CoWaBoo: A Descriptive Protocol of Learning Driven Applications

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***Abstract*— Algorithms, data, services seem to create a net of semantic stability for users to consume information but come with concrete disadvantages regarding the way we understand, discuss and teach them. Social bookmarking applications are no exception to this, as they follow a similarly opaque way to organize and publish data. This article will examine the possibility to shift from predetermined results to open and descriptive protocols and applications that revisits fundamental web user activities such as search, classification, group formation and valorization of participation. This approach combines both a data handling protocol (CoWaBoo) and an application (collective observatories) that serve as wider concept and practice of application use and development. Our initial results from 2015 and 2016 university group course works, contributes to shifting our attention from how things end up, to how things *become*, an important competence in the field of ICT training and education.**

Keywords-ICT opacity; open protocols; learning driven applications

I. INTRODUCTION

Scholars agree that we need to look more deeply into the opacity of a growing algorithmic reality, where users perform prescribed tasks. The nature of the 'opacity' of these tasks is related to sociological interests in classification and discrimination, framed around 'digital inequality' that has frequently focused on the distribution of computational resources and skills [1]. How people may be subject to computational classification, privacy invasions, or other surveillance methods in ways that are unequal across the general population, could be in violation of existing regulatory protections [2]. This is crucial for several reasons but in this paper, we will focus on its possible effect on our training practices in education.

This "click on the most often" culture [3] is exemplified by Google's searching normalization resulting from user habits that have "deeply ingrained habitual patterns" [4]. The result of this is a widely spread culture of opacity of web applications, data or machine learning algorithms assuming a certain normality: when a computer learns and consequently builds its own representation of a classification decision, it does so without regard for human comprehension. The examples of handwriting recognition and spam filtering illustrate how the workings of machine learning algorithms can escape full understanding and interpretation by humans, even for those with specialized training, even for computer scientists [5].

Algorithms, such as those underlying the Google search engine, are often multi-component systems built by teams producing an opacity that programmers who are 'insiders' to the algorithm must contend with as well [6]. The opacity concern arises in the middle of an input - black box - output approach. For the most part, we know how the data are fed into the algorithm: we produce it ourselves through our activities. We also typically know the outputs of the algorithm: we are either told, or we can reasonably infer how the algorithm has classified the data. What we do not know is what is going on in the middle, inside the 'black box', or which bits of data the algorithm selects and how it uses that data to generate the classifications.

To sum up, we cannot rely merely on the modern "disciplinary" methods and frameworks of knowledge in order to think and interpret the transformative effect new technology is having on our culture, since it is precisely these methods and frameworks that new technology requires us to rethink' [7]. We need to propose and invent an analysis that intersects the current state of opacity and, at the same time, applicable in training and collaborative scenarios. Following sections of this paper will pursue this analysis, further. In Section 2, we, briefly, position protocols as an important, but not sufficient, parameter against an opaque, black-box culture of application use and development. This culture is exemplified by an analysis on social bookmarking applications and practices. Section 3 is devoted to CoWaBoo, a protocol assuming a socio-semantic logic, empowered by specific rules and architecture. In Section 4, we demonstrate how an application of collective observatories, built on the CoWaBoo protocol serves a double objective: validate the rules and functions of the protocol, while raising further research and learning questions in a context of collaboration and knowledge production. Finally, in Section 5 we highlight the initial training and experimentation results of using CoWaBoo and the collective observatories in university courses. Our conclusions include our future work and challenges.

II. ON PROTOCOLS AND SOCIAL BOOKMARKING APPLICATIONS

Partnerships between legal scholars, social scientists, domain experts, along with computer scientists may chip

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away at these challenging questions of fairness in classification in light of the barrier of opacity. User populations can give voice to exclusions and forms of experienced discrimination (algorithmic or otherwise) that the 'domain experts' may lack insight into. Alleviating problems of black boxed classification will not be accomplished by a single tool or process, but some combination of regulations, audits, the use of alternatives that are more transparent, user education, as well as, the sensitization of those bestowed with the power to write such consequential code. Moreover, we need pedagogical concepts and tools that can form and carry a culture of educated openness. We would like to introduce protocols as an important parameter of future application analysis and design.

A protocol is founded on a contradiction between two opposing machines, one machine that radically distributes control into autonomous locales, and another that focuses control into rigidly defined hierarchies. In order for protocol to enable radically distributed communications between autonomous entities, it must employ a strategy of universalization, and of homogeneity. It must be implementing, at the same time distribution and anti-diversity. It must promote standardization in order to enable openness, while organizing peer groups into bureaucracies. A protocol, then, becomes an ambivalent space where both opacity and transparency are possible and certain short-term goals are necessary in order to realize one's longer-term goals [8]. Applications running on protocols can use or, sometimes, play down this contradiction but never break away from it.

Social bookmarking applications can be understood as social machines, a collective of humans and machines and computers (or algorithms) working collaboratively on some area. This assemblage involves large numbers of users, some level of interaction, responding to a certain task. Software or applications mediate between the user and other users or machines' in a way that obscures how searching, tagging, curating posts and bookmarks, or forming groups take place. Their users are involved in a "many to one to many" schema of directive search and classification where the intermediator the "one" is setting the agenda of how the documentation itself takes place. This combination of directive searching, leads to limited diversity for retrieving information and, results, to "one-click" driven documentation. We will use the terms atonal posts and reticular search to frame the results of this process, as a components of how prescription works in social bookmarking.

Atonal posts appear as flat bookmarks with standardized description that carry no actual engagement on behalf of the user. Atonal posts are produced with the minimum number of clicks, where decision and curation process are merely mentioned, and, thus, a post exists without any other event connected. They flood search engines and information aggregators, while creating impressive numbers of individual posts. They are prescribing information items as something distant but true, a set of data of something classified, thus becoming important, with a minimum effort of description or documentation.

The term *reticular search* carries the user expectation that searching of information, in the connected networks of our times, is a sufficient proof their own intentionality access knowledge. In this sense, searching and documenting information is imagined within fixed patterns: being efficient in information search implies knowing the "right tricks" as to cut down the time needed and the diversity of the possible results. This creates a kind of reticular search where a minimum set of keywords, thrown in a sea of algorithms, consist of a sufficient process. Both reticular search and atonal search help us frame how users interact with protocols and social bookmarking applications, nowadays. Producing atonal posts based on a culture of reticular search acts as an explicit normative context to a future self that is mediated as time-series structured data streams. Take the example of social media: we are often prescribing parts of ourselves, within few clicks, words and images, creating more and more (atonal) posts, or data for more (reticular) search.

III. THE COWABOO PROTOCOL IN A DESCRIPTIVE SOCIO-SEMANTIQUE LOGIC

CoWaBoo starts as a concept and an ambition to understand and change user actions and results in social bookmarking. It enters the field of information search by integrating, in a conscious manner, the reuse of results that are available in existing curating communities. Searching in CoWaBoo means identifying experts as mediators, or trusted entities in the research of information. This search is not to be inscribed in an immediate response but in a wider logic of information culture and curation of information. CoWaBoo attempts to move the boundaries of social bookmarking from an, opaque, click and post culture towards a storytelling event that involves serendipitous browsing and learning. The term "serendipitous browsing" is used to refer to information search that result in discovery of relevant information as by-product of the main task [9].

It is heavily connected with its possibility to stimulate competences including "sagacity" as penetrating intelligence, keen perception and sound judgment [10], "intellectual readiness" as the ability to recognize clues which may lead to meaningful discoveries, "openness" as the ability to seize an unexpected and unplanned event [11] as well as "preparation, training and knowledge" [9]. The CoWaBoo approach on social bookmarking is based on the identification of users who share common interests. The goal is to find information and websites and to identify experts in a field [12] not so much as a final, unmovable product but more as an unexpected travel. In this sense, information research process can be described as a travel with discoveries, information, websites and people. CoWaBoo opens this process to community-curated resources, while the users are gathering selected discoveries: they need to make choices and engage in some kind of a result that contributes back to the original sources.

In this sense, CoWaBoo opts to explore, not so much on "what is social bookmarking", but "how social

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bookmarking is". It is drawing on the previous work on user driven data search and management, social bookmarking applications and uses cases, online collaboration skills and user capacities, in order to reposition them in the proposed mediation interface. Positioning CoWaBoo "in between" current search and organization of information trends and algorithms, means reusing social bookmarking data, connecting with communities and users, producing results both locally and globally, decentralized and centralized.

Our next step in this direction is putting trust in the work of others by creating a circular understanding of searching and curating information. This comes in contrast with web 2.0, algorithmic based, ways of capturing data, seeking to extract value through an unintentional capacity of participation and opens a virtuous circle of social bookmarking. A different logic open to iterative transformations of the work of others, a possibility to produce knowledge through the act of redocumentation. CoWaBoo, then, is positioning itself, not as another collaborative application, but a protocol. We consider the addressee of these wider computational systems made up of arrays or networks as a future actor of it design. As the interaction needs to be open to further development, the code of CoWaBoo protocol needs to apply the following default rules:

- Assure the lucidity of past (as stored data), present (as current data collection, or processed archival data), and future (as both the ethical addressee of the system and potential provider of data and usage).
- Store objects that do not resemble to complex computational models but act as a section to existing social (bookmarking) practices, structuring assumptions, conditions generated from their use.
- Demonstrate in a transdisciplinary way that code's mediation can be rethought, researched for intervention, contestation and the un-building of code/software systems.

The overarching concept of the protocol is to formalize an always-editable space realized by the rules set above. This space stays vague if we do not experiment its utility. This is why we bring in the collective observatories application, as one, of the possible many applications, built upon the protocol. In this application, the protocol would store and allow us to recover a general index of a given subspace (observatory) and then be able to navigate through the different versions of the entries in this observatory. To achieve this within the application, we introduce two more layers of representing information reusing data from the protocol: a) the use cases, or the way we propose users to explore the possibilities of the protocol, through the creation of collective observatories and b) the graphic representation of classified information. The use cases need to be concrete with a measurable result. Users can search information that communities have already curated and form groups. The graphic interface attempts to address how users will experience the above.

In terms of communication, data and account handling the CoWaBoo protocol adopts the following approach. All data are stored on InterPlanetary File System (IPFS), a p2p storage protocol, with its current state available in the application. Community management is based on Stellar, an open source protocol, blockchain based, for value exchange. CoWaBoo is utilizing a NodeJs server with a Stellar Javascript SDK to provide the CoWaBoo API with a way to communicate directly with Stellar. Every time that a new member is subscribed, a new Stellar account is also created. This account receives the minimum amount of lumens (Stellar currency) to work properly as a CoWaBoo account Once the account is created, it automatically give its consent to carry out currency exchanges created by the "bank" of CoWaBoo in Stellar. Consequently, all transactions (votes in groups) are stored on Stellar blockchain infrastructure creating Stellar exchange community with a cryptographic Public Address and Secret Key. While Web 2.0 applications tend to prescribe our participation, in CoWaBoo we seek to re-open the discussion on the group rules and results as entries or definitions are editable and possible to change from everyone, as long as her/his entry is voted in a group. In the following sections, we will discuss in detail the utility of this function.

It is important, however, to demonstrate if and how the default rules are applied. Once an entry is added, modified or deleted, the observatory created a new version of itself that is registered to a different place of the old. To achieve this we have drawn from the blockchain paradigm. Blockchain as a distributed, cryptography boosted, database technology is a thing of the 80s, that computational capacity of our time brought to full implementation with the Bitcoin deployment. Blockchain, can also be understood as an implementation of distributed ledgers that comes with a unique set of possibilities in its design. It opens up the way to shared databases, where multiple entities can transact, with no or some trust between them, co-existing with no intermediation.

The CoWaBoo protocol reproduces the main blockchain synchronous properties, as described above in the following generic approach: a) accessible and affordable shared databases with resilience through replication and no single point of failure and control, b) where multiple entries are possible, c) based on the possibility of disintermediation. Blockchain implementation comes with two more interesting features: d) interaction "in and between" transactions (or more commonly framed as smart contracts). Going back to our collective blockchain application, we will try to point out the exact process and code that demonstrate the above

CoWaBoo can be understood as a re-documentation effort opening to possible, iterative transformations of the work of others, to produce knowledge, in three ways. Firstly, searching is based on existing "community curated" resources already available in existing socially curated results from Diigo, Zotero, two social bookmarking applications, and Wikipedia, inviting users to develop an intentional logic of collaborative indexing evaluation and curation of information. Secondly, groups are initiated with the possibility of voting in all group decisions using a currency that allows their users to valorize their effort and the results in the group. Thirdly, the rules of the protocol are themselves configurable and re-applicable in a variety of

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applications, with our collective observatories serving as an initial experimentation.

IV. IMPLEMENTING THE PROTOCOL THROUGH THE COLLECTIVE OBSERVATORIES APPLICATION

A protocol is never neutral in the sense that all decisions regarding its functions are already set to bring some kind of normality on users (agents) behaviors. Thus, it becomes crucial to describe in more detail the use cases of the collective observatories application and illustrate how the interaction with the protocol will take place. We present the use cases as a descriptive middleware, between the protocol and collective observatories application, appearing itself to its users:

- **Build your story:** A prompt to click on the start the button and move to an empty text area is the first step. The empty text area is destined to be the user's notebook, potentially filled up with search results discovered using the connected APIs for search on tag, bookmarks, articles and existing entries (linked to the Visualize tags and stories in observatories use case). Keywords for initial search lead to tags to visualize existing stories in bookmarking software or CoWaBoo observatories with the selected info are inserted in the text area, as part of the actual user story. This tentative story-result can stay local, private and unfinished, to-be-posted posted in an observatory, or become the first entry in a new possible observatory. Adding a post in an existing observatory is subject to a verification process depending on the rules of the observatory: self – validated means that the post is validated by the user, peer – validated are linked with a "vote" from someone of its existing members".
- **Edit a story:** A click on the full text search button of the application connects the user's keywords, then transformed to used tags, to visualize existing stories in observatories or observatories themselves (linked to the Visualize tags and stories in observatories use case) and select them as content for further editing into the text area (linked to the Build your story use case)
- **Start a community of transactions (group)**: The click on the community button initiate a community creation function with the possibility to add emails, each participation verified through the related email account and attributed both public and secret keys. The group creation launches the possibility to start, transparent, intra-group transactions where all group users being informed on energy limits to credit or store value of the group. Group participants use the secret key to perform transactions, while the results of the effectuated transactions as well as the user balance remain publicly linked to each user's public key. New members are proposing themselves through direct demands to join an observatory (group) or through accepted stories when observatory entries are accepted from someone of its existing member". The user in this instance can be a part of a multiple, group transactions possibility, his/her public key is added to the group users for further transactions.
- **Editing tags**: CoWaBoo treats tags as distributed objects, recasting the tag object as an autonomous transaction providing its user with an opportunity to redefine, rebuilt and redistribute through the work of others. Tags in CoWaBoo acquire a multiple meaning as they, simultaneously, represent: a) "Tags to be": user typed search keywords in the text area leading to tags used by other users, b) Keywords that are then selected as Tags (CoWaBoo step by step search), leading educated choices of stories description and proposed entries or definitions for observatories, c) Tags are treated as semantic elements pointing to entries in observatories (list of tags per observatory), d) names of observatories are also treated as tags (list of observatories) and proposed to users in order to contribute or consult before creating a new observatory
- **Propose or "vote" an entry or a member** (validation & valorization). Each story is accepted as entry (definition) when posted and voted by at least one group member as a verification (the fastest reply - user is considered for attributing the value of the transaction). Each accepted entry is tokenized with one (1) energy (limit +10 for every user), while a vote for an entry uses 1 energy, (- 10 for every user). The variation in personal energy is, initially, anonymous but transparent, connected to each user's public key.
- **Visualize tags and stories in observatories**: This use case is connected to user keywords (full text search) becoming tags and visualizing an index view with linked tags, entries and observatory names.

Here follow some important questions that will guide to the presentation of the initial results of the protocol and its collective observatories application: Firstly, do tags serve at the same time descriptive keywords, linked data (to stories) and ongoing collections (observatories names)? How do they connect entries and observatories? Do they provide some kind of navigation through the information initiated by the application and stored by the protocol? Secondly, the protocol does not promise, or highlights, a completed story or observatory but a possibility create stories and edit all products in future events. How is this appearing in the existing digital space? Can the CoWaBoo (protocol and application) unfinished social bookmarking space serve as an experimentation understood both in semantic, representational and process level in a context of collaboration and knowledge production? The following pages will present the initial answer to these questions.

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V. INITIAL RESULTS

Our efforts on introducing re-documentation and collaboration, as pivotal skills in students group works, starts during spring 2015, a full semester course, with twenty participants. All results of this initial effort entitled HEG Digital – Lectures on "Wikinomie are documented at the Diigo web social bookmarking application [13]. At that time, we used Diigo to document various group activities including: thematic awareness on selected areas, business and process analysis of Diigo and co-design of a collaborative social bookmarking application on the CoWaBoo protocol. Each of these activities would deserve a separate presentation and analysis. At this point, we will focus on the quality of social bookmarking posts produced from students during their curse activities. In both the examples used below, be it the "expert", from another existing Diigo group or the "student", from our own HEG initiative, we see the emergence of atonal posts, presented in Section 2: entries in a system produced with the minimum number of clicks, where decision and curation process are omitted.

In this context, posts exist with the minimum set of information and without any other rule or event connected (Figure 1 and 2).

Figure 1 Atonal post – Typical example of an expert's bookmark in a Diigo group (Web 3.0) [14]

Figure 2 Atonal post – Typical example of a student's bookmark in a Diigo group [15]

These two posts are indicative of current social bookmarking trends: the "expert" will post a minimum set of information, using a rich set of tags but shows no further engagement in describing the bookmarked resource. The "student" provides the bookmark with a minimum set of tags and description. Both posts expect the potential user to have a specific interest on the topic in order to pursue further with their reading or reuse.

The results of the 2015 experiment led to the creation of the collaborative observatories application on CoWaBoo protocol. This application was introduced in our university courses the during spring semester of 2016. This new experimentation organized with twenty-four students of the University of Applied Sciences in Geneva during the HEG Digital – Lectures on "Wikinomie [16]. This group of, 3rd year, bachelor students were invited to work in groups of three, around a specific thematic area (i.e. Blockchain, Bitcoin, Wikipedia, Airbnb, Uber, Free and Open source software, Open licensing, Open innovation) using CoWaBoo as the main space of redocumentation, producing four concrete results for further evaluation: a) an introductory course presented in class, b) a collaborative documentation space in CoWaBoo, c) an infographic presentation and d) an accepted contribution to an existing Wikipedia article.

Once more, we are presenting selected results regarding the use of tags from students in their respective observatories. This is connected to our Editing tags use case and our understanding of tags as descriptive keywords, linked data and ongoing collections. *The first remark* on this work comes on the way the information of each observatory (eight in total) is presented with a certain tags selection. Let us use the "blockchain" observatory to see how its tags are visualized:

Blockchain (theme and name of the CoWaBoo observatory) with selected tags:

|| DAO || France || IDE || Parlement || analysis || badge || banques || bdd || bitcoin || blockchain || chain || concept || crypto-money || ethereum || finance || finance on blockchain || fonctionnement || governance || infographie || peer-to-peer || plate-forme || politique || presentation || questionnaire || reference || smart contract || technologie || wikinomie || wikipedia ||

The second remark is the way that each tag find is linked to other tags. This uses data coming from all other CoWaBoo observatories as linked tags with the word blockchain.

Linked Tags (in English and French) to other observatories for the "tag" blockchain:

Cowaboo, properties, avantage, bitcoin, monnaie, concept, fonctionnement, infographie, smart contract, reference, presentation, wikinomie, badge, questionnaire, Wikipedia, peer-to-peer, innovation ouverte, plateformes, copyleft, creativecommons, smartcontract

A third remark has to done on the entries (stories) that are being created and edited in the respective observatories, with the tag blockchain in each entry. **Entries using the tag blockchain:**

- CoWaBoo

|| CoWaBoo || blockchain || properties ||

- Bitcoin

|| avantage || bitcoin || blockchain || monnaie ||

- Blockchain

	blockchain		concept		fonctionnement		infographie	
	blockchain		smart contract	
	blockchain		reference	
	blockchain		presentation		wikinomie	
	badge		blockchain		questionnaire	
	blockchain		smart contract		wikipedia	
	bdd		blockchain		peer-to-peer	

- Innovation Ouverte

|| R&D || blockchain || innovation ouverte || plateformes ||

- Copyleft

|| blockchain ||copyleft || creativecommons || smartcontract ||

A fourth remark needs to be placed around the use of the word blockchain in all the observatories that CoWaBoo is hosting. **Observatories using the tag CoWaBoo:**

- CoWaBoo
- Bitcoin
- Blockchain
- Innovation Ouverte
- Copyleft

These four remarks summarize the possibility of an application, like our collective observatories, to use the CoWaBoo protocol's functions in order to reclassify user data. The protocol therefore formalizes all the necessary functions:

- Data storage, recording new data in an observatory: entry, member list, configuration
- Ensuring the current state of an observatory
- Possibility to add, change and delete data from an observatory
- Registration and acceptance of new members
- Vote counted and executed through blockchain intra-community transactions
- Configurability and re-applicability of the rules of the group in the protocol itself.

It is also important, to describe if and how the default rules are applied. Once an entry is added, modified or deleted, the observatory created a new version of itself that is registered to a different place of the old. This is important because whatever change on this code is reposted as a new block of information [17]. In the following figure (4), we can the current state of the blockchain observatory. This includes its id, entries, members, date, configuration (public or private) author and, most importantly, the path (hash) to its previously stored version. This process applies to all data stored from the CoWaBoo protocol and generated from the collaborative observatories application: observatories, entries and member list.


```
dictionary: {
    id: "Blockchain",
  - entries: {
        ||blockchain||concept||fonctionnement||infographie||: "QmfWnntT3xPk6A39XuSakU8G1bFXy8kPpbDWUYsFjqav1Z"
        ||blockchain||smart contract||: "QmV56Quamx9obCQeShXoWZqE6GymvYVDXk7mUCe1Le51n",
        ||bitcoin||crypto-money||: "QmX9zhF9Tg8jQx5Xj4qrSuvukuPdFcYBUyb35kQEf6811",
        ||IDE||chain||erie||ethereum||plate-forme||smart contract||: "QmZBiiR3VUkdQ8jp2hASeBScBhRChf9qBKjakm4t
        ||blockchain||reference||: "QmYt4gaVZ55MvT3MSQnCyG1qRxD23dGE6kS7GEp8nbTkPR",
        ||blockchain||presentation||wikinomie||: "QmPYwY8xWvMkm93io1pHG7CxF74FbNQ4z4DUvMSdZwKr7K",
        ||badge||blockchain||questionnaire||: "QmPqAQA2Exs9BMR15yMiPsepFy6jdnQ72nuEXR883Vma6p",
        ||blockchain||smart contract||wikipedia||: "QmUPuCqrH6ab6dZJaU2Yu65CVzQa5uvdob7yLPc93TaTyLo",
        ||bdd||blockchain||peer-to-peer||: "QmPuSxcKPNFxYuFqcRpoVfVpcT294GZCQ2yKGDaZC8Mt1Q",
        ||DAO||analysis||ethereum||finance on blockchain||governance||: "QmRtGqsUvsq537npLQVPVcjeANjGZqR3eLyes
        ||France||Parlement||banques||finance||politique||technologie||: "Qmfs3n3PXS5dXs55ZAnYhBPxRpzACTkcM2um
    },
  - member_list: [
        "celine.paniz@etu.hesge.ch",
        "thanasis.priftis@ynternet.org",
        "jean-david.sandoz@hesge.ch",
        "vanessa.marcuzzo@etu.hesge.ch",
        "lucille.lg.guillerault@etu.hesge.ch"
    ],
    date: "201606092013",
    conf: [ ],
    previous: "QmPpSM6BdexQYAW9Sxph4HBkEynApoX95c6CEHG61U6ZS3",
    author: "celine.paniz@etu.hesge.ch"
}

    // 20170220161251
    // https://gateway.ipfs.io/ipfs/QmaDv45G23aRmwveRgpqYEuSGKgqUu1bWqF2vST5SX7SmK
```


Figure 4. A CoWaBoo (blockchain) observatory stored on IPFS

As already mentioned the InterPlanetary File System (IPFS) is a content-addressable, peer-to-peer hypermedia distribution protocol. Nodes in the IPFS network form a distributed file system. IPFS plays a crucial role in CoWaBoo acting as a public ledger of all posted or edited data. The same goes for any rule, or post. All changes in membership, authorship and rules of this observatory are re-traceable in the blockchain logic of the protocol with the previous version always available. Content wise, things are also significantly different, compared to a standard social bookmarking application. Entries are taking more of wiki form with descriptive and links. The image below shows the text of the || France || Parlement || banques ||finance || politique || technologie || entry

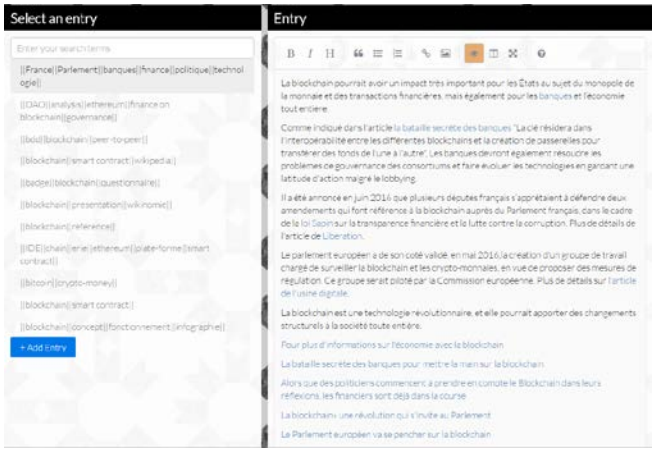

Figure 5. A CoWaBoo entry on the blockchain observatory

There is a clear shift, in all observatories, to adding text and sources in entries and forming them more as stories. This is due to the discussion related to CoWaBoo lecture on social bookmarking and the evaluation criteria but it goes hand in hand with our initial anti-click-culture approach. However, the creation of a tag dictionary based on group decisions and a diverse user participation including researchers, students, professors, experts and professionals from all project's entities is, now, emerging CoWaBoo's next step. In the table below, we summarize how CoWaBoo introduces the redocumentation process in steps:

TABLE 1. COWABOO REDOCUMENTATION PROCESS

Step title	Description	Process
Search and Post	Users are invited to search in existing communities, discern knowledgeable others, edit text and post result in existing groups	Search through tags on existing community curated resources Select resources and edit a story Publish on a group a shared "block of information" with tags ⇒ Create unique link (URI) that could be posted on selected web services
Reuse and Curate	Initiate a process of critical scrutiny and group content production for participants	Engage in a group - observatory, where an exchange between users, data and group rules is possible. Provide feedback on group's entries Contribute to the implementation of the group's collective observatory Provide history of group decisions and documentation

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VI. CONCLUSIONS AND FURTHER WORK

This paper tried to demonstrate how the CoWaBoo protocol aims to reverse our habits to prescribe information and describe how various processes around this can take place. Although we can give not a binary answer as to whether (protocol and application) provide with a semantic and representational tool, in a context of collaboration and knowledge production, we have demonstrated how such a process could be initiated. Further work on the use of the protocol and its applications include the validation of the results of these use cases, during the spring semester 2017, within a targeted course in the Information Systems Department (HEG) of the University of Applied Sciences in Geneva. This pilot will continue the documentation of the work of 30 students in 15 sessions in 2017. This involves reusing the protocol through its use cases and functions, experimenting on:

- More complex group rules and valorization of transactions between participants in various groups. This should include testing of the default rules of the protocol and evaluation of the transactions functions in the application, while leading to group rules and results editable and possible to change from everyone, as long as her/his entry (definition) is voted in a group through the CoWaBoo currency.
- An alternative search experience based on an understanding of community resources as a reference to information search. Our goal is to stimulate competences as penetrating intelligence, keen perception and sound judgment.
- Creating new applications, scenarios and early implementations, based on the CoWaBoo protocol API (including both IPFS and Stellar protocols). These scenarios can be deployed using the protocol and its rules, or being inspired by it.

Finally, we believe that understanding web applications as potential open and descriptive protocols is a crucial step towards more transparency, less opacity, in our digital era. We intend to continue our research both as a way to unmask current opacity in digital technologies and experiment on new tools that could support collaborative and critical competences.

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[15] This example comes from the HEG – Digital 2015 group work on Airbnb available at https://groups.diigo.com/group/heg-digital/content/tag/airbnb

[16] All HEG – Wikinomic 2016 results are available at http://project.cowaboo.net

[17] The link for the blockchain observatory is now available at: http://project.cowaboo.net/observatory/Blockchain, with all of its data stored on IPFS, a p2p storage protocol. Its current state (blockchain observatory) is available at https://gateway.ipfs.io/ipfs/QmaDv45G23aRmwveRgpqYEu5GKgqUu1bWqF2vST5SX7SmK

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