# Measuring Value in the Commons-Based Ecosystem:

# Bridging the Gap Between the Commons and the Market

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## Abstract

*Commons-based peer-production (CBPP) constitutes today an important driver for innovation and cultural development, both online and offline. This led to the establishment of an alternative, Commons-based ecosystem, based on peer-production and collaboration of peers contributing to a common good. Yet, to the extent that this operates outside of the market economy, we cannot rely on traditional market mechanisms (such as pricing) to estimate the value of CBPP. We present here a system - which we will name Sabir - that can resolve some of the most recurrent problems encountered within CBPP communities. The Sabir system[1] is composed of three layers that will help us: (1) Understanding the social value - as opposed to market value - of different CBPP communities, so as to compare them to one another. (2) Identifying the value generated by individuals contributing to the Commons and evaluating it through a common denominator of value. (3) Creating an interface between the market and the CBPP ecosystem so that the two can interact, and benefit from each other.*

## Introduction

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Mia has clear passions: writing Wikipedia articles and making Creative Commons
documentaries… but she struggles to survive, being forced to make stressing and
unfulfilling advertising work in order to get some money. Her family doesn't
understand why she spends so much time working on things that provide no money in
return, whereas Mia is frustrated on why her contributions to the Commons are not
recognized as actual work by society.
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How could we help Mia?

Today, the production and dissemination of information is increasingly done outside of the market economy. An alternative model of production is emerging - both on the Internet and elsewhere - that does not rely on market transactions but rather on sharing and cooperation among peers. Production is based on voluntary collaboration and resources are released under specific licenses, such as Open Source and Creative Commons licenses, so that they can be freely used and reused by everyone. This new model of production - sometimes referred to as Commons-based Peer Production[2] - constitutes the building block of the sharing economy, which consists, for the most part, of social interactions that do not belong to the market economy. In the realm of information, Wikipedia is perhaps the most popular example, along with Free/Libre Open Source Software (FLOSS) and Creative Commons, but the same applies also in the physical realm, with a growing number of initiatives such as the Open Source Ecology, FabLabs, etc.

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[1] Sabir website: http://sabir.cc.

[2] Benkler, Y. 2006, The wealth of networks. How social production transforms markets and freedom, New Haven; Tale University Press.

Commons-based Peer Production (CBPP) is a new model of production that lends itself to a different economic system based on the notions of *abundance* and *sharing*, and which does not properly fit within the framework of most conventional economic theories based on the notion of *scarcity* and *exchange* .[3]

Conventional market mechanisms are unable to estimate the overall social value of CBPP because the market is incapable of understanding the value of non-market transactions.[4] Indeed, in the market economy, the key concern is to assess the economic value (or market value) of things through the mechanism of supply and demand. Everything else - such as friendship, solidarity, or even deeper ideological values such as freedom or justice - are regarded as mere externalities which will only be accounted for to the extent that they can be, or have been translated into monetary value.[5] [6]

Without the traditional system of "pricing", one can no longer rely on a universal unit of analysis (value proxy) that can be used to assess and compare the value of different CBPP platforms, as well as the value contributed by various individuals to these platforms.[7] Even when they do have monetary value, given that Commons-based entities operate outside, or at the edges of the market economy, we cannot rely on traditional market mechanisms (such as pricing) to assess the value produced by them. Hence, we need to identify another indicator of "social value" (other than price) capable of understanding and measuring the value generated by CBPP and that will allow us to assess, compare and communicate the value of different entities or projects that operate, only and exclusively, in the sharing economy.

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Mia would like to show her friends and family - who are not themselves part of the
Commons ecosystem - what is the value she is contributing to the world. Everyone knows
about Wikipedia, but still not many people know about Creative Commons, or even
smaller initiatives like Couchsurfing and the like. Moreover, even if they are (either
directly or indirectly) benefiting from them, it is difficult for people to understand
the value that these Commons-based initiatives yield.
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[3] Hess, C., & Ostrom, E. (2005). A Framework for Analyzing the Knowledge Commons: a chapter from Understanding Knowledge as a Commons: from Theory to Practice

[4] Schiller, R. (2012). Finance and the Good Society, New Haven; Princeton University Press.

[5] Lindenberg, S. (1988). Contractual relations and weak solidarity: the behavioral basis of restraints on gain-maximization. Journal of Institutional and Theoretical Economics (JITE)/Zeitschrift für die gesamte Staatswissenschaft, 39-5

[6] Cohen, I. G. (2003). The price of everything, the value of nothing: Reframing the commodification debate. Harvard Law Review, 117(689)

[7] De Filippi, P. (2014). Translating Commons-based Peer Production values into metrics: towards Commons-based Crypto-Currencies, in Lee Kuo Chen D. (ed.), The Handbook of Cryptocurrency. Elsevier.

# A Value Metric for Commons-based Entities

For instance, what's the value of Wikipedia? Does it have a monetary value? - and if so, would it make sense to measure it in monetary terms? We know it has a high social value because of the perceived value others give to it - but how can this value be measured? Ideally, we should have a quantified indicator of the approximate (social) value of Wikipedia... or any Commons-based entities/communities (from now on CBEs[8]).

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Mia could then communicate to her family and friends more easily, by simply pointing
to the value of the different CBEs she's contributing to, for them to understand,
immediately, the importance of her (unpaid) contribution to the Commons.
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Of course, in order to have an indicator, we need an alternative *value metric*, separate from the market one, that will allow us to understand the value of CBEs.
We believe such a metric of social value of a CBE should be constructed on 2 basic assumptions:
- as an indicator of social value, its value should emerge from the network of involved actors, that is, the CBEs
- as a subjective value, it should be based on the perception of peers, that is, the other CBEs

Thus, based on those premises, we propose a value metric algorithm inspired from:
- *Flattr[9]*, understood as a meter of individual appreciation that translates into donations. That is, the peers may express their appreciation for other peers by clicking on their badge (*flattring* them), and anyone can see the amount of *flattrs* received by someone (or something e.g.: a blog post, a project, etc).
- Google's *PageRank[10]*, as a means to ponderate the importance of a webpage based on its incoming links. That is, the algorithm calculates a quantification of the social relevance of each node based on the network of links.

In our model, we combine the two in order to achieve a more sophisticated system for estimating the social value of CBEs:
1. Inspired from Flattr, any CBE can *vouch* for another CBE that it considers valuable.
2. Inspired from PageRank algorithm, we can then calculate how many incoming vouches, as opposed to incoming links, a CBE has according to a specific algorithm.
3. Inspired from the fractionality of Flattr, a CBE may assign a particular weight to each one of its vouches (where the sum of these weights given must be always equal to 1).
4. Inspired from the transitivity of PageRank, a CBE channels a fraction (a percentage indicated by the vouch weight) of its own social value to the CBEs it is vouching.
5. The more value a CBE accumulates, the more socially valuable it will be considered. That is, quantity matters: how many vouches I have; and quality matters: who is vouching for me.

We can see an example of this indicator (which we will refer to as "the social value indicator" from now on) in Fig. 1, where Wikipedia has plenty of value (1500, and a larger circle) because of receiving plenty of weight. Couchsurfing is small, but still it has 200 because even if it's only receiving a 0.1 of weight, it comes from the large Wikipedia.

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[8] Which are usually named Commons Based Peer Production communities. Here we use CBE for the sake of simplicity.

[9] Flattr is a microdonation web service: http://flattr.com.

[10] Page, L., Brin, S., Motwani, R., & Winograd, T. (1999). The PageRank citation ranking: Bringing order to the web.

WEIGHTED REPUTATION
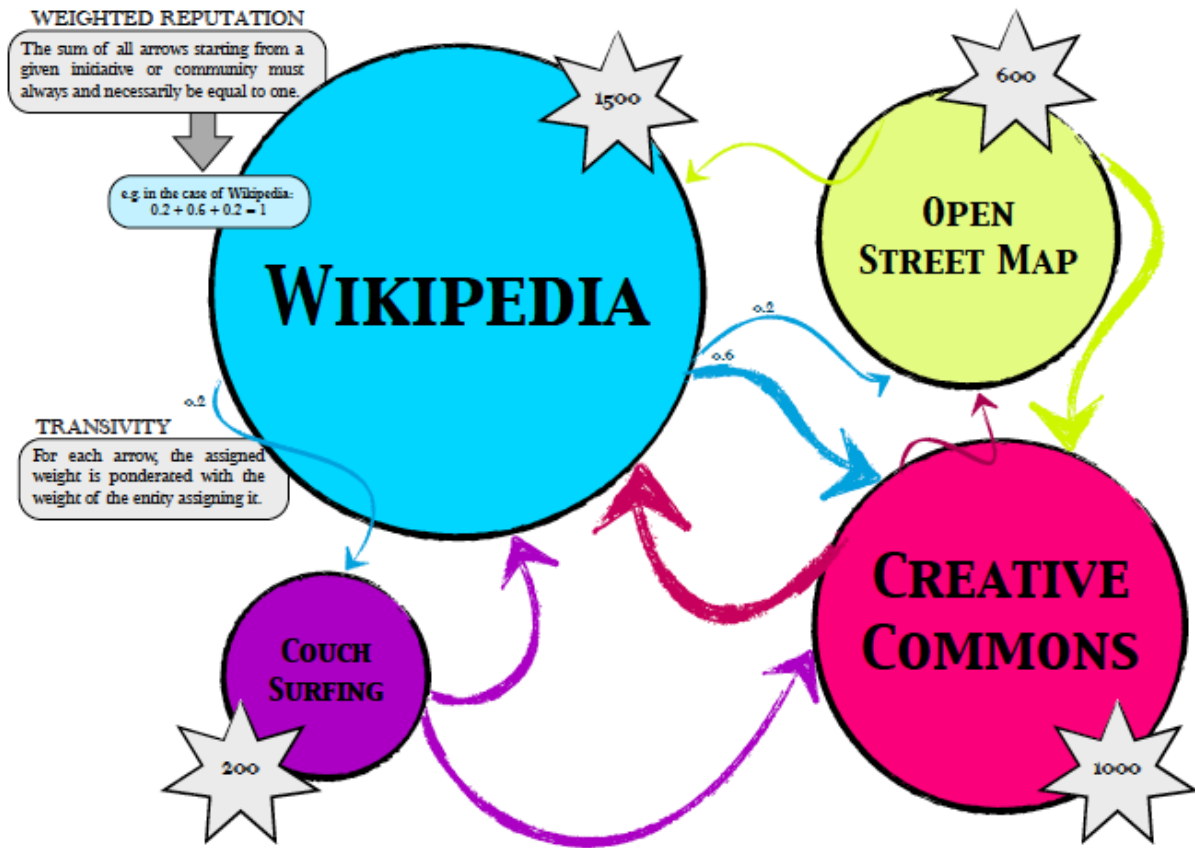The sum of all arrows starting from a given initiative or community must always and necessarily be equal to one.

e.g. in the case of Wikipedia: 0.2 + 0.6 + 0.2 = 1

WIKIPEDIA

1500

OPEN STREET MAP

600

TRANSIVITY
For each arrow, the assigned weight is ponderated with the weight of the entity assigning it.

0.2

0.6

0.2

COUCH SURFING

200

CREATIVE COMMONS

1000

Fig. 1: Example of several CBEs vouching each others with different weights, resulting in a social value number for each.

As an algorithm, in its simplest form[11], we can implement it as follows:

For any given entity X, its social value (SV) at time t is expressed by the function SV(X, t). SV(W,t) indicates the total amount of *weight* (w) received by X from other entities in the system (A, B, C), ponderated by the SV of these entities:

$$SV(X, t+1) = w(A, X) \cdot SV(A, t) + w(B, X) \cdot SV(B, t) + w(C, X) \cdot SV(C, t)$$

Taking into account that every CBE can assign weight to others, but their sum must be equal to 1.

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[11] The following equations are a strong simplification, as there are more complex algorithms available. Still, for preliminary testing in a prototype and for the sake of communicating the concept, we'll stick to those.

More generally, the complete formula can be expressed as:

$$SV(X, t+1) = \sum_{i \in Ux} w(i, X) \cdot SV(i,t), \quad where \; \forall i \in Ux, ( \sum_{k \in Vi} w(i, k) ) = 1 \quad and \quad 0 \leq w(i, k) \leq 1$$

*where*
*Ux = the universe of all the entities assigning a weight to X*
*Vx = the universe of all the entities that were assigned weight by X*

This specification complies with the definition of *ordered weighted averaging* (OWA)[12] aggregation operator in fuzzy logic, and therefore it has its interesting mathematical properties.

For details on implementation within a web environment, see FAQ #1 for registration and verification, see FAQ #2 for the process on vouching and weighting, and see FAQ #3 for the visualization of social value.

Finally, it is also important to note that the community of communities forming within the system is structurally (and necessarily) biased: it should only be made of Commons-based entities (CBEs) forming a web-of-trust. This requires some kind of pre- and post-filtering or discrimination. For instance, how to prevent Skype from joining, if it claims to be part the Commons ecosystem?

- To begin with, in order to join, a new CBE may need to be endorsed by certain number of CBEs (algorithm pre-filtering): e.g., one needs to be invited by at least 5 entities before it may join the system.
- Subsequently, the CBEs participating within the system would self-regulate who belongs to the system (community filtering): e.g., if a large amount of CBEs believe Skype is not a CBE, it may be kicked out.
- In addition, the system may contain rules that would facilitate the rejection process (algorithm post-filtering): e.g. if no one vouches for an entity for a long period, it is a signal it may be kicked out;

Essentially, this would be creating a network-of-trust model, and thus the initial selection of entities might have a significant impact on the subsequent population of the ecosystem (see FAQ #4).

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[12] Yager, R. R. and Kacprzyk, J., The Ordered Weighted Averaging Operators: Theory and Applications, Kluwer: Norwell, MA, 1997.

# Rewards for Contributors to the Commons

Thanks to the social value indicator, we now have a clear idea of how much social value each CBE has within the Commons-based ecosystem. However, a CBE can do nothing with such an indicator, except bragging it. We propose here a possible use for such an indicator, which would allow for the value contributed to the CBE to flow back to where it originated: the CBE contributors.

The (macro) value of CBEs is generated only and exclusively by the community of individuals participating in (micro) co-creating content (articles, source code, videos, etc.), discussing, sharing, rating and essentially contributing to the community. Therefore, the long-term sustainability of CBEs depends on a constant flow of (quality) contributions, which can only be achieved if the contributors are spending a sufficient amount of time/effort/resources contributing to the CBE over time. Thus, it would be ideal if contributors to the Commons could be somehow rewarded for their time and effort.

Today, CBEs (and online platforms in general) can employ different mechanisms to gratify their contributors, by means of both immaterial rewards (e.g. reputation, admin rights, privileges) and material rewards (e.g. virtual currencies, donations) as seen in Table 1.

| Value Metrics | Immaterial Reward Mechanisms |
|---|---|
| Reputation in the system based on the trust by other users (Ebay) | Real reputation (real-world volunteer networks) |
| | Power and status in the community, administrative permissions |
| Quantitative measures: | Privileges in the community, more space, speed (FTP media sharing) |
| number of contributions, size (Stackoverflow) | Qualitative rewards, e.g. congratulations from individuals (Wikilove) |
| popularity of content, visits, likes, shares (Facebook, Youtube) | Token (medals/badges) received from other's appreciation: Wikipedia, P2PUniversity |
| Online social network service analytics (Klout, Kred) | **Material Reward Mechanisms** |
| Calculation of "karma" based on "helpfulness" algorithm (Slashdot) | Tokens exchangeable for services within the community (FarmVille) |
| | Donations from individuals, crowdfunding (Kickstarter) |
| Token (medals/badges) received from other's appreciation: | Distributed donations from the community (Flattr) |
| Wikipedia, P2PUniversity | Offers from others to contribute to projects (Free/Open source) |

*Table 1: A series of examples of existing value metrics and value rewards.*

Yet, most of these reward mechanisms are limited by one of two issues. On one hand, rewarding contributors with material rewards - such as money, or anything that can be readily exchanged for money - may lead to undesirable results:

- if some contributors are paid for, others may not want to contribute *for free* anymore.
- as more and more people start contributing *for money,* efforts may shift towards these things that will be the most highly rewarded, as opposed to those that people feel the most passionate about.
- since money is scarce, contributors may start competing against each other, instead of collaborating towards a common goal.

On the other hand, if gratification is limited to immaterial rewards, the situation of contributors is barely improved. That is, contributors need to keep doing *those boring tasks that provide them with a source of income* instead of contributing to their favorite CBE: the one which does not know how to reward them appropriately. Besides, given that most of these rewards are CBE-dependant, contributions do not scale well in multiple CBEs: each reward mechanism is disconnected from the other and contributors cannot aggregate, exchange or compare the value they helped generate in different communities.

We propose here a mechanism for rewarding contributors, which abides to the following principles:
- It should not involve money, nor any scarce and transferable resource that may be exchanged for money - thus avoiding the emergence of competitive/individualistic dynamics among contributors.
- It should support people *in the physical world,* nowadays dominated by market logics.
- It should account for the contributions from all CBEs the contributor may be participating in.

Summing up, what we aim for is an interface between the market and the Commons-based ecosystem, that would provide rewards that are non-transferable (i.e. not currency-based) but that the market may somehow recognize. Let's imagine that we have such system - the so-called *Sabir* system - for a moment, and follow the story...

## The Journey Towards Rewarding Mia

Imagine a world with a flourishing Commons-based ecosystem that operates alongside the market economy. In that world, some CBEs would be invited to join a network-based value system, where their value would be established by other CBEs according to their weight in the ecosystem (see the social value indicator in the previous Section).

Now, let's assume for a moment that, in such an imaginary world, Wikipedia (WP) has a social value of 1500, and Creative Commons (CC) has a social value of 1000. Mia is a CC video artist and WP contributor; she only has a part time job, because she wants to spend more time on doing what she loves, that is, making CC documentaries and WP articles.

Whoever contributes to the Commons is rewarded with a particular set of non-transferrable tokens issued by a specific CBE. Each CBE is free to decide on the number of tokens to produce, and on the manner in which these tokens will be redistributed to its contributors, according to an internal reward mechanism based on gratitude and appreciation. Each CBE has its own token type, that is, its tokens are different from those other CBEs may issue.

WP has lots of contributors, so it has issued 12,500 tokens. CC has only issued 5,000 tokens so far. As Mia participates actively in both of these communities, she has received 125 WP-tokens and 200 CC-Tokens, which she collects in her portfolio.

In order for people to compare the value of their contributions between different CBEs, the value of each token must be translated into a common denominator of value, Sabir, calculated with the following formula:

$$Value\_of\_1\_token\,(CBE) \;=\; \frac{Social\_Value\,(CBE)}{Total\_number\_of\_tokens\_issued\_by\_the\_CBE}\;\;sabir(s)$$

*(Eq. 1)*

and thus, the number of sabirs for one person $P$ would be expressed by the following:

$$Sabirs\,(P) \;=\; \sum_{every\ CBE\ of\ P} tokens\_earned(CBE, P)\,*\,Value\_of\_1\_token\,(CBE) \;=$$

$$=\; \sum_{every\ CBE\ of\ P} tokens\_earned\,(CBE,\,P)\,*\,\frac{Social\_Value\,(CBE)}{Total\_number\_of\_tokens\_issued\_by\_the\_CBE}$$

*(Eq. 2)*

Thus, in the case of CC:

$$Value\_of\_1\_token\,(CC) \;=\; \frac{Social\_Value\,(CC)}{Total\_number\_of\_tokens\_issued\_by\_CC} \;=\; \frac{1{,}000}{5{,}000} = 0,2\;\;sabir(s)$$

Hence, Mia's 200 CC-Tokens are equal to 40 sabirs, and Mia's overall contribution to the Commons is equal to:

Amount of Sabir (Mia) = 125 * SV( )/12,500 + 200 *    (  )/5,000 = 15 + 40 = 55 Sabirs

Mia is really proud of herself, not only can she understand the value that she has contributed to the Commons over the past year, but she can also easily express it to her friends.
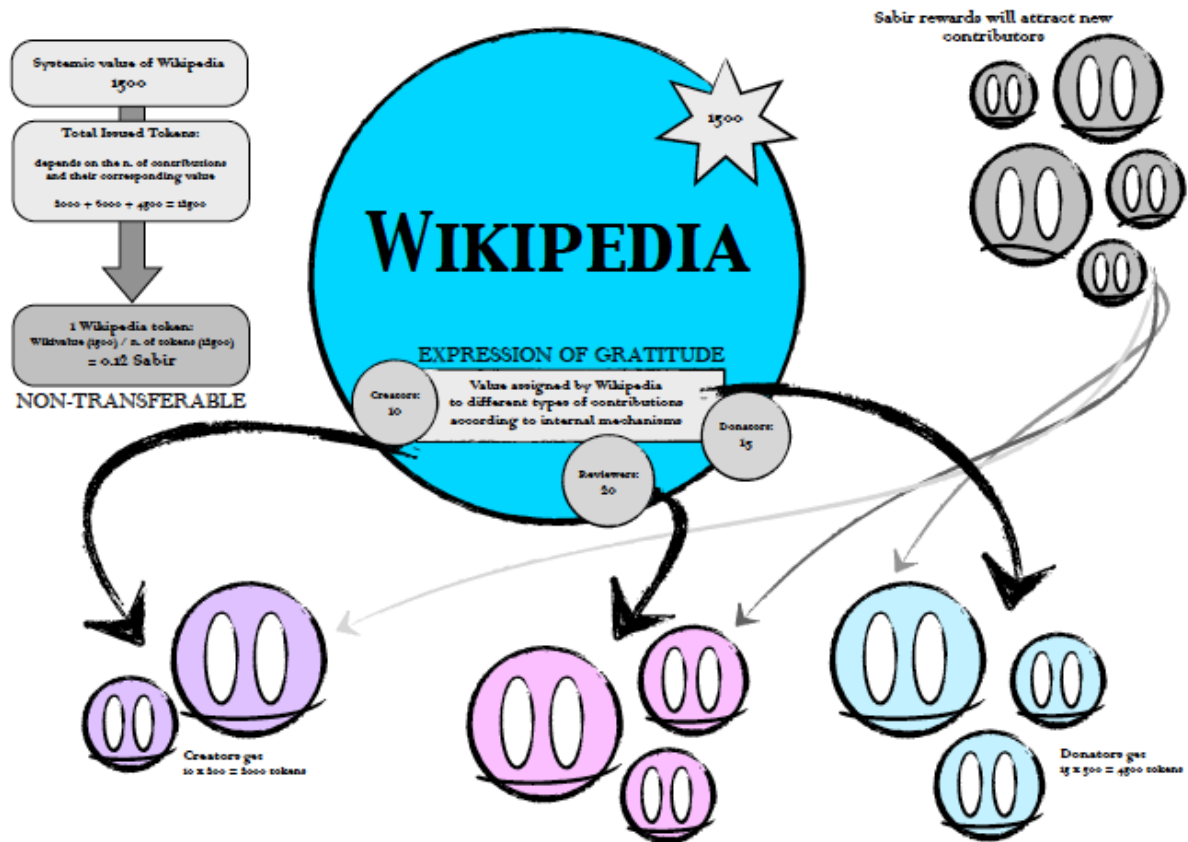
# Gratification



*Fig. 2: Wikipedia, with its own social value, generates and distributes its own tokens (WP-tokens) to different contributors based on their task.*

The system of gratification can be explained through the example shown in Fig. 2. Wikipedia, with a Social Value of 1500 as we saw in Fig. 1, issues 12,500 wikipedia-tokens (WP-tokens). In this specific moment, Wikipedia is adopting a strategy of prioritizing the quality rather than the quantity of its articles, so it decides to reward article reviews the most, followed by donations and then the creation of new articles. In the particular example we illustrated, Wikipedia rewards with 20 WP-tokens all those providing an in-depth review of existing articles, 15 WP-tokens for each donation over $200, and 10 WP-tokens for each article created longer than a stub that is accepted by the community. This way, it is providing some kind of reward to its contributors. Even though this might distort the nature of contributions, if properly used, this can be employed as a tool for the CBE to slightly direct the flow of contributions towards the tasks that are most needed at the moment. E.g. if a contributor hesitates on whether to create a new article, or review an existing one, she might favor the review based on the higher value it has for the community, as expressed by the internal mechanism of rewards.

The system should make sure that:

- Users know what kind of rewards can be earned by which tasks. Thus, each CBE should provide a standard table where these task+gratification are indicated. The more transparent it is, the more the CBE could encourage its contributors to focus on the most needed tasks.
- Each CBE keeps track of how many tokens are earned by each contributor. Thus, it should provide a standard way of accessing such information, either by querying the CBE contributor's profile (if any), or via an API for people to use their own personal *wallet* - i.e. a software that can keep a record of all the tokens they have earned and what is the sabirs value of each one of these tokens (see FAQ #5).

Even though the tokens are a quantified expression of gratitude, we are not aiming to *quantify everything*. These rewards can be earned according to *internal rules* decided by each CBE, and such rules can be either quantitative or qualitative, and can refer to, for instance:

- Project / Task for which people can earn a particular number of tokens. Reward may be based on both quantity (e.g. number of words) and quality (e.g. 3 OK's from librarians).
- Role / Function providing some sort of salary-like remuneration. This may be common for maintenance and caring-related roles., e.g. Wikipedia administrators might earn 5 WP-token / month.
- Others, unpredictable rewards. Tokens can be distributed as prizes to really productive or skilled users that did remarkable contributions. We can also think of some users/administrators with the right to distribute a certain amount of tokens as they wish.

WP-tokens are generated on demand: Wikipedia can issue as many as they want, that is, no *a priori* artificial limitation is imposed. This means that these tokens are not scarce, as it happens with real money or typically to virtual currencies (such as Bitcoin). Besides, these WP-tokens are non-transferable: a contributor cannot *sell* its tokens to someone else, neither exchange them for anything. Finally, the value of each WP-token is different than the value of each CC-token: the value depends on the actual social value of the CBE issuing them, and on the amount issued.

We propose here a simple way to normalize the value of all those CBE tokens, through our common denominator of value, *Sabir*: a quantified indicator that approximates the value of all contributions that someone has made to the Commons. Such indicator is easy to understand not just by the contributor herself but also by others, who might not be acquainted with the particular CBEs to which the contribution was made.

## Interaction with Market Players

Sabir can essentially be regarded as a proxy for value in the Commons-based ecosystem. Just like the price does in the market economy, Sabir allows for individual contributions to be assessed and compared according to a common denominator of value (which remains distinct from market-value). While price is linked to a particular service or product of exchange, Sabir is an expression of the value that a particular individual contributed to the Commons over a lifetime, and should therefore remain linked to that individual over the whole lifetime (i.e. it is not transferrable).

As a common denominator of value, Sabir establishes a common language (lingua franca), an interface acting as a bridge between the Commons and the market economy, so that the two can benefit from each others, without one actually taking over the other. Indeed, by introducing a quantitative denominator of value for Commons-based contributions (similar to price in the market economy), Sabir makes it easier for market entities to understand the

value generated by CBE contributors to the common good, and reward them accordingly, if they so wish. Hence, people who highly contributed to the Commons but who remained outside of the market economy might eventually be able to interact with the market economy, insofar as some commercial player recognizes the value of their contribution to the Commons. These market players can - if they so wish - provide free/discounted goods or services to anyone who contributed to the Commons, as a form of appreciation to their work.[13]

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Mia's part-time job doesn't provide her with plenty of income. Fortunately, there are
several market entities, popular among CBE contributors, which recognize the value of
her work. Once a week, Mia can have free lunch  in a local restaurant whose owner is
also a CC artist, and she can travel to Wikimania every year with the stand-by tickets
offered by British Airways.
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From a commercial perspective, Sabir enables market players to price-discriminate between standard customers and CBE contributors, potentially restricting their offers only to those people who contributed at least x Sabir to the Commons.

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Mia loves to record her songs with a commercial recording software, but the license is
expensive; fortunately the software company provides free licenses to anyone who
contributed over 10 Sabirs to the Free/Libre Open Source Software community.
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Besides, being Sabir an open value system, anyone could assign value to CBEs according to their own value metrics, e.g. schools or universities could apply the "education" matrix, giving more importance to Wikipedia and Creative Commons, whereas a local restaurant might apply the "slow food" matrix, giving more weight to local farmers and producers. Thus, the previous Equation #2 could be customized by a third-party M as follows:

$$Sabirs\,(P\,,\,M) == \sum_{every\;CBE\;of\;P} tokens\_earned\,(CBE,\,P) * \frac{Value\_Matrix\_M(Social\_Value\,(CBE))}{Total\_number\_of\_tokens\_issued\_by\_the\_CBE}$$

*(Eq. 3)*

that is, the third party may apply its customized *value matrix* to the already given social value of the CBEs, valuing more those that may be more related to it. Still, not every third-party needs to build a matrix: they may use the standard social value (Eq. 2), use their own customized matrix, or use a matrix deployed by others. E.g. Github may use the standard social value, a customized Value_Matrix_Github, or the  Value_Matrix_FOSS, a common matrix used by many within the Free/Open Source Software realm. See FAQ #6 for details on where to find value matrixes.

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Mia is a good student, she's smart and very interested in the topics she loves. She
spends a lot of time on Wikipedia, researching and reporting her findings together
with a community of other passionate users. The school recognizes the value she's
contributing to the "Commons" and gives her better grades for that, although the
university only looks at the Commons from an "education lense" which assigns greater
value to academic institutions such as Wikipedia or the P2PUniversity, and does not
care too much about other CBEs such as Couchsurfing or other non-academic CBE
platforms.
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Individuals can choose whether to work for the market (earning money) or for the Commons (earning sabirs), without necessarily having to give up for the other. By providing an interface between the Commons and the market

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[13] This is already happening, albeit in a very limited way: e.g. Github provides free (*as in beer*) services to FLOSS accounts, Bambuser provides premium accounts to journalists and activists, and SafeCreative provides a restricted amount of "all rights reserved" registrations while an unrestricted amount for CreativeCommons works.

economy, Sabir might ultimately encourage people to contribute to the Commons in order to benefit from the advantageous deals provided by certain market entities to CBE contributors.

Eventually, as more and more market entities recognize the value of Sabir, and CBE contributors accordingly, Mia will be able to spend more time doing what she loves, contributing to the Commons while benefiting from the goods/service offered by the market without necessarily having to interact (directly) with the market economy.

Over time, a positive feedback loop is established, as the market entities that support (or sponsor) the Commons will gain reputation within the Commons-based ecosystem. Ultimately, this would lead to more and more people to purchase their goods or services.

Everytime she discovers a new entity that supports the Commons, Mia gives them a good rank, and tells all her friends about it. Whether or not they are themselves CBEs contributors, they will nonetheless be happy to purchase the services offered by that entity, knowing they are ultimately also helping the Commons.
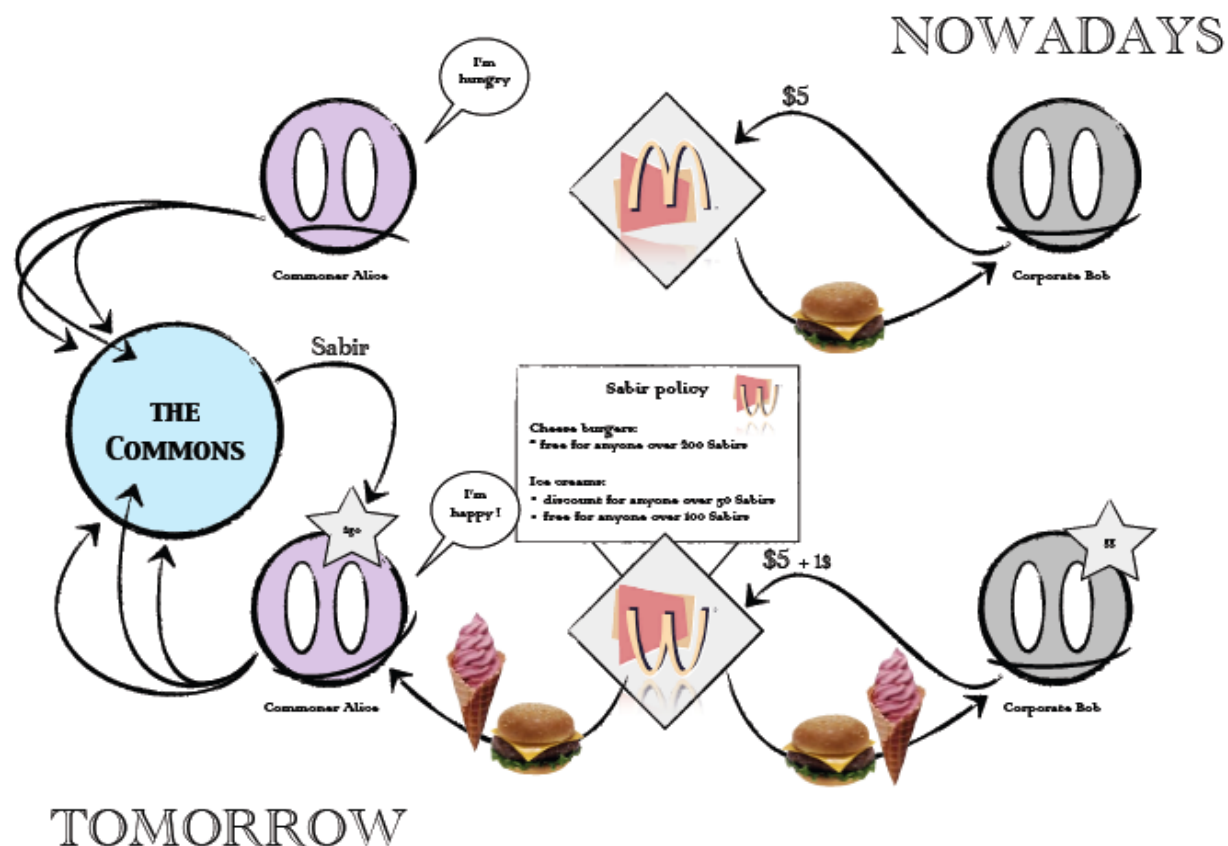


Fig. 3: Example illustrating the current state of affairs for contributors to the Commons and how Sabir may help changing it.

In Fig. 3, we illustrate the benefits of the Sabir system, as an interface between the market and the Commons-based ecosystem. Nowadays, Alice is contributing to various CBEs but, since she's not earning any money from this effort, she cannot benefit from the products provided by the market system (i.e. burgers and ice cream from McDonald's in this case) unless she actually decides to play the market game by getting a remunerated job. Tomorrow, thanks to Sabir, Alice will be able to express the value that she has been contributing to the Commons through a common denominator (the amount of sabir she has accumulated in her wallet), which can be easily understood by market actors. In this example, WcDonald's recognizes the value of the Commons and has implemented a specific policy to reward CBE contributors with free burgers and free or discounted ice creams, depending on the amount of value contributed to the Commons. Hence, Alice is happy since she can keep contributing to the Commons, knowing that the time she spends doing so will counts towards obtaining free burgers and ice cream from WcDonald's. Bob also contributed to the Commons, but to a lesser extent, and he's therefore only entitled to a discount on the ice cream.

## Implications & Benefits

In a nutshell, the proposed system can help (1) measure CBEs social value, (2) distribute non-transferable tokens to relevant contributors, and (3) facilitate the process of rewarding these contributors by market entities. The system presents a variety of benefits for the various actors involved and different implications which are analyzed more closely in this section (summarised in Table 2).

| Actor | Implication |
|---|---|
| Commons-based Entities | Understand the perceived systemic value of CBEs |
| | Facilitate establishing a reward system for contributors |
| | Encourages participation and growth |
| | Direct contributions where they are most needed |
| Commons-based Contributors | Understand the value contributed to the CBEs and to the whole ecosystem |
| | Communicate the value of one's contribution to the Commons |
| | Receive direct benefits from the market entities recognizing Sabir |
| Market Players | Direct economic benefits through price discrimination |
| | Indirect benefits resulting from visibility and reputation |
| | Self-realization |
| Whole System | Interface between the market and the Commons-based ecosystem |
| | Cooperation without contamination |
| | Positive feedback loop between the Commons and the market system |

*Table 2: Implications of the proposed system, classified by the actor concerned*

# For Commons-based Entities

- *Understand one's perceived systemic value*
  From the perspective of CBEs, the most clear benefit of Sabir is that it allows for each CBE *to understand its own* (systemic/social) *value within the CBPP ecosystem* thanks to the social value metric (explained in Section 2) - or at least, an approximation of how it is perceived by others. This is a useful indicator, which may (positively or negatively) evolve over time, depending on the CBE's actions. Thus, it is a good indicator for guiding the CBE during its evolution.
  It may happen that a CBE is receiving much less value than expected (for example, following Fig. 1, Couchsurfing may wonder why it has just a value of 200, although internally they believe they should have much more).
  This may be regarded as a signal for a variety of things, e.g.
    - Poor relationships: for some reason, other CBEs do not vouch for this CBE, and it may be related to its poor relationships with them, due to past dissents or other reasons. If this is the case, the CBE may want to work on this aspect.
    - Bad communication: the CBE actually has plenty of value but it is perceived otherwise by the other CBEs and society… if they believe that's the issue, this may trigger a change in its communication strategy.
    - Wrong focus: the CBE is trying hard to generate value on particular aspect, which is however actually not creating value for others in the ecosystem. Thus, the earlier it knows, the earlier it would be able to shift focus.
  In any case, it is still useful for the CBE to analyse all possible underlying reasons for their low social value, so as to react accordingly as an attempt to resolve the problem. Without the social value metric, CBEs would remain ignorant of how they are perceived by other CBEs.

- *Estimate the value of contributions and reward contributors accordingly*
Another benefit of Sabir is that it *facilitates the elaboration of a system of internal rewards for estimating the value of contributions*. This is a typical issue for many CBEs, they are interested in reward systems in order to promote participation, but still there are multiple issues: reputation systems can be risky, as they may trigger unexpected and uncontrolled changes within the established communities; reward mechanisms are complicated as there is no systematic procedure for gratifying contributions, and the existing systems have several issues (as seen in Section 3: Gratification). With Sabir, the introduction of non-transferable CBE-dependant tokens can be done in a gradual and systematic manner (e.g. starting off by gratifying only one small subset of contributors or tasks, and then iterating from there). This would minimize the risks and, if the experimentation fails, it is easy to revert back to the initial state of affairs.

- *Attract contributors and direct their contributions where they are the most needed*
A third benefit of such a gratification system is that it would likely *increase the participation and growth of the community of contributors*, while also providing a means to *direct the contributions to where they are most needed*, according to each CBE's priorities at any given time. CBEs might not only be concerned in increasing participation, but also in promoting a certain type of contribution (e.g. donations, maintenance, technical tasks, filtering, etc) that it is urgently needed but lacking - and may thus threaten the sustainability of the community. Crying for help may not be sufficient without an appropriate strategy for gratifying contributors according to the priority assigned to the different tasks, so as to encourage them to help more. As times goes, and priorities change, CBEs would of course be able to re-calibrate the amount of tokens granted for each task, or even to create new tasks and eliminate older, less necessary ones.

# For Commons-based Contributors

● *Understand the perceived value of one's contribution to the Commons (within each CBE and the ecosystem as a whole)*

Similarly to CBEs, a direct benefit for contributors is to understand the value they are providing both to the whole Commons-based ecosystem (expressed in Sabirs) and to each individual CBE (expressed in their own gratification-tokens). This is particularly useful to the extent that individual contributors can compare the value they contribute to different CBEs and understand where their contributions are the most needed or appreciated. For instance, a contributor might be contributing 10 hours / week to Wikipedia and only receive a little amount of gratification from it; whereas, within Creative Commons, where she contributes only few hours a month, her contributions are valued much more. Hence, the contributor might eventually decide to spend more time on Creative Commons, since her work is generating a much greater value to the Commons-based ecosystem as a whole.

Instead, if the contributor receives less gratitude than expected from a particular CBE, perhaps she should focus on a different task, or even stop contributing to that particular CBE (and shift to another entity instead). Even if this might seem like a negative outcome for the particular CBE that the contributor is leaving, this might - overall - lead to a more positive outcome: the contributor is clearly not producing great value in this community, and her skills may be more useful somewhere else. Besides, knowing it early may reduce the possible frustration of continuously trying to contribute and wondering why her work is not being appreciated by others, which might have led to the contributor leaving the community (even without the Sabir system).

● *Communicate the value of one's contribution to the Commons to society*

Sabir may be understood as some form of reputation system from within the Commons-based ecosystem, but also as a means to communicate one's value to the outside world, which may or may not be aware of the particular CBEs one has been contributing to. For instance, people who contributes to Wikipedia might easily explain the value of their contributions to their friends or family, but those who contribute to smaller CBEs might have a hard time communicating the value of their contribution to others, even if these contribution are highly valued within the Commons-based ecosystem. By providing a common denominator of value, which applies equally to all CBEs, Sabir makes it easier for "commoners" to communicate the value they have contributed to society, and maybe even encourage others to join and contribute to the Commons as well (so as to get their own sabirs!).

● *Benefit from certain goods or services provided by the market*

The main benefit for contributors is obviously those coming from the market, in particular from the market players which recognize Sabir as a reliable indicator of the value which has been contributed by each individual to the Commons-based ecosystem. See FAQ #7 for more details on the actual interaction between commoners and market entities.

As explained in Section 4, a growing community of commoners and market entities joining the system may result in profound changes on the commoners' lives, who might end up reducing their dependence on traditional market mechanisms (ruled by money) to spend more time contributing to the Commons, while nonetheless being able to benefit from some of the goods and services provided by the market.

# For Market Players

Market players[14] can benefit from the system in a variety of ways, which can be categorized into three broad categories:

- *Direct economic benefits by means of granular commercial policies*
  Market players can engage into fine-grained price discrimination, by means of customized pricing policies which allow them to allocate some of their resources - otherwise wasted - to the Commons, without (excessively) affecting the market price. For instance, in the case of software, in addition to the traditional licensing fees for "commercial" vs. "educational" uses, software companies might set up a particular licensing scheme for the Commons (with a very low fee, or perhaps even for free) to reward those who have been contributing to the open source community. Similarly, in the restoration business, certain players could decide to provide free coffee or discounted meals to their customers according to the amount of work they have been contributing to the Commons, as a form of appreciation to their efforts. Finally, although less realistic at least in the short run, in the case of many airline companies, known for allowing their planes fly without reaching full-capacity, they could introduce a "Commons class", in addition to the business or economic classes, that would only be available to those who can prove they have been contributing to the Commons-based ecosystem.

  The advantage of such particular kind of price discrimination is that it does not (theoretically) affect the market price, because only Commons-based contributors will be able to benefit from it. Of course, as more and more people contribute to the Commons, the system might lead to a progressive drop in market price (since the demand will drop as more and more people can obtain the same goods or services as part of the "Commons-based" ecosystem). Yet, this is only a marginal problem since market players maintain the right to update their Commons policy at any time, so as to raise the minimum threshold that one must contribute to the Commons before one can benefit from such policy. That is, as in Fig. 3 burgers were offered to those with more than 200 sabirs.

- *Indirect economic benefits as a result of greater visibility and reputation.*
  It is common practice for many market players to support Commons-based initiatives, such as social, cultural, or educational programs; environmental and humanitarian projects, public events including conferences, festivals, workshops, etc. Support can be given by means of financial contributions (sponsorship) or other material and immaterial resources (e.g. infrastructure, human resources, knowledge and skills, etc). While market players generally do not receive immediate economic returns from their participation in these initiatives, the greater visibility and reputation they acquire might eventually turn into economic compensation in the medium/long term.
  With Sabir, market players can support the Commons-based ecosystem without having to distinguish between different initiatives in order to select the ones that they would rather donate their resources to. They can, instead, indirectly contribute to the Commons-based ecosystem as a whole, simply by showing appreciation to anyone who contributes to the Commons and rewarding them accordingly - although they maintain the right to assign more value to certain initiatives than others (see Equation 3).
  In addition to the greater reputation they might acquire from supporting the Commons and not wasting valuable resources for the sake of keeping the prices high, market players participating to the system might also benefit from collateral economic returns, as people who shares the same values will be more likely to purchase from them (similarly to the green movement, where people who support environment-friendly

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[14] We refer here to market players as any entity that subsists within the market economy and operates mostly according to market logics.

companies, as opposed those who pollute the environment). Besides, those who benefit from discounted/free goods or services (as part of the Commons-based policy) will also be more likely to purchase other goods or services provided by these same players, whenever they interact on the market.

- *Self-realization*
  Although, in most economic theories, market players are described as rational beings acting only and exclusively according to their own self-interest and utility maximization, in practice, behind market players there are ultimately human beings with principles and ideological values that might go counter traditional economic rationality. Hence, certain market players might be tempted to participate into the system in order to feel better about themselves, by supporting the projects that reflect their own values and, more generally, by contributing to making the world a better place.

# Systemic

- *Interface between the market and the Commons-based ecosystem*

From a systemic approach, the main advantage of Sabir is that it acts as a bridge between the Commons-based ecosystem and the market economy, without necessarily favoring one over the other.

Today, the market can take from the Commons, *i.e.* it can benefit from the outcome of Commons-based peer-production, without ever giving back to the Commons-based ecosystem. Thus, even though the market is not always taking anything away from the Commons, it is to some extent free-riding over the resources that people are contributing to the Commons (which are thus subsidizing the market economy).

Conversely, the Commons-based ecosystem cannot benefit from any of the goods or services that the market provides, unless it actually adopts a market logic, which necessarily entails the commodification of Commons-based resources to be turned into an object of trade.

- *Cooperation without contamination*

Thanks to Sabir, the two systems can keep operating according to their own logics: *abundance, collabroation, and sharing* for the former, *scarcity, competition* and *exchange* for the latter. Nonetheless they are able to interact with one another without incurring the risk of contaminating, or being contaminated by the other. In other words, by creating an interface between the Commons and the market economy, Sabir allows for CBEs to benefit from some of the goods and services provided by the market, without necessarily having to interact (directly) with the market economy. Instead, individuals can choose whether to work for the market (earning money) or for the Commons (earning Sabirs), without having to give up one for the other.  As more and more market entities recognize the value of Sabir (and reward CBE contributors accordingly), people will be able to spend more time doing what they love - contributing to the Commons while also benefiting from some of the goods and service offered by the market economy.

- *Positive feedback loop between the Commons and the market system*

As a result, Sabir might actually encourage people to contribute to the Commons in order to benefit from the advantageous deals provided by certain market entities to CBE contributors. Over time, a positive feedback loop will therefore be established, as market entities that support (or sponsor) the Commons will gain reputation within the Commons-ecosystem. This might, ultimately, bring more and more people (whether or not they are themselves CBE contributors) to purchase their goods or services on the market, knowing that, by doing so, they are also helping the Commons.

## Concluding Remarks

The value of CBPP has been widely acknowledged over the past few years[15] [16] [17] [18]. Accounting for the value produced by different CBEs and determining the relative value of each contribution is a worthy endeavor, which is however difficult to achieve insofar as there are - to date - no proper tools capable of understanding the value of CBEs or estimating the value generated by their community members.

The Sabir system combines some (but not all) characteristics of a credit score, a cryptocurrency, and a reputation system in order to provide an indicator which constitutes a proxy for *social value* (as opposed to *market value*) in the Commons-based ecosystem.

As individuals contribute to the Commons, they receive "gratitude" from the CBE they have contributed to (expressed in their own gratification-system, i.e. the CBE tokens). As a common denominator of value, Sabir represents the *lingua franca* between these different systems. It translates the gratitude generated by individual contributions into a numeric value according to an algorithm (standard or customized through a value matrix, as seen in Equations 2 and 3) ponderating every contribution with the overall social value of the Commons to which they contributed (see Equation 1). As such, Sabir makes it easy for anyone to assess the value produced within a particular CBE, as well as to compare the values of different CBEs among each other.

Through Sabir, it becomes therefore possible to benefit from the advantages provided by a universal indicator of value, without falling within the scope of conventional economic theories. Indeed, just like the price does in the market economy, Sabir allows for individual contributions to be compared according to a common denominator of value. Yet, the value expressed by Sabir is not the actual *market value* (or exchange-value) but rather the *value that emerges from every contribution to the Commons*. In other words, Sabir acts as a proxy for the value of an individual actions within the Commons-based ecosystem. Hence, as opposed to price - which is linked to the product or service of exchange - Sabir is ultimately linked to the individuals contributing to the Commons. It is, therefore, important not to confuse Sabir with an actual currency (or cryptocurrency). As opposed to conventional currencies which can be transferred from one individual to another, the Sabir indicator should stick to the same individual during a whole lifetime, i.e. it cannot be transferrable... although, just like price, its value may fluctuate over time.

And yet, measuring the value of CBPP within a non-market economy nonetheless raises an important question. It is unclear, at the moment, whether the introduction of a system like Sabir, offering a formalized, personal (albeit non-transferable) indicator of value is likely to increase or reinforce the motivations for people to contribute to the CBPP ecosystem, or whether it might, on the contrary, disrupt that particular set of motivations which have been established thus far.[19] Hence, could CBPP values (such as freedom, sharing, or cooperation) actually be translated into quantifiable terms, without incurring a loss?

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[15] Cheal, D. (1988). The Gift Economy. New York: Routledge. pp. 1–19.

[16] Gold, L. (2004). The sharing economy: Solidarity networks transforming globalisation. Ashgate Publishing, Ltd.

[17] Bauwens, M. (2005). The political economy of peer production. CTheory, vol. 1.

[18] Benkler, Y. 2006, The wealth of networks. How social production transforms markets and freedom, New Haven; Tale University Press.

[19] Benkler, Y. (2014), Peer Production and Cooperation, forthcoming in JM Bauer & M. Latzer (eds.), Handbook on the Economics of the Internet, Cheltenham and Northampton, Edward Elgar. Peer Production and Cooperation

# Technical FAQ

FAQ #1: How could we verify a person registering in the website actually belongs to the CBE she is stating?
As a basic mean of automatic verification, we can ask for an email from the *recognized* domain of the CBE, e.g. @creativecommons.org. In the (hopefully few) cases where this is problematic, such as informal communities or CBEs without their own domain, we may move to crowd verification (others should validate you) or manual verification (a person should check your credentials).

FAQ #2: Why would our CBE vouch for others? What would be the motivation for it?
In the start, we should probably link the fact of receiving vouches with giving vouches: that is, either you play with the rules, or you don't play. That is, you cannot be receiving vouches (and value) without vouching anyone. If the system reaches critical mass, the rules could be more relaxed.

FAQ #3: We want our CBE's social value to be seen! Not just by those who register…
The same way as anyone can embed a badge, a license, or a crowdfunding banner in a website sidebar, your CBE could embed their recognized social value for any visitor to your CBE website to see it.

FAQ #4: What will be the initial population of the system?
The same way Bitcoin and other cryptocurrencies *pre-mine* currencies before launch (that is, generating additional currencies that will generate the initial transactions, distributed among predefined actors), we should provide a set of preselected initial CBEs within the system. Those, manually selected, will be guaranteed to follow a Commons-based approach (e.g. Wikipedia, Creative Commons, Mozilla), and therefore should help to grow the community organically on the right direction.

FAQ #5: What do you mean by a wallet for each contributor?
If I earn 50 WP-tokens, those may be published in a page of Wikipedia, or in my Wikipedia profile page. However, if I earn 50 WP-tokens, 10 CC-tokens, and 2 CouchSurfing-tokens, I would need a place to keep track of all those. It may be a web service or a client software installed in my computer. And such wallet would calculate how many sabirs I have in any given moment. In order to have an updated record, the wallet should query the CBE websites for the info, using the contributor's credentials to verify that she's actually the one who owns that username in that CBE. Thus, the wallet keeps a record of all the *identifiants* used by the contributor to interact with the different communities, i.e. something akin to keybase.io.[20]

FAQ #6: Where would the information be stored?
Again, we may think of several ways of implementing this. The sabir.cc website (or any other website) could host public wallet information and/or a collection of uploaded and customised *value matrixes* (see Equation 3). The site could have a public API that may be consulted from third-parties. The actual data could be stored either on a distributed and transparent database, such as the Ethereum[21] blockchain (the technology behind Bitcoin) or on a centralised database governed by a particular community.

FAQ #7: How will the commoner show her sabirs to the market entity?
Although there can be others, a possible manner would involve the commoner's smartphone and her wallet. The wallet software (an app or a webapp) may generate a QR code containing the information needed, including a verification of its legitimacy. The market entity may read the QR code, consider it valid, and apply the appropriate gift/discount. It may be compared to a coupon from those deal-based websites such as Groupon.

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[20] Keybase is a web service providing an aggregation of the person's social media usernames. http://keybase.io
[21] Butterin, V. (2014). A next-generation smart contract and decentralized application platform. White Paper.

## Acknowledgements

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