

Blockchain for social good: a quantitative analysis

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ABSTRACT

The rise of blockchain technologies has given a boost to social good projects, which are trying to exploit various characteristic features of blockchains: the quick and inexpensive transfer of cryptocurrency, the transparency of transactions, the ability to tokenize any kind of assets, and the increase in trustworthiness due to decentralization. However, the swift pace of innovation in blockchain technologies, and the hype that has surrounded their “disruptive potential”, make it difficult to understand whether these technologies are applied correctly, and what one should expect when trying to apply them to social good projects. This paper addresses these issues, by systematically analysing a collection of 120 blockchain-enabled social good projects. Focussing on measurable and objective aspects, we try to answer various relevant questions: which features of blockchains are most commonly used? Do projects have success in fund raising? Are they making appropriate choices on the blockchain architecture? How many projects are released to the public, and how many are eventually abandoned?

CCS CONCEPTS

• **Applied computing** → **Electronic commerce; Digital cash; Electronic funds transfer;**

KEYWORDS

Blockchain, cryptocurrencies, social good

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1 INTRODUCTION

In the last few years there has been a steady increase of interest in blockchain technologies. This is witnessed — among the other things — by the venture capital funding of billions dollars in blockchain start-ups [3], the proliferation of open-source projects [9], and the interest of major ICT and consultancy companies [7] and national governments [10].

Among the various fields where blockchain technologies are believed to have an impact, social good is among those that are generating the greatest expectations [4, 6]. However, it is not easy to foresee whether these expectations will be met. On the one side, the evangelists of blockchain technologies think that “*blockchain will touch, if not disrupt, every major industry and will even alter the way that people and societies interact*” [4]. On the other side, blockchain skeptics believe that the flaunted “disruptive potential” of these technologies is only hype, as no convincing use case has been found yet [8]. From a strictly technical perspective, these skeptics find support in that every blockchain use case can also be implemented *without* a blockchain: indeed, the added value of blockchains is that they can weaken the trust assumptions of an application. For instance, Bitcoin — the first blockchain-enabled cryptocurrency — implements a globally-agreed ledger of currency transactions, which is maintained by a P2P network [2]. Unlike the previous generation of cryptocurrencies, which required a trusted authority to maintain the ledger, the only assumption underlying the security of Bitcoin is that nodes have a rational behaviour, i.e. their choices are driven by economic incentives. This decentralization of trust — from a single authority to a network of mutually distrusted nodes — is the real potential of blockchains (at least, of their “permissionless” incarnations).

Although decentralization could play a role in determining the success of social good applications, there are still no objective data on how the projects that have been proposed over the last years are actually behaving. The most recent reports on blockchain for social good are quite limited regarding objective data: they just describe some use cases, trying to motivate the applicability of blockchains [6], or

provide statistics about social good projects on the basis of interviews to their proposers [4]¹.

Objective measures on social good projects could help to separate the hype from the reality. The web already makes available several sources of measurable data: for instance, the projects websites, their code repositories, the crowdfunding and ICO rating platforms, besides blogs and social networks.

Contributions This paper is a quantitative analysis of blockchain-enabled social good projects, based on publicly available data. In summary, our main contributions are:

- (1) a public dataset of 120 blockchain-enabled social good projects (goo.gl/Erfm86), containing all the data needed to reproduce the analyses developed in our survey;
- (2) an open-source repository of projects descriptions (<https://github.com/blockchain-unica/social-good>);
- (3) a study of the distribution of social good projects among different impact sectors;
- (4) an analysis of the main features of projects, focussed at discovering how they exploit blockchain technologies;
- (5) an estimate of how, and how much, projects have gathered investments, and of the success of fund raising campaigns with respect to the expectations;
- (6) a systematic study of the architectural choices made by projects, and a comparison between the actual type of blockchain chosen and the one predicted by the decision making process in [11];
- (7) an evaluation of the status of projects, taking into account both their online channels and the activity on their code repositories, aimed at measuring the successful deployment and the mortality of projects.

2 COLLECTION OF SOCIAL GOOD PROJECTS

We have crawled the web for articles on social good projects, focussing in particular on websites which rate ICOs (like e.g. icobench.com). By manually filtering these results, we have collected 120 social good projects based on blockchain. Our criteria for deciding whether or not a project should be in the collection are the following:

- (1) the project declares to use a blockchain, of any kind;
- (2) the goals of the project must be coherent with the [UN Sustainable Development Goals](#);
- (3) social good should be the preeminent goal of the project.

We have chosen to keep in our collection also the projects that have already been abandoned, since we want to measure the mortality of projects. We have also kept in our collection the projects that are already operational without any

¹These interviews are mainly focussed on *subjective* data, asking e.g., “how does your initiative use blockchain, and why is blockchain a good technology for this problem?”, or “in what time frame do you think you will see meaningful impact from your blockchain initiative?”.

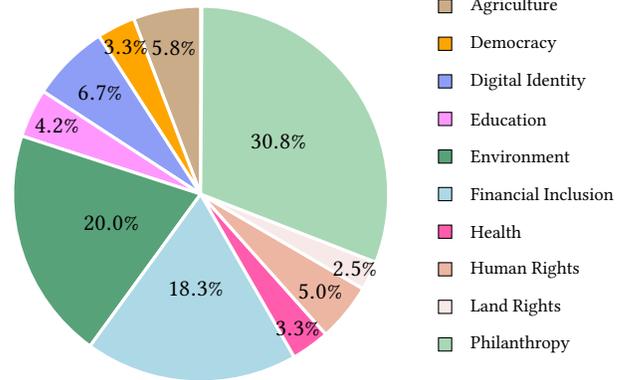


Figure 1: Projects by social impact sector.

blockchain, but that have planned to switch to blockchain in the near future (this is the case e.g. of [Neighborly](#)). One of the most delicate choices we had to make concerns the projects in the health sector and in the energy sector. Although health and energy are coherent with the UN Sustainable Development Goals, many project in these sectors are preeminently business-oriented, thus violating our third criterion.

After the collection phase, we have analysed the project to perform a first categorization, based on their social impact sector. To this purpose we have followed the taxonomy in [4], so to be able to compare their results with those in our survey. Our categorization is shown in Figure 1, from where we see that the most populated category is “Philanthropy” (31%)², which includes e.g. charity donation platforms. The “Environment” category includes projects whose main purpose is to improve the quality of the environment, as well as projects aimed at optimizing the usage and distribution of energy. “Financial Inclusion” comprises e.g. software platforms for remittances and for micro-loans.

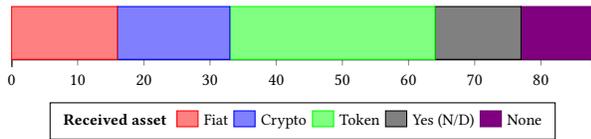
3 WHAT DO SOCIAL GOOD PROJECTS DO?

We now isolate some archetypal features of social good projects, and we measure them for those in our collection. Since most projects allow for exchanging some kind of asset, we focus on features which impact the financial side³.

We start by studying which kind of asset the projects accept as input, if any. The results of our analysis are displayed by the following diagram.

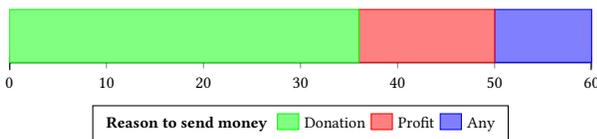
²In contrast with [4], where “Health” is in first place. This discrepancy is due to our choice to exclude business-oriented health projects.

³In our measures we omit the projects for which it was not possible to infer the values of the features from the online documentation.



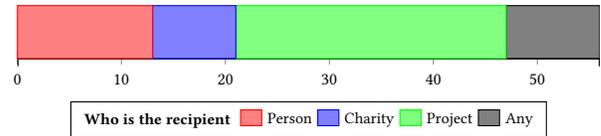
We see that of all the projects, only 11 seem not to receive any kind of asset. Example of these are: [Flux](#), which gathers environmental data to help farmers improve yields; [Poseidon](#), which help to track one's carbon footprint; and [Handshake](#), which stores on the blockchain the contracts of migrant workers, to help reduce abuse. For the other projects, the most common ways to receive assets are cryptocurrency (chosen by 31 projects) and fiat currency (17 projects). Some of the projects manage both kinds of currency: for instance, wallet applications ([ChangeBank](#), [BitPay](#), [Unocoin](#), [Kora](#)) which help users to trade fiat for cryptocurrencies, and send (any) assets to someone else, anywhere, in a short time. Projects of this kind target people living in unbanked regions and allow them to receive remittances from their family without the need of a bank account. Besides fiat and crypto, the other possibility is that the project implements its own token, and uses it as a medium for payments. This option has been chosen by 16 projects ([Pink](#), [Moeda](#), [MonedaPar](#), [AlmBank](#)). Some projects (e.g., [AidCoin](#) and [SureRemit](#)) receive fiat or crypto, and then convert them into tokens; alternatively, tokens have to be purchased through exchanges like [coinbase.com](#). Buying tokens is not the only way to obtain them: in some cases, tokens can be earned as reward for some behaviour, like e.g. using the application ([Wala](#)), attending school ([GiveFoundation](#)); tokens may also serve as a basic subsidy to eradicate poverty ([Mannabase](#)).

The following diagram measures the reason why money is sent to projects.



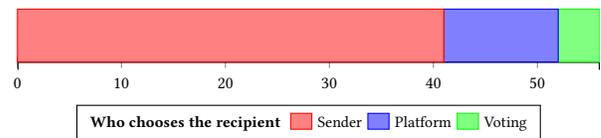
harvesting of goods, with the idea that when the product is ready and sold, the token are paid back; [Batan](#) tracks carbon footprint, and assists in buying carbon credits; [RecycleToCoin](#) aims at paying people in order to collect plastic waste, targeting the double goal of helping people out of poverty and cleaning the environment.

The following diagram measures who is the ultimate recipient of the money sent to social good applications:



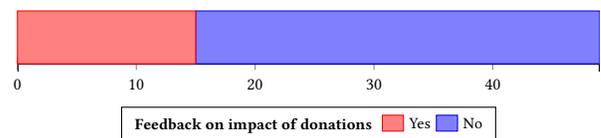
In 13 cases the recipient is an actual person. Most of these cases are wallet applications that do remittances, and charity projects which aim at helping individuals. For instance, [Fummy](#) and [Hypergive](#) transfer money directly to homeless people to allow them buy food; [Give](#) project sends money to children who attend school. In 8 philanthropic projects (e.g., [GoodCoin](#), [HumanityRoad](#), [UrbanArray](#)), funds are sent to a charity, with no further specification on how they will be spent. In the vast majority of cases (26), money is gathered to fund a specific project (that can be either for charity or for investment). For instance, [Neighborly](#) allows users to choose the projects to invest in, among those who benefit the local community; [GiveTrack](#) offers a choice of different projects to which one can donate money.

The following diagram measures who decides the recipient of money: this can be the sender himself, the application, or a voting procedure.



Most projects (41 cases) allow senders to choose who receives their donations. In 11 cases (e.g., [GoodCoin](#), [Charity-Token](#), [DistributeGiving](#)) the choice is made by the platform itself, often without detailing their policy. In 4 projects (e.g., [Benefactory](#), [Positive Women](#), [CharityDAO](#)) the choice is taken after a vote among the senders.

The following diagram analyses whether who sends money to a project can obtain some feedback on what has been accomplished with their money.



In the vast majority of cases (36), the money is sent as a donation (e.g., in [BitHope](#), [AidCoin](#), [CharityDAO](#)). Indeed, projects that collect money for charities are soaring, since blockchain technologies allow for fast transfers of money across countries, with the added benefit of making the flow of money observable by donors. Beside donations, 14 projects try to couple social good with the possibility to make profit⁴. For instance, [Moeda](#) and [EthicHub](#) are platforms to crowd-fund agricultural projects, which, in case of success, will pay back investors; [WeTrust](#) and [Suretly](#) implement micro loans; [Banancoin](#) and [CacaoShares](#) sell tokens linked to the

⁴We are not considering the mere ownership of crypto as an investment.

We observe that in the majority of projects (34 cases), no impact data is provided, while 15 projects provide donors with some sort of feedback. For instance, [GiveDirectly](#) features a web platform through which the recipients of donations can promote their cause or provide feedback. [SureRemit](#) implements a remittance service which allows senders to know how their money has been spent. [EthicHub](#) implements a reputation mechanism which rewards farmers that repaid their loans. [Amply](#) and [EducateGirls](#) are projects developed by the [IXO Foundation](#) to provide education for children in Africa and India; both projects store impact data to assess the project progression. In the [Alice](#) platform, funded projects are monitored and assessed. In the [GiftCoin](#) platform, projects are funded incrementally, according to assessment results.

Finally, we study whether projects implement some mechanism to automatically trigger payments.



The majority of projects (43 cases) transfer assets manually; only 18 projects manage part of the money transfers automatically. Examples for the latter are [Amply](#), [EducateGirls](#), [GiftCoin](#), and [Alice](#), which assess the progression of projects and use the fulfillment of goals as a criterion to trigger payments through smart contracts.

4 FUND RAISING

In this section we study how social good projects get funding. Overall, 35 out of the 120 projects in our collection have received some funds⁵. As far as we can tell from the information available online, only 8 of them have been funded through conventional sources, like private investors or international organizations. These projects gathered *USD* 65.3 millions in total, with a peak of *USD* 30M raised by [Abra](#), a financial inclusion project which enables cross-border money remittances. The other 26 projects have received funds through Initial Coin Offerings (ICOs). These are a form of fund raising that has become widespread since 2017 [1, 12]. In an ICO, the project founders create and put on the market a set of crypto-assets, called *tokens*. Investors fund the project by buying these tokens, hoping that they will gain value if the project is successful. By querying various ICO trackers we have found that 45 projects (among those in our collection) have launched, or are expected to launch, an ICO. Out of the

⁵All our estimates about fund raising are conservative, since a project could not declare how much funding it has gathered *off-chain*.

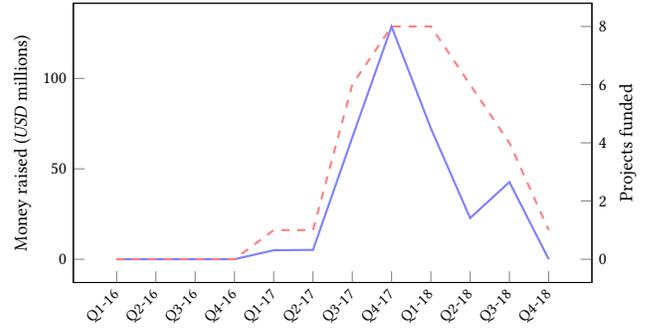


Figure 2: Funds raised through ICOs.

34 projects for which the ICO has been closed, 26 projects have received some money, for a total of *USD* 346.4 millions⁶.

In Figure 2 we measure the overall funding received by the projects in our collection through ICOs, showing the temporal evolution by quarters of year (solid blue line), as well as the number of projects funded (dashed red line)⁷. To associate projects to quarters we consider the average between the date on which the ICO was started, and the date on which it was closed. The peak in Q3 2017 is mainly contributed by *USD* 20M raised by [Moeda](#) (a platform for investing in agriculture projects) and by *USD* 15M raised by [Propy](#) (a project to tokenize land properties), while the peak in Q3 2018 is mainly due to *USD* 42M raised by [4NEW](#) (a project for producing and distributing green energy).

In Figure 3 we analyse the success of the ICOs, by comparing the money raised through the ICO and the money expected. We represent as a point in the diagram each of the 17 projects for which we have been able to determine both the actual money raised through the ICO (on the *x*-axis) and the *soft cap*, i.e. the money expected by the project founders (on the *y*-axis). The 11 blue circles correspond to the projects for which the fund raising was successful, i.e. the money raised exceeded the soft cap. Instead, the 6 red triangles correspond to the unsuccessful ICOs: in some cases, these project were abandoned just after closing the ICO.

5 ANALYSIS OF BLOCKCHAIN ARCHITECTURES

In this section we analyse the blockchain architectures of the projects in our collection. We start by studying which blockchains are used to implement their application logic⁸.

⁶The information about the money raised by ICOs reported by ICO trackers are not always reliable, since they are provided by the projects themselves. However, in most cases this is the only source of information available, since the addresses used to raise funds are not usually made public.

⁷The fall in the number of funded projects in Q3 2018 is probably due to the fact that the third quarter is not completed yet at the time of submission (3rd September, while Q3 will end on 30th September 2018).

⁸We do not consider, in this analysis, the blockchain used for the ICO (in most cases, this is Ethereum).

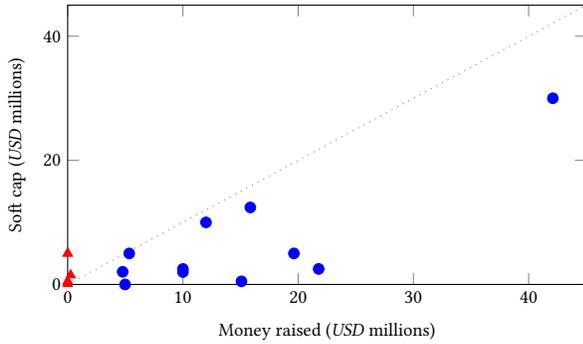


Figure 3: Money raised through ICO vs. soft cap.

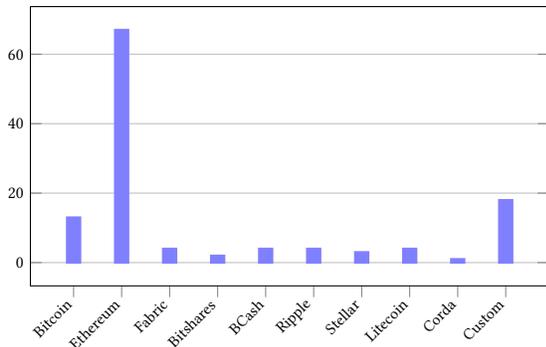


Figure 4: Blockchains adopted by the projects.

To retrieve this information, we inspect the project websites and whitepapers (when available): out of the 120 projects in our collection, we have managed to determine the blockchain used by 100 projects; 12 of them use more than one blockchain. Figure 4 shows the number of times each blockchain is used by a project. The most used blockchain is Ethereum (67 projects); 18 projects develop their own blockchains.

Another relevant question we try to answer is whether the projects are using correctly the blockchain technology. Several processes for deciding, given the project features, which blockchain architecture is needed are described in literature [5]. Among them, in this survey we apply the process in [11]. This process uses a flow chart (displayed in Figure 5)⁹ to determine, given a set of basic architectural choices, which kind of blockchain (if any) is appropriate for the given use case. The flow chart has 3 possible outcomes: no blockchain, *permissioned* or *permissionless* blockchain. If there exists only one entity authorized to update the blockchain (i.e., a single

⁹Compared to [11], our flow chart is a bit simplified. First, we omit the first decision (“Do you need to store a state?”), since the answer is always yes for the projects in our collection. We also drop the decision “Is public verifiability required?”, which allows to distinguish between public and private (permissioned) blockchains, since the information about the blockchain used by our projects do not allow to distinguish between these two cases.

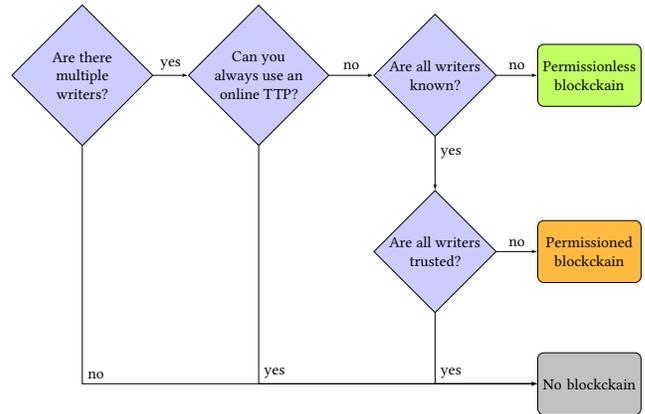


Figure 5: A flow chart to determine which blockchain technology is appropriate for a given use case (inspired to [11]).

writer), or multiple writers which are wither all trusted or can be safely replaced by a trusted third party which is always online, then there is no need for a blockchain. In the other case using a blockchain is appropriate: this should be permissioned if all writers are trusted, otherwise permissionless. Indeed, in a permissioned blockchain (e.g., Hyperledger Fabric) there exists an entity that grants permissions, for instance it decides which is the set of users authorized to append new transactions to the blockchain. Instead, in a permissionless blockchain (e.g., Ethereum and Bitcoin) there is no such authority.

The following table displays the results of our analysis. Notably, for 5 projects the actual blockchain does not coincide with the predicted one: these projects use a permissionless blockchain (almost always, Ethereum), whereas they should have used a permissioned one. This choice may negatively impact the effectiveness of the project, e.g. requiring higher fees for appending transactions or running smart contracts.

		Predicted		
		Permissioned	Permissionless	No
Actual	Permissioned	4	2	0
	Permissionless	5	13	1

6 STATUS OF PROJECTS

In this section we analyse the evolution of projects, to find how many of them remain in the status of proposal, how many become operational, and how many are eventually abandoned. To this purpose we associate each project in our collection with one of the following tags:

Proposal the project has been advertised online, and it may have issued an ICO to gather funding (the ICO may be either upcoming or closed). However, the project has not started the development lifecycle.

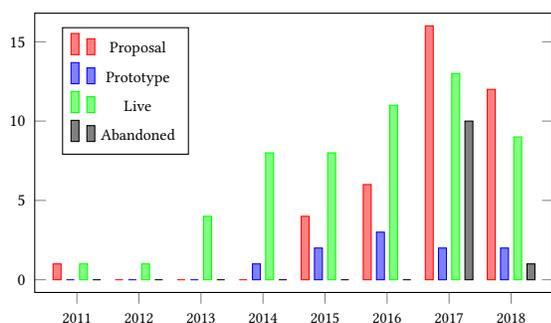


Figure 6: Status of projects by year of proposal.

Prototype the project is not operational yet, but its development lifecycle has started: some prototype, demo, or open-source repository is available to the public.

Live the project is operational and available to final users.

Abandoned the project website is down, or it displays obsolete content, or there is some external source which declares the project abandoned.

To keep track of the status of projects we use the information available online, while we do not consider the “development roadmap” often included in the project whitepapers, since it may not correspond to reality. Figure 6 shows the status of projects, grouping them by the year when they were proposed. There is a peak of proposals in 2017 (probably related to the overall growth of Ethereum-based projects), with a corresponding peak of abandoned projects¹⁰.

We also count how many projects are developed in the open-source environment. Indeed, open-source is a common trait of blockchain technologies: the survey [9] counts ~86K open-source projects based on blockchain (not only for social good) up to October 2017, with an average of ~8K new projects each year. Similarly to [9], we conduct our search on GitHub; we find that only 38 out of the 120 projects in our collection have published some code on GitHub. The analysis in [9] found that only 8% of projects in their dataset are *alive* – meaning that their GitHub repositories have been updated at least once in the last six months. A similar analysis on the 38 open-source projects in our collection yields more positive results: 23 of them are still alive (60% of the total).

Table 1 relates the availability of documentation and open-source repository (and its liveness) to that of funding. Since values of funded and not funded projects are quite close, we cannot infer that funding is related to availability of source code (or its liveness) and documentation.

7 CONCLUSIONS

Our paper gives a snapshot on factual data about social good projects. Our dataset represents a significant sample of how

¹⁰As before, the fall of 2018 may be due to missing data at time of writing.

Features	Funded	Not funded	Total
Whitepaper	27	35	62
GitHub (alive)	15 (9)	23 (14)	38 (23)
Whitepaper + GitHub (alive)	15 (9)	13 (9)	28 (15)

Table 1: Projects documentation and code vs. funding.

blockchain technologies are applied for the social good. Of course our results are not conclusive, since many more years will be needed to have a clear understanding of how (and if) blockchain technologies will enable social innovation. However, ours is first step of a long-term effort towards a systematic analysis of this phenomenon, which we will continue to study as new data become available.

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