TRIODOS Bank: An eco-system for a multi-company blockchain with a complementary currency

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Context and problem

United economy on blockchain

The Dutch initiative United Economy (started in 2015) consists of a network of companies that envision a greener, more social economy with its own rules and its own currency: the United. The companies deliver goods and services amongst each other based on real economic value and they pay the invoices in Uniteds. By keeping the Uniteds in their own circle it enables them to create green impact repeatedly.

This initiative is concerned with the real economic value produced by companies, exchanged via the United ('supplier's credit'). The United can only be used -by design- as a medium of exchange because no party can speculate with Uniteds. Members cannot earn interest on savings of Uniteds. The United is 1:1 related to the Euro. All tax rules and general bookkeeping rules apply. Tax can only be paid in Euro's. A membership mechanism exists. Only companies that are "green" or "green enough" can join and members may have to periodically report their satisfaction of some green criteria.

The Uniteds can be considered as a complementary currency next to the Euro, but is only valid in the group of participating companies, which we further call a community.

The United Economy initiative is organized by means of a co-operative and foundation in which participants are (possibly indirectly) represented.

The United Economy co-operative manages the operations to run the United Economy: eg. Administration, marketing and sales, arranging memberships, revoking memberships, arranging the possibility to run transactions in Uniteds, granting loans in Uniteds, handling possible bankruptcy of members related to their loans etc. Also, they organize events where people and organisations meet up. The United Economy co-operative members decide on the plans and financials, they mandate the co-operative to execute those plans and they provide funding through, for example, their membership.

The United Economy Foundation safeguards the ground rules of the concept. Any decision by the co-operative that impacts these specific rules needs an advice and decisive vote from the United Economy Foundation. The United Economy Foundation also holds the coverage fund and the guarantee fund. These funds are the mechanisms that ensure the value of the United related to the Euro, mainly based on the loans provided.

Currently, the United Economy initiative is supported by a centralized information system that keeps track of the transactions and balances of the participants. In fact, the same system supports other complementary currencies.

The United Economy initiative is an example of a more general phenomenon, namely the wish to give direction to where money goes and what impact it creates. Some other examples of this kind of communities are the Sardex network (Italy) and WIR Bank (Switzerland).

Blockchain technology

Triodos Bank (Zeist, The Netherlands, one of the members of United Economy) and the University of Twente executed a pilot in November 2016, showing the feasibility of using the Hyperledger blockchain technology for keeping United transactions in decentralized way, thereby potentially removing the centralized information system. The result of this pilot motivates a more in-depth exploration of how to apply the blockchain technology and its underlying philosophy to the United Economy initiative.

Problem statement

How to apply the blockchain technology philosophy such that communities (for example the United Economy), with their own complementary currency can benefit from it. Two important aspects of the blockchain philosophy to consider are (1) increasing transparency of the information in the network, more specifically the transactions, and (2) removal of the middlemen.

Research approach

We execute the following research approach to solve the above problem:

1. Analysis of the existing United Economy goals and its stakeholders as an example of similar, communities with their own complementary currencies.
2. Elicitation of functional and non-functional requirements of, communities with their own complementary currency with blockchain technology as their technology platform.
3. Creation of a solution space with a number of solutions, which all use blockchain technology.
4. Scoring the solution space using the requirements as identified in step 2.
5. Selection of solution to focus on.
6. Selection of the most optimal blockchain technology for the selected solution using the requirements elicited in step 2.
7. Design of a revised business model for alternative, community oriented complementary currencies using blockchain.

Results

Analysis of the United Economy initiative goals and its stakeholders

Overall goals:
The network of entrepreneurs that together builds towards an honest, social and green economy, with the use of its own 'money' the United. By creating (more) sustainable impact. Based on membership to ensure e.g. only members that align with the United Economy goals and their own sustainable policies.

Stakeholders:

- Partners (can trade), they get an initial loan in Uniteds
- Members (can trade), they do not get an initial loan in Uniteds

- Network members (cannot trade)
- (Consumers: private person who wants to become a member) – not yet part of the initiative, possibly in a later stage
- United Economy co-operative
- United Economy foundation
- Suppliers to the co-operative and (possible) role:
  - Triodos Bank (credit check)
  - Software provider
  - Insurance (liability of management) o MRO suppliers
  - Legal advice
- Tax authority

Elicitation of functional and non-functional requirements of the United Economy with blockchain technology as platform

Functional requirements:

1. become a member
2. revoke a member
3. issue complementary currency
4. enabling transactions with the complementary currency
5. grant and revoke access of members to the platform (and therefore to e.g. to possibility to pay for goods or services)
6. regulate the system (e.g. changing the rules for credit, issue of currency, etc.)

Non-functional requirements:

1. the system should be trustworthy to the stakeholders
2. risk of defaulting (e.g. bankruptcy) should be covered
3. reach consensus about the transaction truth and regulation changes in environmentally friendly way (lowest Carbon print)
4. scale up the number of members, but not necessarily the number of blockchain nodes
5. scale up the number of transactions
6. run the solution locally, e.g. not exclusively as a software-as-a-service

Creation of a solution space with a number of solutions which all use blockchain technology

We envision three different solutions:

1. Centralized solution: Using the blockchain as a technology only to replace the current centralized information system. The control of all current tasks of the centralized co-operative and foundation as for example in the United Economy remain unchanged.
2. Decentralized solution: The control of all tasks of the co-operative and foundation are now distributed over all the nodes in the network.
3. Hybrid solution: Granting access and revoking access to members and the guarantee fund and coverage fund are centralized. It is possible to decentralize both functions (see solution 2), but they can be easier realized by a central authority. Also, this solution can considered as an intermediate step to arrive from the current centralized solution to a fully decentralized solution.

Scoring the solution space using the requirements

1. Centralized solution: All tasks are performed under direct control of the co-operative and foundation; nodes are only used for computational purposes.
   a. Advantages: increased redundancy of the currently centralized IT
   b. Disadvantages: increased costs, overhead, low scalability, centralized, unequally divided power
2. Decentralized solution: All tasks of the co-operative and foundation are controlled and performed by the network, in practice by all the nodes.
   a. Advantages: increased redundancy of IT, flexibility, rapid expansion, agility, forking (easy formation of sub communities), removal of middlemen and spreading of power equally over the network
   b. Disadvantages: devaluation, fraud, malicious members, brand abuse (although for most of these mitigations can be thought of)
3. Hybrid solution: Granting access and revoking access to members and the guarantee and coverage are under control of a central authority; the rest is under control of all nodes, collectively called the network.
   a. Advantages: increased redundancy of IT, flexibility, rapid expansion, agility, forking
   b. Disadvantages: distributed risk, centralized power (co-operative, foundation)

Selection of solution to focus on
We focus on the fully decentralized solution because this is the most innovative one. Moreover, we claim that the hybrid solution is just a variant of the decentralized solution. Finally, the centralized solution does not follow the philosophy of the blockchain and does not really bring anything extra. It only serves as a (costly) distributed implementation platform. This is according to Gartner is the number 1 mistake in current blockchain implementations.

Selection of the most optimal blockchain technology for the selected solution using the requirements
The blockchain technology for the fully decentralised variant that satisfies most requirements is Hyperledger with the consensus mechanism Proof of Elapsed Time (PoET).

Design of a new business model for the United Economy using blockchain
We have designed a draft e^{3}value model that supports a fully decentralized business model and includes the financial consequences of the use of Hyperledger. The business model shows how the United is created, exchanged, as well as how defaulting is treated. Moreover, it shows how Hyperledger nodes are compensated for their services to the network. The model needs further detailing.

Future work

The following steps should be undertaken:

1. Completion of the e^{3}value model.
2. Quantification of the e^{3}value m
3. Scenario-based financial sensitivity analysis of the e^{3}value model.
4. Executable process specification, which can be considered as an implementation of the e^{3}value model.
5. Stochastic simulation of the executable process of the decentralized solution, using multiple change scenarios (e.g. growth of number of members, growth of number of transactions, significant number of defaulting, etc).
6. Proof-of-concept using Hyperledger (PoET).

7. Field tests.