

Social Tagging in Community Memories

Luc Steels^{1,2}

¹ AI Lab, Vrije Universiteit Brussel

Eugenio Tisselli²

² Sony Computer Science Lab - Paris

October 5, 2007

Abstract

Communities form in order to manage and defend a commons and Community Memories are distributed information systems that help them do so. This paper discusses the use of tagging within Community Memories. We argue that the role of tagging goes beyond being an aid in navigation. It is a means by which communities come to grips with the tensions and challenges of their environment through the bottom-up construction of a common ontology and a representation of themselves.

1 Collective Intelligence and Community Memories

Social tagging burst on the scene a few years ago through sites like CiteULike and Flickr and is now a routine component of many content provisioning and content sharing web sites. The idea of tagging is straightforward: Users associate tags (words) of their own choosing with media items like pictures, text, video, etc., and they can then browse through these items by using the tags. For any given item they see the tags and for any tag they can find back the items that have been tagged that way. Tags are then made visible to a whole group of users and frequency of occurrence as well as co-occurrence is displayed in the form of tag clouds which thus visualise the emergent 'folksonomy'. Browsing can be further enhanced by adding content processing, such as visual feature detection, or signal and text processing[12]. It is remarkable that despite the totally distributed activities of users, there are nevertheless clear trends detectable in the usage of tags [8], [4], which is why tagging can act as a bottom-up alternative to the top-down design of ontologies practiced for the semantic web.

Social tagging has so far been used for a class of applications that is generally classified under the header of Collective Intelligence. Websites like Last.FM, Deli.cio.us, Youtube, Wikipedia, etc. bring together media materials that are uploaded and downloadable by a huge group of users. These materials can be considered a (creative) commons [10]. Users now routinely tag their own materials or those of others in a fully distributed way and statistical methods are used to detect co-occurrence or other network properties of tags. Al-

though most of the Collective Intelligence projects have social networking tools, users generally speaking do not know each other personally and have the possibility to be entirely anonymous. There is no particular shared interest among users, except that they are all interested in similar materials.

Here we are interested in a quite different class of applications of 'Web 2.0' technologies, which we call Community Memories. Although they use the same technologies as Collective Intelligence projects, their main purpose is entirely different. They are intended to build and support communities. We do not define a community here in terms of family, ethnicity, or social strata (us against them), but rather in terms of a commons: *A community is a group of individuals that cooperate to manage a particular commons.* A commons can be as basic as water and air, but it can also be space on the road, wood in the forest, access to public spaces, bandwidth for information transmission, cultural artefacts, political opinion, reputation, etc. To have a *sustainable commons* requires first of all that a balance is maintained between input and output, which means that those who take from the commons must ensure that the processes to regenerate it are in place. Second, there are almost always conflicts between those that supply input and those that take output, as well as among those that take output under the condition of scarcity. The strongest form of egoism occurs in those who take whatever they want from the commons without inputting themselves and the strongest form of conflict occurs if some take whatever they want from the commons based on violence against other users of the commons, including theft. There is often a conflict between a particular community that is managing a commons and outsiders or other communities that feel they should have the right of access to the output of the same commons.

The management of the commons is a primary function of human groups and if it is not done right, the suffering can be immense or the destruction of the commons can be swift. Given this importance and given that there are now many ecological, social and cultural systems under severe threat, we believe that collective tools for managing a commons should be a key concern. The issues are just as pressing for modern densely populated urban societies, as it is for indigenous semi-nomadic communities which are trying to preserve their rain forest environment against the onslaught of logging companies. Particularly communities whose members are illiterate,

have little 'official' legal power, or have almost no access to information technologies, are the ones that are most in need.

We call the information infrastructure needed for maintaining a commons a *Community Memory*. A Community Memory is a medium for recording and archiving information relevant to the commons and for diffusing this information among members or communicating it to those threatening the commons and thus the community. All members making up the community should have access and be allowed to upload, download or inspect information. Once the information is there it becomes possible to 'add intelligence' to the system in various ways, for example by creating maps containing information in relation to its geographic location, by explicating dependencies between information items in order to bring out trends and predict future evolutions, etc. There have been some historical precedents for Community Memories (Colstad and Lipkin (1975), Steels (1985)) but it is only now that the technology is available and cheap enough to put this concept into real practice.

'Community memories' are intended for a real community of real individuals, not a diffuse group that flock anonymously through the Internet and have no real stake in the management of a commons. This implies that there must be first and foremost a community and a commons to be managed. This community can of course take shape as part of the creation of a Community Memory or get reenforced by it, but the community will always be relatively small. The duration of a project is typically limited in time, enough to resolve the conflicts straining the use of the commons. In order to make the community function, we believe that it is necessary that its members recognise each other as individuals and that they meet face-to-face. These meetings are necessary to create the kind of trust and common ground that is required to self-organise the group's activities. Moreover it is absolutely crucial that identity cannot be hidden and actions (even if it is simply the posting of information) can be traced back to the individuals who carried them out.

A lot of work in biology and the social sciences [2] has shown abundantly that altruism and cooperative behavior will only emerge and be sustainable when either the participating individuals are genetically sufficiently similar so that it is in their self-interest to help others (as in ant societies) or when there are enough checks and balances so that free riders and cheaters can be identified and punished. The latter requires at the very least individual recognition so that it is possible to monitor the reputation of others and possibly sanction it. Typically in most biological species, dominance hierarchies emerge, which often involve violence for their dynamic maintenance, whereas humans have managed to establish large-scale cooperative societies by instituting the rule of law, even though aggression and fights for dominance keep cropping up all the time ([7]). Because human individuals interacting through the vast network of the internet do certainly not have or feel any sufficiently strong kinship relation, other means to

establish cooperative behavior must be found. The lack of fool proof individual recognition is making this impossible. Also the lack of a clear 'rule of law' and of mechanisms to enforce it quickly lead to situations where the will of the strongest dominates, possibly through violence. We clearly see these phenomena happening in Collective Intelligence sites:

- *Tragedy of the Commons*. SPAM which is a clear example of anonymous exploitation of the commons (being the bandwidth, storage capacity, and time of all of us) now accounts for 90 % of all internet traffic leading to huge extra expenses for spam filtering and useless traffic. It is sad to see that social tagging is already polluted by spammers who try to get traffic to their own materials [5].
- *Mob behavior*: Increasingly incidents are reported whereby groups of individuals anonymously attack individuals or other groups. Bullying by children of their classmates or teachers through chat rooms, email and 'social' network sites (see e.g. schoolsandals.com) has taken on alarming proportions (in the UK 1 in 4 children is affected, not to speak of their teachers). These phenomena are usually started in an anonymous fashion and because of rapid positive feedback in Internet communication, mob behavior occurs and escalates. Moreover because of the long term memory in web systems, allegations, rumours and embarrassing materials have a tendency to live on and propagate in uncontrolled ways.
- *Identity confusion*: Although a majority of users does not, there is a sufficiently large segment that deliberately hide their actions on the Internet. They take on other identities, steal identities, etc. most often with malicious intent.
- *Information manipulation*: It was only a matter of time before sites like Wikipedia would be victim to information manipulation by interested parties. Again the anonymity acts as a cover for those who want to do this. In the end it can destroy the utility and trustworthiness of sites, in other words the creative commons of cultural goods created by others in good faith.

All these phenomena are a consequence of certain fundamental design decisions made by website developers and businesses, but they have lead to unacceptable negative effects which in the end could kill the extraordinary possibilities offered by Internet technologies. Moreover one should question the morality and responsibility of those creating these socially devastating instruments.

A Community Memory is the opposite of a 'Smart Mob', defined as "people who are able to act in concert even if they don't know each other" [11]. People act in concert because they share a common goal, which is the management of a commons in a fair and sustainable way, and as a consequence the negative side effects of collective intelligence can be avoided. The community orientation impacts all aspects; how these

tools are put into practice (face-to-face contact, self steering by the group, individual recognition, etc.) and the technologies employed: the type of interfaces (usually mobile phones instead of computers), the complexity of the interface (which needs to be as simple as possible), etc. Here we focus only on the use of social tagging in Community Memories. We first describe some concrete examples that have been set up by co-author Eugenio Tisselli in collaboration with the Catalan artist Antoni Abad (see zexe.net) and then on the role of tagging on the Community Memory.

2 Case studies

2.1 A Community Memory for Taxi Drivers in Mexico City

In 2004, Abad and Tisselli started sitio*TAXI [<http://www.zexe.net/MEXICODF>], a community broadcasting project involving a group of taxi drivers in Mexico City. The situation of this specific community is a very complex and conflictive one. In the year 2002, a daily mean of 4,5 crimes committed in taxi cabs were denounced in Mexico City. According also to SETRAVI, the City's Department of Transport, the potential danger presented by taxis is increased by the existence of illegal, or "pirate" taxis. Due to the pressing economic conditions in Mexico City, many people disguise their vehicles as taxi cabs and offer their services on the street instead of paying for a license, which implies a large set of bureaucratic requirements, and often costs more than what can be afforded. It is estimated that the number of illegal taxis is above 20.000. Nevertheless, taxis in Mexico City are an important means of transportation. They perform about 1,1 million trips per day, which amounts to the 6% of the total daily trips in the city. For a long time, many taxi drivers have quietly fought the citizens' negative perception of their jobs. It is not uncommon to see taxi drivers assisting other stranded drivers with their mechanical know-how, or reporting emergencies to the police. The conflict in which taxi drivers are immersed therefore involves two types of commons: the right to offer taxi services, reflected by the struggle between legal and illegal taxis that takes place on the streets, and the access to a better social reputation within the opinion space, which can also be considered an (intangible) commons but with an important effect on the willingness of the rest of society to grant rights to the subgroup.

With sitio*TAXI, a group of 17 participant taxi drivers had an unfiltered means to show their points of views and opinions to the public. Each of these drivers was given a multimedia mobile phone, with which they were able to send images, audio and video clips to a webpage. Using the GPRS network, all messages were sent directly from the phone to the Web, without needing to go through any intermediate process. The direct phone-to-web transmission resulted in a great free-

dom to publish content. When faced with this freedom for the first time, many of the participants were unsure about what to say. Through weekly reunions, which were held around a table in a space lent to the project by the Centro Multimedia, a multimedia lab in Mexico City, the taxi drivers discussed the topics that they were going to deal with. Each driver had a personal section in the project's web page, and there were also collective sections in which they could upload and comment on common topics. The important issues for the participants started to emerge and were reflected in sections of the project such as "sitio*TALACHAS", dedicated to receive content dealing with car mechanics and repairs, "sitio*TARJETON", where they could show the troublesome and time-consuming process of getting a taxi license (called "tarjeton"), "sitio*PANORAMA", a section for registering all the different types of taxis that exist in the city, along with their "street taxonomy", or the names given to each according to their legal status, and "sitio*AMPARO", where the participants who drove a taxi illegally would be able to share their views.

The project lasted for two months. By the end, 14 different collective sections were created, containing a total of 6.194 images, 596 audio clips and 813 video recordings. One of the most successful collective sections was "sitio*CHAMBA", in which a specific mapping of the local society was proposed. Participants interviewed people, asking them their name, their current job and the job they desired to have. A total of 211 short interviews were done, and sent to "sitio*CHAMBA" by 7 different drivers. In accordance to the main objective of sitio*TAXI, which consisted in giving an opportunity to the participant taxi drivers to share their views with the public, the project actively sought close contact with all types of communication media. Thus, sitio*TAXI was intensively featured on the printed press, radio, television and the Internet. A small newspaper-like publication, containing texts about sitio*TAXI and images included in the project, was widely distributed for free throughout the city. Post-project evaluation showed a significant impact, particularly with respect on influencing common opinion about taxidivers.

2.2 A Community Memory for Handicapped people in Barcelona, Spain

The project canal*ACCESSIBLE was initiated in 2005, with the aim of enabling people on wheelchairs in Barcelona to defend their access to the commons of public spaces and streets, a.o. by classifying the physical barriers that they encounter and locating them on a map. Through the use of multimedia mobile phones, the participants of canal*ACCESSIBLE could take pictures of inaccessible places and send them directly to a web page. The project included the same elements as sitio*TAXI with the addition of a geographical location system, which was based on the correspondence between a city address and a pair of geographical coordinates. Through the



Figure 1: The public browsing interface of canal*ACCESSIBLE. Display of an inaccessible place (in this case a truck obstructing pedestrian area) and location on the map where the problem occurs.

use of this system, every multimedia file could be located on a digitized map of Barcelona, available to the public on the project's web page. After only three months, more than 3.000 inaccessible places were recorded and located on the city map.

Each week, the 40 participants got together in a meeting space which was especially set up for them at the Centre d'Art Santa Mnica, an arts centre located in the heart of Barcelona and discussed different strategies for finding and publishing their images. On some occasions, they used the digitized map as a reference, and organized special trips to cover unexplored areas of the city. Thus, the map became both a record that reflected their activity and also a live Community Memory interface, which they used to decide on future actions. The discussions at the meetings also resulted in a basic classification of urban barriers. The participants categorized them as "stairs", "steps", ephemeral barriers caused by "inconsiderate" citizens (such as a parked car blocking a sidewalk), "badly adapted" infrastructures (for example, ramps steeper than the accepted maximum of 12 degrees), "transportation", "sidewalks" and "public toilets". This minimal taxonomy emerged through group discussion, and was used throughout the project to categorize the incoming images. The project was widely disseminated through all types of media ranging from press to TV, and of course the Internet itself. This maximized the communicative potential of canal*ACCESSIBLE, and gave it widespread attention. At the end of the project, several thousands of maps of Barcelona with colored markers that corresponded to the architectural barriers were printed and handed out to the public and the city's authorities, which felt the need to respond their own map.

2.3 A Community Memory for Motoboys in Sao Paulo, Brazil

The city of Sao Paulo in Brazil is known as one of the world's biggest cities, with an estimated population of more than 17 million inhabitants. It has grown quickly and chaotically, despite the implementation of urban planning in some of its areas. One of the main consequences of this partly uncontrolled development, along with ineffective public transport, is the consistent congestion of the city's streets. In this conflictive scenario, motoboys are key players. Motoboys, a hybrid word that combines motorcycle and boy, are messengers who dash across the streets of Sao Paulo on their motorcycles, delivering all sorts of things, from pizzas to confidential documents. Motoboys are considered both as essential motors of the city's economy and as a growing problem. Every day, thousands of motorcycle messengers have to literally hustle their way between cars. The lack of a special lane for motorcycles, and the pressing need to rapidly complete their deliveries, forces them to drive at full speed through the narrow spaces between road lanes and cars. This practice unfortunately results in an alarmingly large number of accidents, often with fatal outcomes both for motoboys and car drivers. Thus, an essentially conflicting situation arises in the streets of Sao Paulo: on one hand, car drivers believe that they have the exclusive right to use the roads, and that every other vehicle must be subject to their rules. Motoboys, on the other hand, believe that it is their right to work in secure conditions, and to earn a decent living through their jobs. It is a typical struggle of the commons. The motoboys have sought to organize themselves in order to fight for a better working environment, yet they have been continuously fingered by large sections of the Paulista society, not only because they are accused of causing traffic accidents, but also because they have been associated (in many cases in an unjustified way) with criminal activities, such as theft, kidnapping and rape. So there is also a struggle within the intangible opinion commons of social reputation. A mix of disinformation and a negative bias has stimulated by the local media has damaged their reputation whereas the motoboys argue that they are simply workers who want better and more secure conditions to carry out their daily jobs, for their own good but also that of their fellow street users.

One year after canal*ACCESSIBLE, the team formed by Abad and Tisselli set up a similar project in Sao Paulo, called canal*MOTOBOY [<http://www.zexe.net/SAOPAULO>]. A group of 12 motoboys armed with multimedia mobile phones were invited to publish images, audio and video clips from the city streets to the project's web page. This time, however, the participants were free to choose the topics that they wanted to deal with, instead of having pre-fixed goals. These topics were discussed during weekly face-to-face meetings in a space that was set up at the Centro Cultural of Sao Paulo. In canal*MOTOBOY every participant has a personal section on the project's web page, where they can send all the multimedia

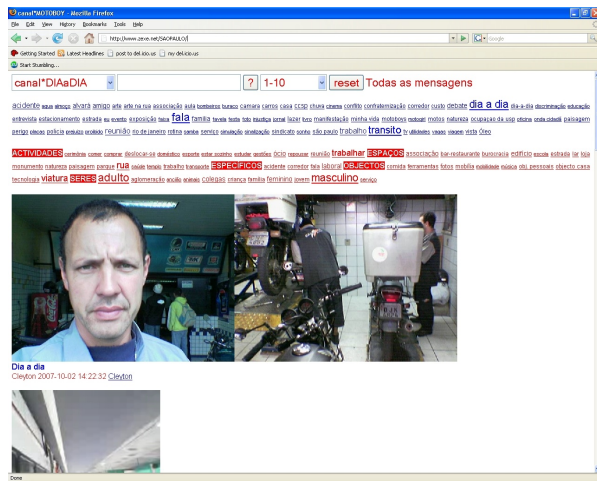


Figure 2: Web interface to the Motoboy Community Memory. There are two tag clouds, one emerging bottom-up (shown at the top) and the other one based on an organised taxonomy (shown below it). We see some uploaded images with associated information.

information they wish, regardless of its topic.

The technological components of canal*MOTOBOY are basically the same as those of sitio*TAXI and canal*ACCESSIBLE, with the exception of the geographical location system, which was not used in this occasion. Also tagging became more prominent and was used in two ways: (1) First tags could be associated to the contents directly on the mobile phones, or by using a special web interface after the contents had been sent. The aggregation of all the motoboys' tags is shown on the main page of canal*MOTOBOY as a tag cloud, which is a list that contains the most significant tags in the annotation system. An emergent lexicon evolved throughout the project's duration, including words which reflect the group's interests and concerns. The most frequently used words are "fala", or "speak" in portuguese, a word that was used to annotate the interviews that the motoboys recorded with their phones, "dia a dia", used to tag what they considered to be their "daily experiences", "transito" (traffic), "trabalho" (work) and, unfortunately, "acidente" (accident). The tag cloud clearly became an interface that not only conveys an immediate, linguistic model of the Community Memory generated by the motoboys, but also serves as a tool for browsing through their multimedia files by keyword. It is important to note that the web-based interface for tagging implements tag suggestions based on keyboard input. The suggested tags are taken not only from a participant's personal collection, but also from everyone's lists. This factor has encouraged the alignment of the vocabularies of each individual.

(2) The bottom-up tags were complemented with a top-down approach involving an anthropologist. He went through

the contents, designed a taxonomy, and assigned the words. We call this pre-fixed vocabulary "descriptors", in order to define their function clearly, and to differentiate them from tags. The personal sections on the web page, as well as the section that aggregate the individual contents, include two different tag clouds. The first one is a tag cloud that reflects the most relevant tags for the owner of the current section (or the collective tags in the case of the aggregate). The second cloud contains a set of words which come from a pre-fixed lexicon. The top-down tags are divided into five categories: beings, objects, spaces, activities and specifics. The fifth category reflects the words which are needed to describe features that arise in specific projects. The pre-fixed words are not assigned to multimedia contents by the motoboys themselves. Tags and descriptors show different points of view of the same objects. While tags are an emergent lexicon that is generated in a bottom-up way by the content creators, descriptors can be seen as a top-down attempt to categorize the same contents, but with the intention of doing it as objectively as possible. These two parallel word clouds coexist in the pages of canal*MOTOBOY. On an immediate level, both the tag cloud and the descriptor cloud can be used as interfaces for searching the project's multimedia contents.

At the time of writing this paper, the canal*MOTOBOY project is still going on. While the face-to-face meeting sessions now happen outside their original space and have become sporadic, most of the participants are still actively feeding contents to the web page. An essential aspect of the project is that it involves an act of collective appropriation. The web page becomes the moral property of the participating motoboys, who have full access to whatever contents they publish in it. As canal*MOTOBOY becomes increasingly popular through its extensive dissemination, its participants are starting to use it as a platform for self organization, and to facilitate dialogue with members of the government of Sao Paulo, academics and their fellow citizens. Some of them have participated in interviews and conferences, publicly expressing their points of view on how the access to the city's streets should be regulated, and which are the working conditions that they desire. They also hope that, through the project's popularity, their image within the Paulista society will be transformed into a more positive one.

2.4 Conclusion

These case studies show that a Community Memory has two main purposes: management of a tangible commons (in the present examples mainly public spaces and streets) and management of an intangible commons, mostly of reputation which impinges on political clout and respect. There are always two parties: the community members themselves which need to get organised among themselves and the community as a whole which interacts with other groups which are competing co-users of the tangible commons or factions influenc-

ing the intangible commons. These case studies (and there are many others, see e.g. a project set up by Jerome Lewis for management of the Congo Rain Forest [9]) are today mostly informed by pragmatic considerations, but some general principles are beginning to emerge. One key principle is that the anonymity encouraged on the Internet has to be given up and actions must be accountable. As soon as individual accountability is violated (e.g. by opening sites to the general public) the negative behavior seen in many Web 2.0 sites crops up. The three projects we have seen trace an evolutionary process of an increased role of tagging over time. In canal*MOTOBOY, tags are the most prominent. The project experimented both with an emergent folksonomy by bottom-up tagging and a top-down expert-designed taxonomy, and the interaction between the two. But there is no doubt that tagging can be used even by people who are not computer literate, and if icons replace tags, they can be used also in cases of illiteracy.

Comparing to other social tagging sites, we believe there is a crucial difference why users are tag or tag in particular ways. Community Memories are set up for another purpose than simply archiving, sharing, and retrieving media materials. The items put into the community memory are representations, in the rich semiotic sense of the term: They attempt to express meanings, i.e. aspects of interaction with the environment that are important for their makers and which they want to share with other members of the group as well as with outsiders. Tags thus become not only simple aids in future navigation but they form an intricate component in representation making. They highlight what the producer of the image believes to be the essential meanings. Psychologists consider representation-making a crucial path for self-development, because through representations the producer is stimulated to conceptualise reality and seek good ways to express that conceptualisation and thus think about how others may view the same reality [3]. Tagging goes one step further than individual expression. It can be viewed as a form of distributed cognition, similar to other cultural activities in which individuals and groups form their own identity and construct conceptual frameworks for making sense of their environment through symbols [13]. These self-representations can be used to intervene positively in the opinion commons where social reputation is negotiated.

Acknowledgement The writing of this paper at the Sony Computer Science Laboratory in Paris was partly supported by the Streps TAGORA project of the European Commission (IST-FET). The cases discussed here were funded by different agencies and cultural organisations and rest strongly on the creative and social talent of Antoni Abad.

References

- [1] Aurnhammer, M., Hanappe, P., and Steels, L. (2006) Integrating Collaborative Tagging and Emergent Semantics for Image Retrieval. In Proceedings WWW2006, Collaborative Web Tagging Workshop.
- [2] Axelrod, R. (1984) The Evolution of Cooperation. Basic Books, New York.
- [3] Bruner, J. (1990) Acts of Meaning. Harvard University Press, Cambridge Ma.
- [4] Cattuto, C., V. Loreto, and L. Pietronero (2007) Semiotic dynamics and collaborative tagging. PNAS, 104(5):1461–1464. 2007
- [5] Cattuto, V., Schmitz, C., A. Baldassari, V. Servedio, V. Loreto, A. Hotho, M. Grahl, and G. Stumme (2007) Network Properties of Folksonomies. AI Communications,
- [6] Colstad, K. and E. Lipkin (1975) Community Memory: a public information network. ACM Sigcas Computers and Society. 6(4) p.6-7.
- [7] De Waal, F. (2005) Our Inner Ape. Riverhead Books, New York.
- [8] Golder, S.A. and B.A. Huberman, The Structure of Collaborative Tagging Systems, J. Information Science, 2006; <http://arxiv.org/pdf/cs.DL/0508082>.
- [9] Hopkin, M. (2007) Mark of Respect. Nature, 448, july 2007.
- [10] Lessig, L. (2007) The Future of Ideas. The Fate of the Commons in a Connected world. Random House, Inc., New York.
- [11] Rheingold, H. (2002) Smart Mobs. The next social revolution. Perseus Publishing, New York.
- [12] Steels, L., Hanappe, P. (2006) Interoperability Through Emergent Semantics A Semiotic Dynamics Approach. J. Data Semantics VI: 143-167 (2006)
- [13] Steels, L. (2006) Collaborative tagging as distributed cognition. Pragmatics and Cognition, 14(2):275–285.
- [14] Steels, L. (1986) From Expert Systems to Community Memories. In: Bernold, T. (ed.) Expert Systems and Knowledge Engineering. Conf. G. Duttweiler Institute, Ruschlikon, Switzerland. p. 17-29.