

# Cover Sheet

BETH Blockchain for Sustainability FS2019

Course report



An Ethereum based donation platform for sustainability

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The code which is part of this report is open source and available at  
<https://github.com/betherworld/ABitOfCharity>.

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## Introduction

Blockchain technology has gained rising attention in the past decade. Among many of those, Bitcoin and Ethereum are very popular and contribute considerably to the use cases of blockchain technologies. Bitcoin shows the feasibility of using blockchain for secure, transparent and anonymous transactions in the form of cryptocurrencies. Ethereum is a later invention of blockchain which introduces a scripting language (“smart contract”) and allows application development on top of cryptocurrency (Ether) transactions.

Apart from making transactions of cryptocurrencies, blockchain technologies also have great potential to be applied in many sustainability development activities. During the hackathon of BETH Blockchain for Sustainability course in 2019, we worked on the project “A Bit Of Charity (ABoC)” where an Ethereum platform is created to facilitate Ethereum-based cryptocurrencies donations to organisations which carry out sustainable activities, e.g. charities and non-governmental organisations (NGOs). On the one hand, the cryptocurrency holders who would like to make donations could spend their cryptocurrency on supporting sustainability development, and get attractive rewards in return. On the other hand, charities and NGOs will have access to additional donation collection channels.

Cryptocurrency donation has a big potential. One successful example is Pineapple Fund [A1] which manages to donate 5104 Bitcoins (worth approximately 55 million US dollars) to 60 charities. Cryptocurrency donation also grows very fast. According to [A2], Fidelity Charitable received 69 million US dollars from cryptocurrency donation in 2017, which is almost 10 times higher than the amount received in the year before.

## Challenge and solutions

One key challenge of the ABoC project is how to ensure the validity of the beneficiary accounts, i.e. charities and NGOs, avoid frauds, and gain the trust from cryptocurrency donors. Another challenge is how to manage the reward system in a simple manner so that the donors are incentivised to donate. The third challenge is to design the platform to achieve better donating experience.

In order to tackle these challenges, on top of the decentralised Ethereum transaction platform an NGO called ABoC is created to centrally manage the beneficiary accounts and enhance trust from donors. The NGO ABoC also manages the reward system centrally so that the donors get and redeem all the rewards in one place and avoid the tricky work to contact all the charities/NGOs to collect rewards. In order to provide superior donating experience, a web interface is created which allows the donors to conveniently choose the charities/NGOs and the donation amount.

# Concept

## Working structure and stakeholders

Withdrawing cryptocurrencies is always cumbersome, no matter what the amount is. As soon as the bank notices that the money being transferred into a bank account comes from cryptocurrencies, the suspicions arise and the procedure to conclude the operation becomes time consuming and hard. This is the main issue on which the idea of creating a platform like ABoC is based.

The whole system relies on four main components: on one side there are three smart contracts based on the Ethereum network and on the other side ABoC, a registered non-governmental organization (NGO) owner of the contracts.

A web-based platform allows a user to interact with the smart contract, making it possible for the donor to determine how to donate. In fact, a customer not only can submit a donation using Ethereum or any Ethereum-based token but using the service provided by ABoC a donor has now also the opportunity to bestow his money to many NGOs and Charities and decide in which percentages the donation should be shared between the organizations. Lastly, since receiving institutions are also categorized, there is also the possibility of donating directly to those belonging to a specific group. Once all the details are completed, the donation is sent to the smart contract which, after controlling if all the requirements are fulfilled, finally releases the money to the beneficiary associations.

If the donation occurs without errors, a second smart contract responsible to generate Ethereum-based tokens ("Charibit") is invoked and, depending on the amount donated, delivers them to the donor. These tokens could then be used in the rewards program which will be discussed later.

Another important feature is the opportunity for the user to request a tax credit certificate which ABoC has the power to issue. If the donor wants to claim it, and in this case only, the customer will be asked to enter his personal information so that these can be imprinted along with other security features on the online generated paper. ABoC believes that the privacy of its guests shouldn't be compromised. For this reason, all documents will be produced directly on the client side and any information will not be stored in any database.

Even though these two last features (tokens generation and tax credit) have been broadly discussed and conceptualized, due to lack of time, they could be neither implemented nor coded yet. In case of further developments, both features would be considered as priority extensions.

When it comes to money (or more specifically to Charities) one of the most major concerns is trust. Being the smart contract based on Blockchain, not only all the transactions are

transparent and can be accessed from everywhere in the world with a computer and an internet connection, but the system becomes also decentralized, reducing drastically the possibilities of hijacking a donation and making it, in this way, much more reliable. Furthermore, the project is open source: this means that a copy of the smart contract will be always available and updated on GitHub so that everyone can verify at any moment how the money going through is actually managed. Moreover, on Blockchain, a smart contract can only be either deployed or killed. The only way ABoC can actually interact with it is therefore limited to the list of NGOs or Charities supported by the platform.

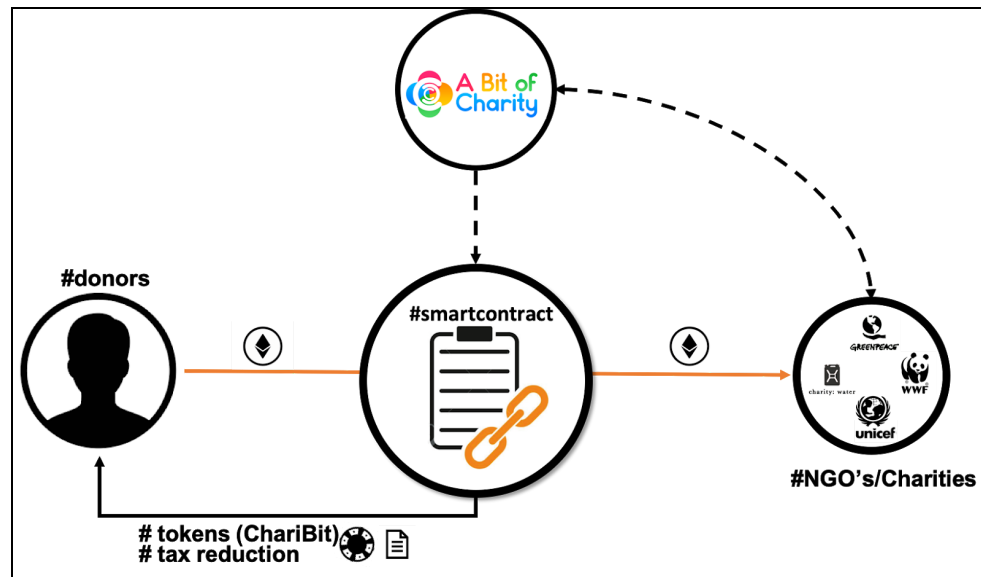


Figure 1: Working structure

In fact, the main role of ABoC as an NGO is to incentivize both donors and NGOs and Charities to join the platform. It is worth to mention that in order to maintain a secure system without any fraudulent association, every individual partner must be properly verified. Although during the development of the project this topic has been largely discussed, sadly the team couldn't find any trustworthy solution that could be adopted so as to have a decentralized mechanism also for this process, leaving the responsibility in the hands of ABoC. Letting everyone insert an organization in the database and implementing a leaderboard where the donor has the opportunity to consume generated tokens obtained after a successful donation, for example, is one approach thought to completely remove any sort of power from ABoC. However, while in general cases asking the users to leave feedback is a great approach to let everyone else understand what information is reliable and trustful, when it comes to our specific case one has a lot to earn by promoting a deceitful association. Let us for example imagine the situation in which someone inserted a fictitious NGO in the system and consider that this person would also have access to the Ethereum account of such an institution. A decentralized system as the one explained above, would basically allow that person to enter a circle in which it could be possible to donate to its own Charity, withdraw the donations and give it positive feedback. Doing this there wouldn't be any loss of money for the interested person and would generate a

leaderboard with misleading results for the community. The risk of money laundry from individuals and criminal organizations should also be contemplated. Clearly, any solution which allows a customer to deceive the system must be strongly opposed.

Setting up a fully working scheme requires also the analysis of other related issues. One of them is definitely obtaining clearance from the Tax Authorities in the impacted jurisdictions. Since ABoC also aims to issue some tax credit certificates, these are obviously subject to governmental approval. In order to achieve this, ABoC should be publicly recognized as a legitimate, internationally recognized organization, which would certainly increase its trustworthiness. Amongst all stakeholders, also sponsors play a significant role. As a matter of fact, convincing them to make rewards available would have a tectonic influence in attracting the donors to use the platform.

## Incentive design

One of the main funding sources of nonprofit organizations, charitable giving by individuals and organizations are influenced by many various factors. For donors, usually, the main reasons to donate are to help others (45.7%), to support an organization that they believe in (15.5%) and felt a moral obligation to contribute (13.4%). While these factors vary for each case, researches indicate that incentives have a major impact on the on charitable giving and the overarching culture of philanthropy within a nation. Without incentives, charities would have a much harder time collecting donations and would not be able to help as many people. Since incentives lead to more donations and more help being granted, having incentives is both moral and good [G1].

In order to incentivize people to donate and join the platform, thanks to a smart contract, A Bit of Charity is offering tax credit certificates and tokens which can be used in the reward program of ABoC.

In case of a successful donation, as a first incentivize, the donor receives Ethereum-based tokens ("Charibit"). The number of tokens received is proportional to the exact market value of the cryptocurrency (ETH) donated when the donation transaction is initiated. As their characteristic, the tokens can be consumed only once and cannot be exchanged between the parties or used for other purposes than purchasing the rewards from the platform.

The reward offered on the platform are created in collaboration with the sponsors. While sponsoring the reward program on the ABoC platform, the sponsors also contribute to NGOs and advertise themselves. As well as commercial companies, NGOs on the platform are also encouraged to participate in the Charibit rewarding program in order to incentivize more people to donate. For example, a donor might choose to redeem his/her Charibits to purchase sustainability-oriented events and courses held by NGOs. These can be almost anything, starting from urban gardening classes and planting activities until wildlife saving trips. Notice that these opportunities are only offered to Charibit owners, in other words to donors. In collaboration with sponsors, the donor could also choose to redeem his/her Charibit tokens to

purchase vouchers that can be used to buy organic products, get a discount at sustainable restaurants, etc.

As a second incentive, in case of a successful donation, the donor can choose to enter his personal information and request a tax credit certificate which ABoC has the power to issue. With a tax credit certificate, donors receive economic benefit from a reduction in the amount of their paid taxes. In economic terms, this motivation to reduce taxes by contributing to a nonprofit organization is known as tax incentive and used widely in the world. According to European Fundraising Association, tax incentives have a major impact on charitable giving and the overarching culture of philanthropy, and the large majority of European nations (87.5%) offer tax incentives to encourage charitable giving [G2].

## Solution design

### Smart Contract

In this section we will talk about the structure and current features of our smart contract by looking at the source code. Missing parts and future work will be covered in another section.

```
pragma solidity ^0.5.2;
import
"https://raw.githubusercontent.com/OpenZeppelin/openzeppelin-solidity/master/contracts/token/ERC20/ERC20.sol";
import
"https://raw.githubusercontent.com/OpenZeppelin/openzeppelin-solidity/master/contracts/lifecycle/Pausable.sol";
import "./Ownable.sol";
contract ABitOfCharity is Pausable, Ownable {
    struct Organization {
        string name;
        address payable addr;
    }
    address owner;
    Organization[] organizations;

    constructor() public {
        owner = msg.sender;
    }
    [...]
}
```

In the code above we are defining a struct that consists of a name and an address and represents an organization (which could be an NGO, a charitable organization, etc.). We can also see the constructor of the contract which assigns its *ownership* to the address that deployed it. The way this works is that, once everything is ready, ABoC needs to create an address (with a small balance in it), deploy the contract, and this address will always be seen by the smart contract as the *owner*.

So what can the owner of the contract actually do? Let's look at these two functions:

```
function addOrganization(string memory _name, address payable _addr) public {
    require(msg.sender == owner, "Only the owner can add organizations");
    organizations.push(Organization(_name, _addr));
}
function removeOrganization(string memory _name) public {
    require(msg.sender == owner, "Only the owner can remove organizations");
    [...]
}
```

In these few lines of code lies the power of ABoC, which is being able to add and remove organizations. The fully decentralized ecosystem could include a voting with reputation system where everyone would be able to add their organization and there would be no central authority such as ABoC. We simply think that at the moment, such a system would be too prone to abuse, since money is at stake. A possible future solution could be a decentralized AI of some form.

## Donation with ether

Let's move on to the actual splitting part:

```
function donate() public payable {
    [...]
    for(uint i = 0; i < organizations.length - 1; i++){
        organizations[i].addr.transfer(msg.value / organizations.length);
    }
    [...]
    organizations[organizations.length-1].addr.transfer((msg.value / organizations.length) + (msg.value % organizations.length));
}
```

The donate function splits the amount of ether transferred (*msg.value*) among all organizations included in our smart contract. Since the integer division could leave a remainder in the



contract's balance, line 7 gives this remainder to the last organization in the list. This might seem unfair, however we are talking about wei here, so given a list of 100 organizations we would need a donation volume of more than 10 trillion donations for the difference to reach one hundredth of an ether. The function that donates with different percentages is similar to the one shown above, it simply needs an array of integers as an additional argument. The contract checks that the sum of all integers add up to 100.

## Donation with tokens

We don't want to go into the details of all functions and we will just spend a few words for the donation using tokens.

We decided to follow a guide [S1] based on Openzeppelin-solidity [S2]. Openzeppelin-solidity is a framework of libraries of reusable smart contracts. The complexity behind the transfer of tokens, is that the transaction must follow this diagram:

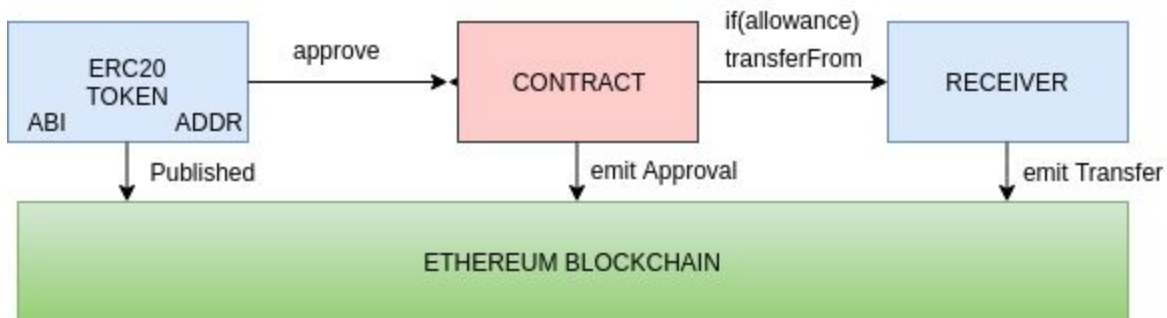


Figure 2: Transaction diagram [S1]

Basically, since tokens are not sent directly from address to address but everything goes through the smart contract of the token, two contracts are involved during the transaction. This means that our contract needs to be allowed to spend tokens on behalf of the donor that holds some tokens in his wallet.

First of all a struct is needed to identify the key players of the transaction.

```

/**
 * @dev Details of each transfer
 * @param contract_ contract address of ER20 token to transfer
 * @param to_ receiving account
 * @param amount_ number of tokens to transfer to_ account
 * @param failed_ if transfer was successful or not
 */
struct Transfer {
    address contract_;
    address to_;
    uint amount_;
}

```

```
bool failed_;  
}
```

The descriptions of the parameters are clear. In particular, we need to understand that the contract of the token (its address) need to be known beforehand. This is all managed by these two functions (and a mapping which is not shown):

```
/* @dev add address of token to list of supported tokens using * token  
symbol as identifier in mapping */  
function addNewToken(bytes32 symbol_, address address_) public  
onlyOwner returns (bool) {  
    tokens[symbol_] = address_;  
    return true;  
}  
/* @dev remove address of token we no more support */  
function removeToken(bytes32 symbol_) public onlyOwner returns (bool)  
{  
    delete(tokens[symbol_]);  
    return true;  
}
```

This means that ABoC has the power to add and remove supported tokens. More could be added based on the donors' feedbacks. Obviously, the token also needs to be implemented in our web interface.

Once implemented, we would only need to adapt the function that donates with different percentages. The two donation functions now accept two or three arguments: symbol of the token, amount sent and if needed the array representing the percentages.

### Charibit – reward token

The reward token hasn't been implemented yet. The implementation could take place in the same main smart contract, or it could call another smart contract which is instead responsible for mining a token and send it to the user that initiated the transaction (given a conversion rate based on the value of the token at the time of the transaction). The token also needs a way to be burned (to redeem the voucher on our website), the implementation would simply make use of an event listener that checks if the tokens were correctly burned in order to release the reward from our web shop. The implementation could be done following this simple guide ([S3]).

### Contract deployment

We executed all our tests using remix[S4], ganache[S5] and metamask[S6]. In order to deploy the contract, one needs to increase the default gas limit of remix. The contract could have probably been optimized in terms of cost by using for example mappings instead of arrays

(where iterating across all elements is not needed). A good article on computing the cost of a contract is [S7]: the top highlight is “We need to find the balance between on-chain and off-chain complexity, while still leveraging the decentralized capabilities of the blockchain”. Storing large amounts of data on the Ethereum is as of now inefficient and expensive. With a more complex blockchain (something like IPFS maybe) one could instead give more power to the smart contract: it could handle the whole voucher redeem process, generate tax reduction certificates, store more informations about the organizations, all by itself. Merging this with a decentralized organizations’ listing cited above, would really turn ABoC in a real DAO.

## Web Application

In this section we will discuss our implementation of a web application which is designed to interact with our smart contract. We use the web3.js Ethereum API to simplify the transaction process for our users.



Figure 2: Structure of our web application

The main functionality of our web application is located on the ‘Donate’ page. Here the user can find a list of our supported organizations and additional information about them. We allow the user to filter the organizations by their focus, for example children, wildlife or clean water. Additionally the user can also make a selection of specific organizations he wants to donate to with the checkboxes located in the top right corner of the organizations card.

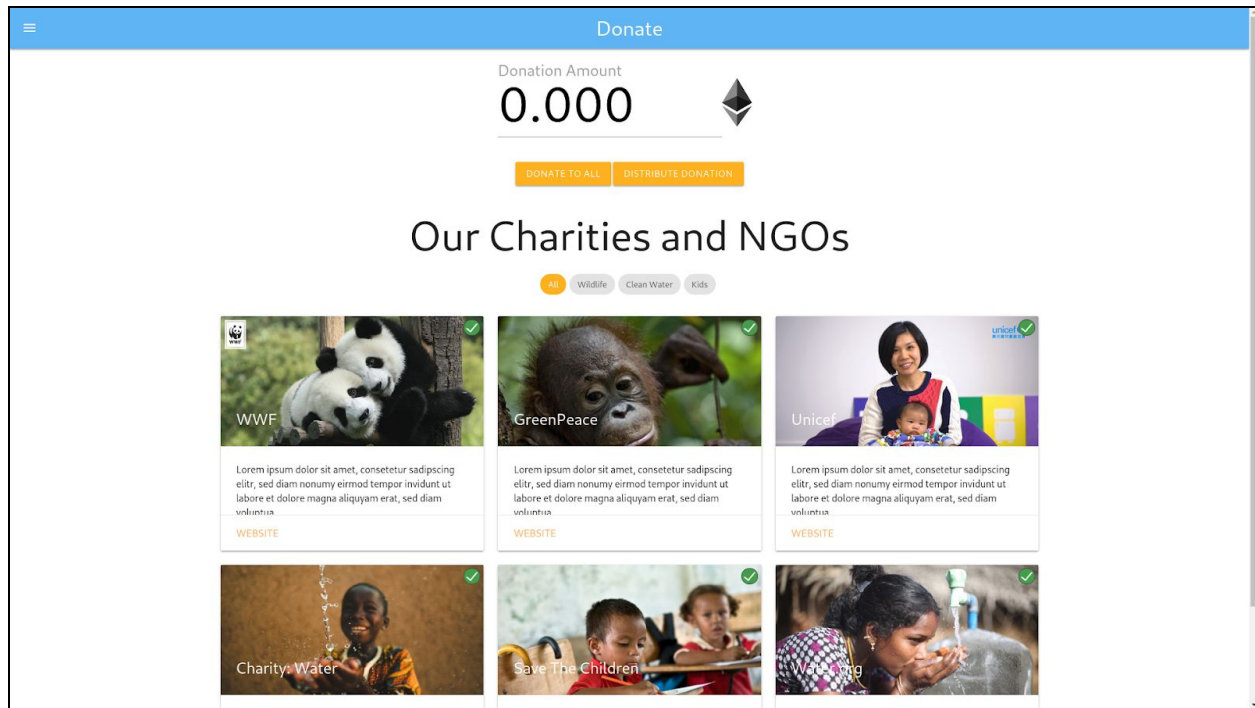


Figure 3: Overview of our 'Donate' page

At the moment, we support the two core functions of our smart contract. If the user doesn't care about the organizations or their focus he can make a general donation which will be distributed between all organizations of our smart contract equally.

If however the user wants to distribute his donation only between a selection of organizations, the web application helps to set the percentages for each organization and initiates the donation.

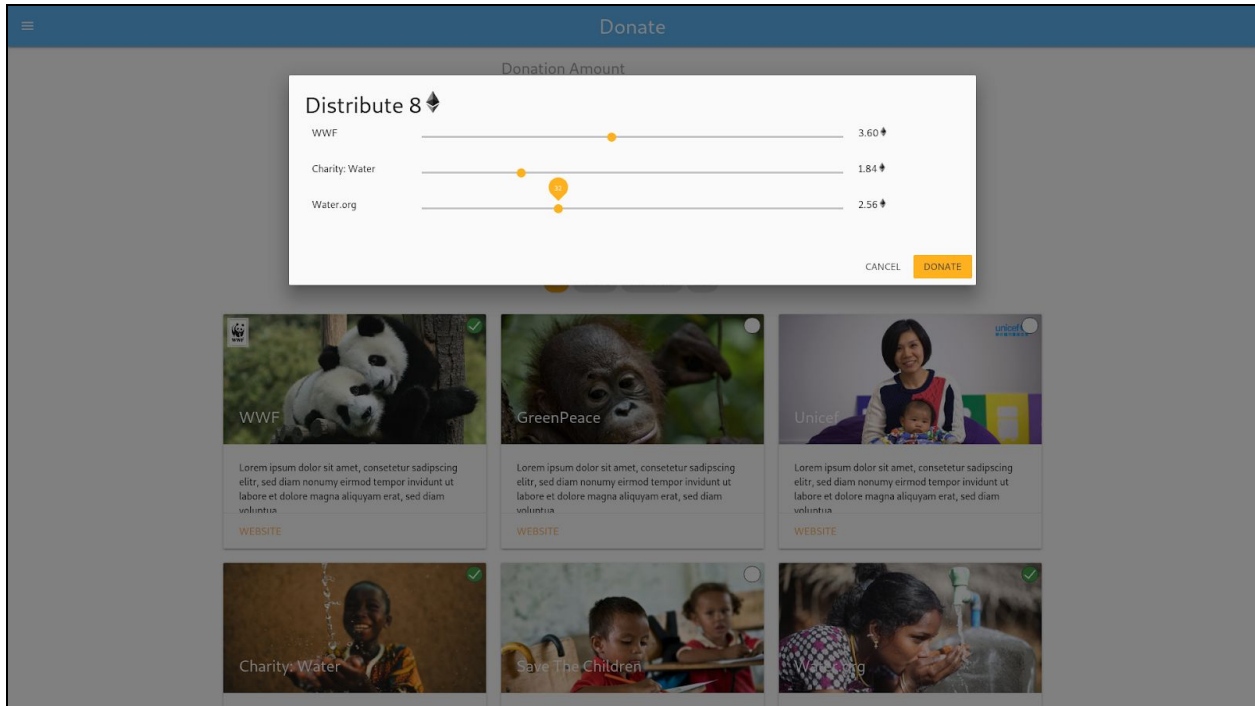


Figure 4: The distribution screen for a selective donation

## Evaluation

We managed to implement the basic functionality of our smart contract in our web application during the hackathon. However there are still features that were left unimplemented.

Our current web application so far consists only of a basic frontend. To deploy the website we would need to first and foremost implement a backend server including a database. The next thing would be to add administration functionalities such as adding and removing organizations to our smart contract and to the website.

Also support for the Charibit needs to be added and it would be helpful to add a section to our web application where Charibit-holders can redeem their tokens for different prices.

## Social impact

In this chapter, the social impact of the ABoC platform is discussed from the perspectives of various stakeholders, namely the donors, NGOs/Charities, sponsors and government.

### Donors

Potential donors are people or organisations who own cryptocurrencies and are willing to donate and contribute to sustainability development. In the traditional way, when a

cryptocurrency holder desires to donate his/her crypto currencies, he/she has to exchange them into the fiat currency first and then donate to charities/NGO's in cash or by bank transfers. However, this process is usually cumbersome and time consuming due to the inconvenient cash-out procedures. For example, the bank has to monitor the transaction and make sure the exchanged money comes from legal source without any risk of money laundering, otherwise the exchange can not be approved.

With the help of ABoC, donors can benefit from donating cryptocurrencies directly to the charities/NGO's they prefer. First of all, it is convenient. Donors can easily choose how much and to whom they would like to donate, and the ABoC smart contract takes care of everything else in a secure way. Secondly, donors get benefits along with any donation they make. Donors can choose to receive a donation certificate from ABoC which could be used for tax reduction purposes. Donor also receive reward tokens (Charibits) automatically which are generated in proportion to the market value of donated cryptocurrencies. The Charibits can then be redeemed for physical rewards which also contributes to sustainability development.

## Charities/NGOs

Being listed on ABoC, a charity or NGO benefits from having an additional donation channel. According to [D1], some charities did see a fast growing trend in the donation amount after adopting cryptocurrency as a payment method. In addition, different from the cumbersome cash-out procedures for cryptocurrency holders, charities and NGOs are usually subject to separate regulations which makes it more convenient for them to exchange cryptocurrencies into fiat currencies.

Charities/NGOs are also encouraged to participate in the Charibit rewarding programs. On the one hand, more donors are incentivized to donate more by doing so. On the other, many reward programs involve donors in continuous sustainability contribution. For example, a donor chooses to redeem his Charibits for a dolphin rescue trip with a NGO in which he gains a unique life experience and at the same time he also acts a volunteer for the NGO in rescuing dolphins.

## Sponsors

By sponsoring the reward programs, a commercial sponsor contributes to sustainability development as well as advertising their product and service. For example, a company which sponsors ABoC with vouchers on their bio-products will attract the attention of donors (potential customers) and even convert some of them to valuable and long-term customers. In addition, sustainability commitment is an important part of a company's differentiation strategy which often increases customers' willingness to pay more for their products/service.

## Governments

Governments also play important roles in sustainability developments. By recognizing the donation certificates from ABoC and providing tax deductions for donors, governments contribute to incentivising more people to donate and consequently more financial sources for charities/NGOs to perform charity missions or sustainable activities.

## Network effects

Similar to the network effects of a digital platform with two sided markets (e.g. Airbnb, Uber), ABoC also generates network effects which facilitates a continuous and positive cycle of donations as illustrated in Figure 2.

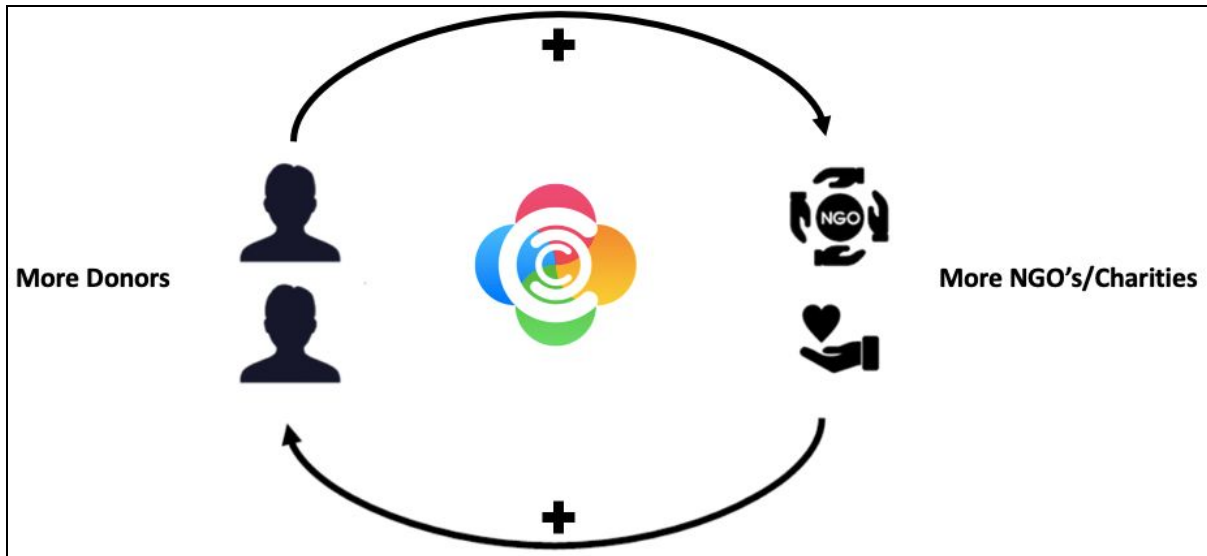


Figure 5: Network effects of ABoC

The more donors choose to use ABoC for donating their cryptocurrencies, the more attractive ABoC is for charities/NGOs to be listed on so that more funds can be collected. The more charities/NGOs are listed on ABoC, the more choices the donors have, which motivates them to donate to the preferred sustainable organisations or projects. Overall, a positive loop between two sides (donors and charities/NGOs) is created, which gives a big potential for ABoC to scale up. The large scale social impact from all stakeholders together will create social value for sustainability development.

## Future development and risks

### Technical development

There are some technical feature to be developed:

- Smart contracts for Charibit generation and invalidation. The smart contract shall generate the number of Charibits in proportion to the market value of donated cryptocurrencies. Once the Charibits are spent, i.e. redeemed for rewards, they must be invalidated to inhibit further usage.

- User interface for donors to enter their identification information (e.g. name, birthdate, gender, social security number, email address, etc.) if they wish to receive donation certificate.

## Concept development

In the current concept, ABoC is a central management organisation on top of the decentral Ethereum-based donation transaction platform which

- manages the list of charities and NGOs centrally in order to avoid fraud,
- manages the distribution of donation certificate under its own name and allows donors to get one certificate for all their donations to various charities/NGOs,
- organizes the Charibit redeeming and rewarding programs.

Despite of its convenient and practical central management, ABoC acts as an intermediary and requires the trust from all stakeholders. An alternative concept is to decentralize the charities/NGOs side as well. In a fully decentralized system, one of the key challenges is how to verify the validity of charities/NGOs and gain trust from donors. One possible way to do so is to use social proofs, e.g. the donors obtain voting tokens through donations and could use the tokens for voting the validity and satisfaction of the charities/NGOs. A charity/NGO with high votes is likely to be trustful, however, methods still need to be developed to avoid cheating, e.g. one donates to a fake NGO multiple times and keep voting for the NGO to gain high ranking and attract donations from other donors. Going into more details, the best thing that we could think of right now, is a sort of treasury system created to decide which charities should be able to get funded. Most of the times a self-sustained system (which removes any central authority such as ABoC) can work only when the idea of stake is implemented. People are usually interested in making the right decision if they have something to lose and one could argue that there is no actual connection to donating to charities since this is a more intrinsic activity (people would ideally donate just for the sake of doing something good). However, we think that one thing doesn't exclude the other: when donating, a donor's biggest concern is making sure that the money are actually used to do good and this is their stake. "Distributed trustless consensus" is one of the major breakthroughs of the blockchain technology, and this is where a treasury system for funding of charitable organizations can find its place.

## Risks

Due to the transparency nature of Ethereum, the code of ABoC smart contracts is open source which implies anyone can employ the concept and create another platform which does the similar functions as ABoC. It is an opportunity if a sister organisation operates in a different region or country and facilitates donations for sustainability. However, it is also a risk if someone makes use of a similar platform to attract donations to fraud charities/NGOs.

Another risk is the volatility of cryptocurrency market. If the value of the cryptocurrencies is too low for a long period, ABoC is no more attractive for charities/NGOs as a reliable channel for collection funds.

Government policies and legal regulations act as additional risks if they are against cryptocurrency exchange, or inhibit the cash-out possibilities of cryptocurrencies.





## References

- [A1] [Pineapple Fund](https://pineapplefund.org/): <https://pineapplefund.org/>
- [A2] [Fidelity Charitable giving report 2018](https://www.fidelitycharitable.org/docs/giving-report-2018.pdf):  
<https://www.fidelitycharitable.org/docs/giving-report-2018.pdf>
- [G1] [Tax Incentives: An Economic Basis for Charitable Giving](https://www.learningtogive.org/resources/tax-incentives-economic-basis-charitable-giving):  
<https://www.learningtogive.org/resources/tax-incentives-economic-basis-charitable-giving>
- [G2] [Tax Incentives for Charitable Giving in Europe](https://efa-net.eu/wp-content/uploads/2018/12/EFA-Tax-Survey-Report-Dec-2018.pdf):  
<https://efa-net.eu/wp-content/uploads/2018/12/EFA-Tax-Survey-Report-Dec-2018.pdf>
- [S1] [Build a smart contract that transfers ERC20 token \[...\]](https://medium.com/coinmonks/build-a-smart-contract-that-transfers-erc20-token-from-your-wallet-to-other-addresses-or-erc20-ee8dc35f40f6):  
<https://medium.com/coinmonks/build-a-smart-contract-that-transfers-erc20-token-from-your-wallet-to-other-addresses-or-erc20-ee8dc35f40f6>
- [S2] [OpenZeppelin - Build Secure Smart Contracts in Solidity](https://openzeppelin.org/): <https://openzeppelin.org/>
- [S3] [How to Create a Burnable Token with Solidity and OpenZeppelin Library](https://medium.com/crowdbotics/how-to-create-a-burnable-token-with-solidity-and-openzeppelin-library-38bd3249d0c7)  
<https://medium.com/crowdbotics/how-to-create-a-burnable-token-with-solidity-and-openzeppelin-library-38bd3249d0c7>
- [S4] [Remix - Solidity IDE](https://remix.ethereum.org): <https://remix.ethereum.org>
- [S5] [Truffle Suite - Ganache](https://truffleframework.com/ganache): <https://truffleframework.com/ganache>
- [S6] [Metamask - Brings ethereum to your browser](https://metamask.io/): <https://metamask.io/>
- [S7] [Calculating Costs in Ethereum Contracts](https://hackernoon.com/ether-purchase-power-df40a38c5a2f):  
<https://hackernoon.com/ether-purchase-power-df40a38c5a2f>
- [D1] [Blockchain in Charity, Explained](https://cointelegraph.com/explained/blockchain-in-charity-explained):  
<https://cointelegraph.com/explained/blockchain-in-charity-explained>

## Abbreviations

ABoC	A Bit of Charity
NGO	Non-Governmental Organisation
DAO	Decentralized autonomous organization