through SMS be used to redeem cash, goods and services at local vendors. Since many Nepalese citizens live in mountainous regions (ex. Buddhist monasteries), they are exposed to natural disasters. Through such digital wallets, the charitable organizations can disburse relief funds directly into the pockets of the inhabitants of the affected regions that they can then expend for food at neighboring vendors.

D. Lessons from supply chain management

The field of supply chain management supplies additional evidence of Blockchain use cases that are relevant for the humanitarian development and philanthropy areas of activity. Indeed, the financial problem of charities is a matter of funds and supply chain management.

[2]First general purpose smart contract platform secured by the Bitcoin Network. Also used by GiveTrack.

The report of Hackius and Petersen [14] features an extensive online survey over 152 logistics companies on use cases, barriers and general prospects of Blockchain in logistics. While the participants' evaluation generally reflects a positive stance, they identify several barriers to this new technology in such a conservative industry like logistics. Below we list the chief points, conjuring that similar points can be found in a similarly conservative industry – philanthropy.

In response to the question "What are the likely barriers for Blockchain adoption in the logistics industry?", the following responses have been given by the participants of the survey:

56%: Regulatory uncertainty
50%: Different parties have to join forces
49%: Lack of technological maturity
49%: Lack of acceptance in industry
41%: Data security concerns
40%: Benefits are not clear
28%: Dependence on Blockchain operators

While one single policy would not be able to address all of the aforementioned barriers, the barrier of regulatory uncertainty is one that can be actively addressed through concrete legislation [15].

The proclaimed benefits of Blockchain in logistics are virtually congruent with the ones found in philanthropy. The Deloitte report lists them as: fast transaction settlement, low costs, transparent and auditable ledger, reliable [16].

E. A centralized ledger alternative

The Bill & Melinda Gates Foundation (BMGF) has released open-source software to support efforts that expand access to financial services in delevoping countries [17].

The lack of access to financial services is still acute in developing and isolated pockets of the world. It is one of the problems that BMGF commits to alleviating through the development of an open-source software for creating payment platforms. It is called mojaloop.io and it is available free-of-cost for software developers to adapt and banks, financial service providers, and companies to implement.

Contrary to other listed projects, Mojaloop implements a centralized ledger, but one which is interoperable with other payment platforms. The Mojaloop project obviates the Blockchain technology, trading the distributed ledger for an ease of integration – the innovation aspect for reduced operational risk.

This example serves as a counterweight in the viability debate of blockchain charities. Indeed, since Mojaloop was designed as a payment platform framework for banks, there is no reason why this platform could not be considered by local charities as well.

F. Recapitulatory review

Vogel P. et al in their analysis of the innovation that Blockchain brings to philanthropy [18] identify the following main benefits for givers and recipients:

- **Reduced transaction costs**. Cryptocurrency transactions do not have daily limits, their costs are not calculated

based on the monetary value of the transaction, but rather on factors such as transaction size, number of transactions made at the same time (Proof-of-Work complexity), or the computational complexity of a smart contract. This results in Bitcoin remaining the cheapest cross-border money transfer solution.[19][20]

- **Highly visible and traceable transactions** The appeal of using a distributed ledger is in its ability to host highly visible and traceable transactions, giving the donors the ability to trace their funds from the outset. By finding out whether the donation has reached its planned end, the donors can make better informed decisions in choosing the charities and program they would like to sponsor in the future, leading towards the formation of a rational donor class. [21] [22].
- **More money for recipients** As explained in the strategic analysis section above, the end cause receives more funds through improved *operational efficiency* and increased *donation amounts*.

Davis R. in his report "Giving Unchained" [23] points the following bold propositions:

- ***Governance-by-algorithm replacing governance-by-enforcement***. Having the charities on the blockchain, through the use of smart contracts one can codify the way in which they are allowed to operate. In this way, the rules are hard-wired into the systems from the outset so that it becomes impossible to break them.
- ***Wide range of assets that donors can give***. An idea taken from the world of music where models using Blockchain technology have been used for royalty payments, it proposes the usage of micro-payments or the donation of spare capacity and shared assets. Further on, with the onset of mass tokenization, donations could consist of assets whose ownership can be transferred through transaction on the blockchain.

Summing up the literature review, we present below a collection of "loose ends" encountered in the literature.

- Both the *idealists* and the *pragmatists* arrive at the following critical question: since most of the development is happening on private blockchains, is this just swapping one kind of trusted authority for another?
- Will permissioning be necessary to maintain credibility of the system? If it does, then the collateral damage caused by operating the blockchain is hard to justify.
- Who decides the content of smart contracts?
- Can smart contracts be challenged or are they irrevocable?

The story of Blockchain technology and charity might not just be about finding new ways to address old problems, but may in fact create entirely new social problems. Could Blockchain technology and wider trends of decentralization and greater transparency create new problems one can't even foresee yet?

IV. Limitations and issues

New technologies that have shown outstanding potential in a particular sector (e.g. Bitcoin) can show substantial limitations when retrofitted to older systems. The Blockchain technology implemented into charity work is a salient example. Trust is on decline... "NGOs were a rocket ship going up but we are now seeing their descent. The NGO sector is seen as important enough to take seriously and judge if it is performing or not," said Edelman President and Chief Executive Officer Richard Edelman [24].

Charities in their conventional form, as we have seen, are organizations where trust and the transaction of funds are the centerpieces of their existence and for which a distributed ledger is a legitimate representation. Pragmatically, however, some core principles of philanthropy and altruism are difficult (or even impossible) to be replaced by a digital system. Indeed, the act of giving goods such a food, shelter, and healthcare, or providing social and religious services require human contact. Oftentimes, the people who are the most in need are those who have no hope for a better future and are ailed by factors that funds cannot buy. In this respect we think of the orphans, the widow(er)s, and the ill. Moreover, digital innovations such as Blockchain require out of the box solutions when deployed in an environment where technological resources are scarce. Evidence of software imperfections resulting in theft of crypto assets, namely the infamous DAO hack [25], are signs that the technology is not fail proof.

This section will enumerate a number of limitations and issues that a blockchain presents when implemented in a charity system. Namely, we will uncover attributes of the technology that seem ground-breaking on the surface but which face sever restrictions in practice.

A. Cybercrime

A Swiss national report on assessing the risk of terrorist financing and money laundering was carried out in the context of the increasing number of crowdfunding platforms accepting crypto assets as payment [26]. Charities in a way operate similarly as crowdfunding platforms: they collect funds to attain a particular goal and are therefore concerned by the related risks. Indeed, due to the anonymity and loose regulatory basis behind crypto cross-border transactions, criminal groups can impersonate humanitarian aid organizations in order to hide activities such as terrorism, money laundering, and drug trafficking.

In the future, the informed public could therefore grow reluctant to finance crowdfunding platforms financed by cryptocurrencies and legitimate charities could face stronger international regulations, pressuring them into not taking advantage of the Blockchain technology.

B. Off-chain implementation

Getting rid of the middle-man in charge of safeguarding the transaction and control of funds to the beneficiary compromises the translation of an on-chain transaction to an off-chain implementation. This question concerns the holistic cycle of a

functioning charity: the release, delivery, and effective usage of funds and the proof of impact that motivates and inspires benefactors to continue donating funds. Indeed, the beneficiary often lives in an environment that lacks the infrastructure and financial institutions to convert the funds into fiat currency, let alone to receive them since crypto accounts require an internet connection. In fact, according to the International Telecommunication Union (ITU) [27], the African continent is the poorest and the least connected region in the world. Some extensive research has been done on using the GSM network to receive cryptocurrency [28] but there is poor evidence that such methods are currently available in poverty-stricken regions, which is the case example of CoinText [29]. Moreover, GSM networks in developing countries are oftentimes unreliable and vulnerable to security threats [12]. Therefore, well-established local organizations and authorities with the necessary tools would need to be solicited and trusted, which could loop back to the problematic of cybercrime discussed beforehand if a Know-Your-Customer (KYC) process is not integrated.

It can already be seen at this point that having funds transferred directly from a donor to a donee is a cumbersome affair that almost surely needs a local authority to organize and allocate funds. Otherwise, complex protocols or smart contracts need to be put in place to ensure that beneficiaries have used the funds correctly and that the stakeholders have been informed of the impact of their donations. Even though this has been partly addressed by the IXO Foundation [30], off-chain accountability remains a concern that cannot fully be controlled by a distributed ledger.

C. Governance

The previous subject matter raises an important concern about the governance of such a system. In section III, we have seen that organizations have openly adopted Blockchain technology in different forms, namely the acceptance of cryptocurrency as means of payment. Even though this enhances the transparency of costs and improves the efficiency of money transfer, the philanthropic processes are not entirely in the hands of the participants of the distributed ledger. Indeed, the organizations are still in charge of controlling the choice of projects and the allocation of funds received for those projects.

In a truly trustless decentralized autonomous organization (DAO) however, the challenges are manifold. The first stems from the fact that a DAO is not tied to any country. This in turn can lead to cultural clashes and diverging insight on how to govern the DAO [31]. Finally in a situation of fraud or crisis, who is accountable? This is a difficult question to answer since the legal framework around DAOs is not clear nowadays. Indeed, since a DAO is distributed and knows no borders, it is tedious to assess which jurisdiction can be applied and who can be held responsible if a smart contract or protocol deviates from its intentional objective and is abused [32]. Moreover, it is even more difficult to point fingers when an exploit is based on code and that the code is open-source.

V. Overview of existing governance models

The introduction of a new charitable organization structured through smart contracts is undeniably less challenging than retrofitting smart contract based operation on existing international organizations. In order to propose a feasible governance structure, it is imperative that we analyze and document the current most common non-profit governance models:

- *The advisory board model.* The advisory board is a team with professional skills and unique talents that are trusted by the management team and serves as an advisor to the president or the CEO of the NPO. [33]
- *The cooperative governance model.*
  In the cooperative governance model, the board takes decisions by voting. Since each vote has an equal weight, this model is best suited for boards in which no member has a higher standing or more power than other.
- *The policy board model.* Presented by John Carver in "Boards that Make a Difference" [34], the policy board model concentrates the decision-making power to the CEO while the advisory board receives regular updates from the CEO.
- *Patron governance model.* The patron governance model is similar to the advisory board model, but the advisory board is comprised of donors that are pivotal in fundraising: donors with large donations, the members responsible for fundraising.

The Blockchain technology allows scaling the size of the advisory boards. In fact, we proceed designing a novel governance model that combines the cooperative and the patron governance models by extending the decision making to a representative model in which all donors participate with a weight commensurate to their total donation amount.

VI. Motivation

In the literature we find a plethora of evidence for permissioned blockchains at the foundation of *operational efficiency* strategies. Most of the encountered use cases are limited to the operational efficiency of the transactions of donations, minimizing the transaction costs. This leaves a void in evidence that addresses the benefit of the operational efficiency brought by codifying into smart contracts the rules by which a charity can operate.

Who would be the direct participants in such a distributed ledger? How can organizations around the world propose projects and how would these projects be voted on and approved by the Blockchain community? Furthermore, by which method will funds be collected and how will they be allocated towards projects? Moreover, can local authorities be bypassed in order to transfer donations directly to those in need in order to improve transparency and costs or are they indispensable in conducting the projects? The following section aims at answering some of these open questions by proposing a novel framework for project proposal and vetting within a blockchain framework.

VII. Proposal

Below we will outline a proposal of how a DAO centered around philanthropic work could be structured. The first part will focus on the procedure for donation and project fund allocation without going into how projects are proposed. The second part will focus on how projects are proposed by a randomly selected review committee.

A. Donors and project fund allocation

Donors can donate funds to the DAO Charity (DAOC). In exchange, the DAOC will give the donor voting tokens. The allocation of these voting tokens plays an important role in fund allocation and project vetting. The number of voting tokens received in exchange for the same amount of cryptocurrency (e.g. USDC) will increase with time and therefore result in an inflation effect. The number of voting tokens a donor receives after donating can be expressed as follows

$$V_m = D_{m,N} \times N \times \left(\frac{D_{m,N} + \sum_{i=1}^{N} d_{m,i}}{\sum_{j=i}^{M} \sum_{i=1}^{N} d_{j,i}} \right) \times \left(\frac{1 + \sum_{i=1}^{N-1} \mathbb{1}_{\{d_{m,i}>0\}}}{A_m} \right) + rN$$

where the first term $D_{m,N}$ is the donation of benefactor m on block number N, supposedly the last block of the chain. In this way, the number of voting tokens V received is proportional to the amount of cryptocurrency donated. The second term N will increase the number of voting tokens V benefactor m receives based on the block number it is currently on. The third term takes into account the total amount of funds benefactor m has contributed during the entire lifetime of the chain including the current donation being made, where $d_{j,i}$ is the total donation of donor j on block i. The fourth term takes into account the frequency of participation of the donor, where A_m is the age in number of blocks of benefactor m. The last term takes account the reward received in the voting phase of project proposals (see section VII-B).To better understand the policy at hand, let us illustrate four cases:

1) A benefactor donates very little but on every block: even though the donor has been active on the chain, its total donations will not allow it to be influential on project voting.
2) A benefactor donated a lot in the past but has not been active for a long time and decides to donate now: depending on how long ago the benefactor last donated, its influence will be greatly diminished by the time it was inactive.
3) A newcomer arrives with a big donation: its frequency will be optimal but its donation compared to the total funds of the chain will not allow this benefactor to exercise great power on project voting.
4) A loyal benefactor has regularly donated a substantial amount since the beginning of the history of the chain: this donor will have a big influence on project voting due to its sum of contributions and activity.

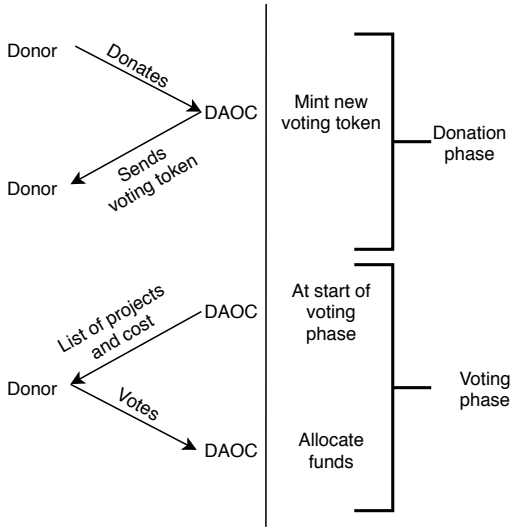

Fig. 2. Donor funding and vote participation. The y-axis represents time.

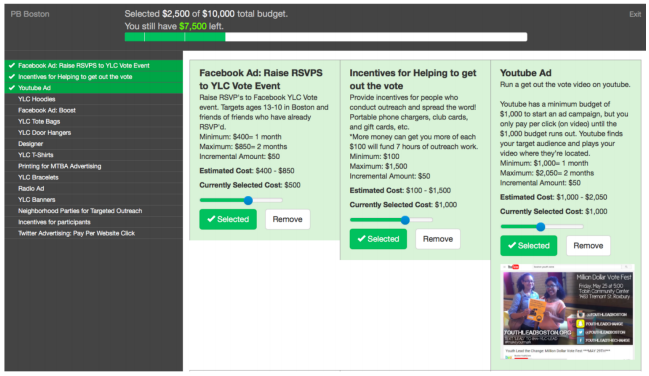

Fig. 3. Fractional Knapsack voting interface demo described in [35]

This policy thus incentivizes donors to donate important funds on a regular basis, their loyalty being rewarded by more voting tokens. Conversely, newcomers arriving will need to work their way up to improve their status on the chain. Finally, donors will have the option to delegate their voting rights to third parties. This structure will thus allow for a combination of direct and representative democratic decision-making to coexist.

Once the votes are tallied, the DAOC will proceed to allocate the funds to the projects. The allocation of funds will be done using Knapsack voting, which is a format of participatory budgeting (PB) where an algorithm optimally partitions the funds among the projects that voters choose with their voting tokens [35]. This has the advantage that it allows donors to specify what would be the ideal way to spend the entire fund based on their preferences. Each period will consist of two parts. First there will be the total fund allocation were users donate and obtain voting rights, then a decision is made on fund allocation. The protocol in question is illustrated in fig.2 and an example of a Knapsack voting interface is shown in fig.3.

B. Project vetting and acceptance

Anybody can put forward a project where its proposal must contain the following content:

- Required funding goal.
- What the funds will be used for (title).
- Description of the project.
- Number of funding rounds the project wants to be active for.
- Destination of collected funds.
- Destination of return collateral.
- Collateral that will be added to the funding pool with no voting tokens if the project is to be rejected.

The collateral serves as a minimum barrier of entry to avoid flooding attacks that would make it impossible for the DAOC to function.

Users are to be selected at random to form a small committee, with active users having a higher chance of being selected. The selection process can easily be modeled with the help of a Poisson distribution: let λ_m be the Poisson density parameter of benefactor m, which can be computed as follows:

$$\lambda_m = \frac{exp\left(-\frac{\sum_{i=1}^{N} \mathbb{1}_{\{d_{m,i}>0\}}}{A_m}\right)}{1 + log(V_{tot,m})}, \quad \lambda_m \in (0, \infty)$$

then we can sample P_m from this parameterized distribution as follows

$$P_m \sim Pois(\lambda_m)$$

where $V_{tot,m}$ is the total number of voting tokens of benefactor m. The λ parameter shrinks with the activity of the user and its total number of tokens. With a Poisson distribution having mean and variance λ, P_m can thus be seen as the position of benefactor m eligible to be in the committee (a low value corresponds to a higher chance of being selected). It suffices then to select k-odd (in order to avoid ties) smallest values of all P_m among all benefactors on the chain to constitute the committee. This model discourages identical committees of being formed from one proposal to another. A member that is selected to be in this committee must accept the nomination, otherwise the DAOC will replace the member by a new nomination (the next lowest P_m). Each member of the application committee will have to vote for either accepting or rejecting the proposal. All members have the incentive to thoroughly inspect the application: if they agree with the majority then they will receive a reward r in the form of voting tokens. Projects that are accepted will be included in the list of projects that can be funded by the DAOC. The fig.4 illustrates the aforementioned vetting process.

VIII. Discussion

The protocol above will allow any charity organization to be run in a truly trustless setting. Such an organization allows all participants to trust the system without worrying that an individual or an organization will undermine the entire process.

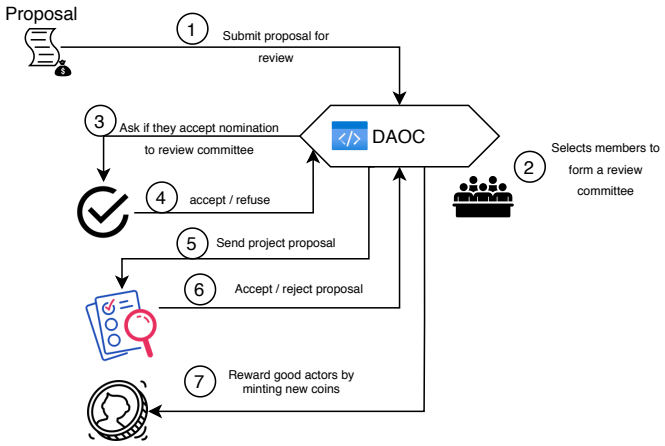

Fig. 4. Project proposal and vetting process.

A potentially easy project to kickstart on the DAOC would be donations to the World Food Program (WFP). The WFP is currently using a private implementation of a blockchain [36] to reduce the administrative costs of distributing funds to people in need. Currently the WFP distributed USD 798 million, 38% of the humanitarian help they provide thought direct cash payments [37]. Cash payments have many benefits such as strengthening the local economy as well as removing the logistic costs involved with delivering food. The WFP is the largest humanitarian organization addressing hunger and promoting food security [38] and won a Nobel Peace prize in 2020. Integrating the DAOC onto the WFP might encourage the WFP to embrace the true benefits of Blockchain by providing a trustless environment that both refugees and merchants can count on. In this light, a private permissioned blockchain is pointless since it does not allow it to evolve in a trustless environment.

The WFP blockchain project would allow the donors to have full transparency of where the funds went, how they are spent, and for what type of goods. The entire process from donation to spending the funds for food is recorded on the blockchain for any party to audit.

We will next enumerate the pros and cons of the DAOC protocol.

A. Advantages

The DAOC provides a trustless charity that is fully auditable and resistant to corruption. Any attacks that aim at heavily influencing the spending decision of the organization would require large amount of contributions. Even in such scenarios the Knapsack voting would still allow for projects that the adversary has not submitted to receive funding.

B. Disadvantages

The main issues with DAOC are also what make up its strengths. Code is the letter of the law in a DAOC and there is no possibility to appeal decisions that were made. If funds are to be withdrawn by a loophole (bug) in the contract then there exists way to appeal this. The rise in popularity in 2020

	Pros
Donor	Trustless donation Reduces donation fess (credit card, Paypall, bank transfer) Transparent use of funds
Donnee	Trust that donated amount will arrive Reduces middle man fees.

	Con
Donor	Risk of hacks Legal framework Understanding of Blockchain
Donnee	Requires internet connection

TABLE I
STAKEHOLDER ANALYSIS

of DeFi has exposed the major issues that plague DAO that rely on code. Many hacks have occurred in 2020 and millions of dollars have been stolen from DeFi protocols [39], [40]. This shows that despite efforts of programmers to foresee potential breaches in their code, the risk related to hacks will always exist.

Another issue that can arise from a DAOC is its legal status. This question must be subject to further research to determine the legal framework of a DAOC.

A non-exhaustive list of advantages and disadvantages of the protocol can be found in Table I.

IX. Conclusion

This paper gives an overview of the status quo of charities: an activity that has been around for centuries with an underlying operation that has not much changed. The Blockchain technology has caused significant disruption in today's economy, namely in the financial sector where cryptocurrencies have revolutionized the way we conduct transactions online and it has been shown that many charitable organizations have begun to hop on the bandwagon. It has been seen that such a technology can either increase the operational efficiency of donations by reducing transaction fees and bringing funds faster to the donees or increase the amount of donations by taping into the market of cryptocurrency benefactors. However, retrofitting ground-breaking technologies to principles that have existed long before the industrial age can present some limitations and issues. With this in mind, this paper tackled one of many issues arising with respect to the governance in blockchain-enabled charity organizations and proposes a novel protocol for allocating voting tokens and funds and vetting projects. The proposed protocol could be fitted onto an existing charity organization and run in a truly trustless setting while being resistant to corruption. Even though the protocol seems promising, further research needs to be done in the fields of game theory and political sciences to better investigate the optimal incentives behind voting and further research on the legal framework around DAOs needs to lead to concrete applications.

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