Hubcoin - Mapping Pico-Economies With Cryptocurrency

version 0.1 “Valentine”

February, 2017

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Abstract

As decentralization is becoming more and more pervasive, the traditional, monolithic organizations are replaced with an interconnected web of pico-economies. These pico-economies are creating and distributing value inside and outside their own ecosystem based on metrics like belonging, contribution, and age. Hubcoin is a blockchain based attempt to map these processes with cryptocurrency, both at the financial level and at the governance level. Mapping these new, emerging types of organizations using the blockchain technology will streamline their processes, creating a frictionless, more functional social environment.

1. The Problem

In every community, there is a sizable number of interactions that are carrying financial value, but they are difficult to evaluate using the methods of a traditional, monolithic economy. Either the activities are too small to be evaluated in fiat currency, or the frequency of those actions is too low, or their specific is too diverse to infer predictability, making it difficult to assign the traditional financial value to them.

These actions, though, are constantly impacting the community and, on a medium and long-term, they are a significant source of growth in each specific community.

Because of these constant interactions which are carrying financial value, communities are in fact very small economies, even if they are not designed specifically around traditional economic processes.

We will name them pico-economies.

Using blockchain technology, the interactions in a pico-economy can be formalized and the processes can be streamlined.

Hubcoin is our attempt at formalizing pico-economies.

2. Definitions

The basic building blocks of the Hubcoin ecosystem.

2.1 Pico-economies

A pico-economy is a new type of economy, in which transactions are either too small or their frequency is too low, for them to be mapped using traditional, fiat currency. Pico-economies are naturally created around very diverse communities: from co-working spaces and startup incubators to neighborhoods or sports team fans.

2.2 Pico-transaction

A transaction which takes place in a pico-economy. The total amount of pico-transactions is creating a pico-economy. The term "pico" may refer to the following attributes:

- the fact that the amount of value attached to a specific transaction is usually very small, compared with a traditional, fiat based transaction
- the fact that the underlying activity mapped by the transaction is usually very fast, lasting from a few seconds to a few hours (getting an information from a member of the same community, coaching for a half an hour, participating in an ad-hoc event for a couple of hours)
- the fact that the transaction is not necessarily programmed and it happens on the "as-is" basis, spontaneously

2.3 Hubcoin

Hubcoin is the token with which all the processes in the Hubcoin blockchain are measured. Hubcoin maps pico-transactions, interface implementations, token exchanges and any other actions usually attached to any normal currency.

2.4 Interfaces

In the Hubcoin ecosystem, interfaces are transaction facilitators. They allow the free passage of Hubcoin between the interface implementor(s). In the Hubcoin ecosystem, interfaces have a tree-based schema, inheriting from the root interface.

The root interface is the "membership interface" and implementing it signals the intention of a Hubcoin owner to become a community founder. All other interfaces must inherit the root interface in order to be validated.

Interfaces can facilitate transactions between:

- two or more Hubcoin holders (peer to peer)
- between one or more Hubcoin holders and pre-programmed machines (peer to machine)
- between one or more programmed machines (machine to machine).

An example of a peer-to-peer interface would be a coaching session.

An example of a peer-to-machine interface would be a coffee machine, which is used by a Hubcoin holder to buy a cup of coffee.

An example of a machine-to-machine interface would be an entrance access mechanism which communicates with a vending machine. Every usage of the entrance could increase or decrease the price of the items in the vending machine, based on a specific algorithm (the more popular the venue is, the more expensive the items, etc).

2.5 Community

In the Hubcoin ecosystem, a community is a collectivity implementing the root interface "membership" and following its general and local governance rules expressed in the blockchain (see Governance).

2.5.1 Community Notation

In the Hubcoin ecosystem, the community notation follows the reverse domain protocol, with the only root "domain" being .hub (dot hub). Every community will attach itself as a subdomain of the root domain. E.g.: "makers.hub". Each community can have sub-communities, which are adhering to the specific governance rules of the mother community, like "wood.makers.hub". A community can refuse the affiliation of a sub-community without any given reason.

2.5.2 Community Metrics

Is it our understanding that a community is defined and influenced by at least 3 main metrics: belonging, contribution, and age. These metrics are impacting the pico-economy processes, hence they are influencing the creation and value of the Hubcoin, as a currency (see Implementation).

2.5.3 Belonging

Belonging defines the activity by which members of a community are keeping their affiliation with that specific community. It encompasses a large number of processes, some of them identified at the moment of writing this paper, some of them yet to be discovered (see Implementation). Among the processes observed for the belonging metric:

- the total number of members in a given community
- the amount of the collateral committed by the founders
- the frequency with which they are reimplementing the membership interface (they are renewing their membership)
- the churn ratio (how many members are in the community at specific intervals versus how many have left)

2.5.4 Contribution

Contribution defines the processes by which the members are growing the community, by implementing its various interfaces. Given the huge complexity of the interfaces that can be created, contribution is a metric hard to define in a static way. One example would be, for an online community, how many articles that community creates, as a result of its members implementing the "write articles interface" (see Implementation).

2.5.5 Age

Age defines the total time in the existence of a specific community (or the total time since the first implementation of its root interface). In certain contexts, age can be evaluated as reputation or as stability (both impacting the value of a Hubcoin).

3. Governance

Governance in a community is a process established by the initial vote on the membership payment interval, by at least 3 members, a process defined as “seeding”.

If there is no initial vote or no voting activity whatsoever, and there are more than 3 members in the community, the community is still valid, but it won't trigger the "hot" Hubcoins creation mechanism (it will be considered "dormant"). Only when a community gets out of the "dormant" state and it becomes "seeded", it triggers the "hot" Hubcoins creation mechanism (see below).

All voting processes are transparent in the Hubcoin ecosystem.

The governance rules are based on supermajority: a decision is taken with at least 2/3 of the votes, by the members with voting rights (hence the initial 3 members needed to properly seed a community).

Voting rights may or may not be a specific interface implemented by a community (members of a community may or may not be voters, according to what the founder(s) decides).

By implementing the root interface "membership", a Hubcoin owner accomplishes a few things:

- broadcasts around the Hubcoin ecosystem the fact that he created a new community
- pays a fee for the name rights which is subsequently redistributed evenly towards all Hubcoin owners (the "interface fee")
- blocks collateral in order to prevent spamming and to indicate his personal commitment to the community. The collateral is not capped (at this time, but this may change) and it's publicly visible. Collateral can't be used by the interface implementor for the entire duration of the community. It becomes available only after the owner does one of the following actions:
    - willingly renounces the interface by announcing this publicly and the community disappears from the ecosystem (in this case the name becomes "orphan" and it may not be used again). It also automatically releases the implementation of the interface by all members and their potential blocked collateral
    - the interface fee is not renewed (see below)

Interface names are unique and immutable (non-editable), but they can be transferred between community owners (see below).

The naming structure for the community names follows the TLD reverse notation, allowing for sub-communities derived from a "mother community". Each sub-community owner must pay the standard "interface fee" and must follow the governance rules established by the "mother

community", including the amount of collateral needed to seed the sub-community. The "mother community" has the rights to refuse the affiliation for a specific sub-community.

The right to use the interface names is renewable on a yearly basis, by paying the "interface fee", whose value is set up every year by the community owners, following a transparent voting process.
If a "mother community" fails to renew the interface fee or the founder(s) are publicly renouncing the community, then all sub-communities are destroyed as well.

Apart from having a certain amount of Hubcoin "attached" to it, an interface can generate value for the community or it can be just a way to consume value, in various forms, from outside the community.

A publishing interface, through which a member can contribute content to the community blog, for example, is generating value for the community. A coffee-machine interface, through which a member can only buy coffee, is just a way to consume value, from outside the community. Ideally, even the interfaces which are allowing consuming from outside the community should generate value (by adding some margin to the value of the consumed object) but that's not always the case.

The Hubcoin protocol should be agnostic to this process, leaving it to be established at each pico-economy level. Potential frauds or attempts to inflate the Hubcoins of a specific pico-economy should be mitigated by each community in the Hubcoin ecosystem. Failure to do so may impact the community's metrics and the perceived value of the "hot" Hubcoin, which may go negative. In other words, a community may be penalized if it fails to adhere to basic ethical principles.

The right to use interface names is transferrable to other community owners, via a public transaction. The price of this transaction is established directly between buyer and seller, and it's public. The transaction enforces the transfers of both the rights to use the name and the collateral. In other words, if somebody wants to "transfer" a community, he will also transfer the collateral which will become available to the new owner as per rules stated above.

A transferred community cannot be renounced earlier than the next "interface fee" interval, i.e. the collateral will remain blocked until the next yearly payment cycle for the "interface fee", when the new owner may choose to stop payments and cash out the collateral or to continue by paying the next yearly fee.

As the ecosystem grows, each community collateral may be an indicator of the potential value of the given community, mapping the size of it to the involvement of the founder(s).

Once a mother community is founded, other Hubcoin holders may join it, by implementing its "root interface", a.k.a. membership. It's up to the community founder(s) to choose the renewal period of this implementation, in the first governance voting transaction, by choosing between monthly or

yearly. Once a member implements the membership interface, he is considered to "belong" to that community and he may start to implement the rest of the interfaces exposed by that community.

A community can hold an indefinite number of members, but if the number goes below 3, it's automatically taken to the "dormant" state and it will stop producing "hot" Hubcoins.

4. Hubcoins and Hot Hubcoins

Once a community is established with a minimal governing structure (a minimum of 3 members) and once it has the initial seeding vote, it may start to produce "hot" Hubcoins.

"Hot" Hubcoins are tokens with a modified value, following a multiplication scheme. The simplest multiplication scheme would be a percentage specific to each community, based on the 3 most important metrics of it:

- belonging
- contribution
- age

So each community will have its own multiplication rate, which will be applied to the tokens obtained by the members while they are belonging to a specific community (see below, Implementation).

Let's illustrate this with an example.

Alice is a member of community A. Bob is a member of community B.

During her membership in community A, Alice receives 10 tokens from a specific source (for the simplicity of the example, will consider she gets them from another member, but sources may vary).

The A community has a specific multiplication rate of 0.95, which means 0.95%. So her 10 tokens will actually be worth 10.095 Hubcoins.

During his membership in community B, Bob receives 10 tokens from a specific source. The B community has a specific multiplication rate of 3.45, which means 3.45%. So his tokens will actually be worth 10.345 Hubcoins.

The difference in Hubcoin value from the tokens of Alice and Bob comes from the difference in the value of the two pico-economies. This value, mirrored in the "multiplication rate", changes constantly.

The "hotness" of the "hot" Hubcoins comes from the fact that they must be spent before the next payment of the membership interface (usually a month). So, in order for Alice to spend 10.095 Hubcoins worth of tokens, she must do this before the end of the month, otherwise, her Hubcoins will lose their extra value. At the end of the month, if she decides not to spend them, she will have only 10 tokens.

The "hotness" of Hubcoins accounts for the following facts:

- the value of a token is tied to a specific economy (just like the dollar is tied to the dollar-using-economy, euro to the euro-using-economy, etc)
- the value of a token in a specific economy is tied to a specific time interval

Pico-economies are fast changing communities and the underlying currency mapping these processes should constantly adapt to these changes. By locking the value inside a specific time interval we make sure the actual worth of a “hot” Hubcoin is correctly referring the current value of the mapped pico-economy.

Please note that the extra-value of a “hot” Hubcoin is recognized across the entire Hubcoin ecosystem, i.e. if Bob wants to spend his “hot” Hubcoins inside Alice's community, he will spend 10.345 worth of Hubcoins, as long as he does this before the ending of the membership renewal interval.

5. Implementation

The key concepts used in defining a Hubcoin-mapped pico-economy are:

- belonging
- contribution
- age

Belonging is a metric measuring the overall affinity of people for a certain community. It manifests by many actions, among which are:

- how often and in what capacity members are renewing their commitment (membership, endorsements, etc)
- how often members are referring other members who are renewing their commitment
- the size of the collateral committed by the founders
- whether or not members are required to commit collateral with their membership and the size of this collateral

Contribution is a metric measuring the overall value production by pico-transactions. It manifests in many ways, among which are:

- how often and in what capacity members are interacting with other members
- how often and in what capacity a member is contributing value using bi-directional interfaces

Age is a metric measuring the overall impact a pico-economy has, based on the duration of its existence.

The overall value of a Hubcoin is determined by a continuous process of evaluating and integrating these metrics.

The "hot" Hubcoin value could me mapped using a function like this:

$$hH = (0.33(F(b)) + 0.33(F(c)) + 0.33(F(a))) / H$$

Where:

hH = hot Hubcoin multiplier
H = 1 Hubcoin
F(b) = the function mapping the belonging parameter, returning a value between 0 and 1, 0 being no belonging, 1 being maximum belonging, calculated across the community membership ecosystem
F(c) = the function mapping the contribution parameter, returning a value between 0 and 1, 0 being no contribution, 1 being maximum contribution, calculated across the community membership ecosystem
F(a) = the function mapping the age parameter, returning a value between 0 and 1, 0 being the community was just created, 1 being the oldest community across the entire Hubcoin ecosystem

Please note: we are using this function as an example, the final implementation will be announced in future versions of the white paper.

This function assumes a linearity of all the 3 parameters. In real life, we may observe more diversity and adjust the parameters accordingly.

Conclusion

Hubcoin is our attempt at mapping pico-economies (communities which are not necessarily designed on top of economic processes) both at the financial and governance levels. A community can join the Hubcoin ecosystem by implementing the root interface membership and adhering to the reverse domain notation of a community name. Once the basic governance principles valid over the entire Hubcoin ecosystem are in place, the community can start participating in the Hubcoin protocol, producing Hubcoins and Hot Hubcoins, implementing its own governance rules, creating and implementing new interfaces and allowing members access to the new interfaces. Mapping these processes with the Hubcoin protocol will result in a more frictionless and efficient social environment.