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Olivier Glassey [a]

[a] Observatory of Science, Policy and Society , University of Lausanne , Switzerland

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Exploring the weak signals of starts-ups as a folksonomic system

Olivier Glassey*

Observatory of Science, Policy and Society, University of Lausanne, Switzerland

This article looks at the opportunities for innovation and entrepreneurship provided by the swift technological change in the field of information technologies: the so-called Web 2.0. It focuses on how it could be possible to analyse emerging trends from actor's strategies toward the future. The main research question is to understand how early signals of new trends appear in a field which is not formally stabilised. We looked at the spontaneously produced categorisations (folksonomy) of 250 start-ups. This corpus is analysed in order to explore how these descriptions identify key future evolutions and how these categorisations of future trends change over time. Our central hypothesis is to consider that early elements of future changes (weak signals) are not given once and for all, but exist within perpetual shifting processes and could be tracked with folksonomic maps. The discussion of the results will suggest that weak signals should not be conceptualised as static entities blessed with some strange power to shape the future but as a set of components, whose main features are their abilities to be constantly rearranged among themselves by the involved actors.

Keywords: weak signals; future trends; folksonomy; user driven categorisation; Web 2.0

1. Looking for seeds of change

The main intention of this paper is to tackle the question of the origins of future changes. This question has a long lasting tradition among researchers in foresight (Ansoff 1975, 1985; Coffman 1997; Blanco and Lesca 1997; Mendonça et al. 2004; Saul 2006). Those approaches used a large array of metaphors to embody the idea of 'elements announcing further (r)evolution' (weak signals, early warning signals, wild cards, seeds of change, etc.) While sharing a common interest these approaches do not propose a common ground to define what the basic components of potential changes are. In order to define our own perspective we decided to take from this rich diversity the idea that it is hardly possible to identify, as specific objects, something that could be described as 'the seeds of change'. We decided to start back from a general level and consider how classical approaches to this question of early warning could be categorised schematically in two main trends.

*Email: olivier.glassey@unil.ch

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The first trend consists of the capitalisation on the former experiences by mining a vast corpus of cases provided by history, in general, and history of innovation and technology, in particular (Martino 1983). Sociology, history of technology and especially constructivist approaches developed since the late 1970s,[1] offer a great number of studies and conceptual or methodological tools, which were helpful in understanding the trajectory of innovation. Traditionally such a methodology gathered valuable insight to sociological, economic and historical perspectives on innovation. These analyses which, in their majority, overcome the double hurdle of social or technological determinism (Roe Smith and Marx 1994), allowed us to establish how innovations processes were the results of iterative interactions within an heterogeneous network of 'actors' (ranging from engineers, investors, politicians to end-users) and technologies. These studies point out that the outcome of these negotiation processes influence the fate of an innovation. They also help to clarify the dynamics of innovation and stress how, negotiation on technical (norms, formats) and social aspects (intended users), could have a shaping power in the long term on the innovation trajectory. In that way these studies could help us to identify elements that are candidates to play the part of seeds of change. However, *ex post* analysis, when used in a foresight perspective, is exposed to potential rationalisations, which are often embedded in the narratives supported by these approaches (Hennion 2003). Along with Schnaars (1989), we could argue that the detection of past seeds of change is a poor predictor for present and future situations because it is built upon the influential and non-trivial knowledge of who 'won' (i.e. what is the fate of the past trends). The use of a symmetrical analysis of successes and failures (Bijker, Hughes, and Pinch 1987; Bijker and Law 1992) could reduce this tendency.[2] However the majority of research has trouble putting the same emphasis, on the one hand, on success stories and, on the other hand, on apparently meaningless failures. What is more, the symmetry principle is seldom fully implemented. Indeed, the major obstacle that allows the transfer of experience gained in the field of sociology and history of technology to the field of future studies is related to the tendency to undermine a key ingredient of any foresight analysis: uncertainty. Thus, it is difficult for them to reproduce *ex post* the situation of uncertainty, in which the innovation trajectory existed. This uncertainty could be considered as a defining component to understand actors' behaviours through the options and the strategies they choose.

The opposite approach relies on an *a priori* identification of potential seeds of change. As stated before, this second category of approach is popular among the specialists in the field of future studies. It is at the core of numerous forecasting (Schwarz, Svedin, and Wittrock 1982) or backcasting (Robinson 1990) methods designed to define how to build appropriate scenarios of potential futures. Beyond specific methodological traditions, those scenarios are mostly used in groups. The presentation of future possible trends is translated in the design of a set of scenarios that highlight different options for the future. In order to be understandable by their users, those scenarios must inevitably be somewhat contrasted. These links among the scenarios (the variable identified as valid to characterise different scenario options) define the frame and, at the same time, suggest a definition of the elements considered as relevant in structuring the future. In this perspective, the seeds of change are somehow imbedded at the core of the production modes of scenarios. This way to produce potential seeds raises yet another problem: the definition of the object to observe. It is difficult (perhaps impossible) to conceptualise an approach that anticipates any kind of seeds of change without, simultaneously, inducing a theory about the ontology of these elements. The construction of such scenarios is often framed trough the preoccupation of designers and thus by their definition of what is pertinent to observe.

In order to minimise this double pitfall of *a priori* projections and *a posteriori* rationalisation, this paper would like to suggest an alternative strategy. Our starting assumption postulates that, strictly speaking, there is no such thing as an ontological category of 'seeds of change'. In other words, we propose the idea that no isolated element can fulfil, by itself, the role of influencing the future. On the basis of our hypothesis we need to adapt the focus of our investigation. Instead of seeking for such 'seeds', we should rather try to identify how heterogeneous elements are combined together to frame possible evolution. Metaphorically, one could say that we should not try to define a methodology to build a new set of radar towers for detection of weak signals, but rather recreate the condition of a micro universe in which actual evolution of trends aimed at the future could be tracked and understood in their contexts.

Our principal hypothesis is to consider that the emergence of new changes cannot be done independently of the way people involved in these processes try to represent and understand them, both at individual and at group level. In other words, the socialisation of representations about the future, as they are embedded in the strategies of the actors, constitutes a privileged place for a better understanding of the emerging process of new tendencies.

The creation and organisation of such observation requires us to take some precautions. Among these precautions we must pay specific attention to avoid creating unnecessary determinism where uncertainty exists. We have tried as much as possible not to provide any *a priori* definition of potential candidates that could belong to the whole of elements that could influence the future. As the aim of our research is not to seek reliable forecasts (for which we would have no bases to assess their accuracy) it appeared to be more interesting, because it is more open, to delegate the responsibility for the definition of such relevant elements to the actors themselves. Because our goal is more focused on collecting the diversity and the richness of the representations, through which these actors try to grasp the future, we opted to utilise actor-made folksonomies as an object of study.

2. A folksonomics approach

Folksonomy belongs to the family of what could be described as 'distributed classifications' (Shirky 2005). Categories in a folksonomic process are not produced by a group of experts which control the whole classifying structure and who validate a common thesaurus to use. Folk classification or ethno-classification (Berlin 2002) emerge directly from users' contributions (Merholz 2004). This means that in folksonomies users are free to label categories according to their own preferences; for example, the millions of photographs or videos which are available online on sites such as Flickr or Youtube and are described by a series of labels which characterise them in a non-systematic way. These labels, known under the name of tags, are in these cases proposed by the people who provide the content. To establish these tags, users are 'free' as they can tap into a natural thesaurus: their own imagination (or other users' imaginations). The core principle of these bottom–up classification processes consists in offering to users pragmatic means of contents navigation that are close to their concerns and their own spontaneous classifying practices (Kroski 2005). As stated by one of the sites promoting tags use, the advantage of tags lies in the fact that they are '… a little bit like keywords, but they're chosen by you, and they do not form a hierarchy. You can assign as many tags to a bookmark as you like and rename or delete the tags later. So, tagging can be a lot easier and more flexible than fitting your information into preconceived categories or folders.'[3]

The analyses conducted on the nature of these user generated thesauruses underline the heterogeneity of the utilised notions (Guy and Tonkin 2006). They could cover a broad array constituted

by subjective concepts ('super', 'cool', 'interesting'), phonetic diminutives, misspelled words and even by multilingual linguistic innovations of Creole type (Golder and Huberman 2006). These elements form a kind of 'semantic soup' that has no hierarchy. This lack of structure is obviously one of the main weaknesses of the folksonomic systems, which often fail to generate any kind of guiding principles for user orientation within the classification items. This limit concerning a structuring framework is particularly sensitive at the level of synonyms' management. Indeed, in open folksonomies there are no tools to manage semantic ambiguities (Kroski 2005). Another issue is the lack of lasting consistency because of the unending evolution of tags that are in a state of constant (re)edition and thus make it impossible to guarantee the meaning of used tags.

Considering these limits, it is legitimate to wonder whether folksonomies are more a factor of entropy increase than a means to reduce it (Glassey 2007). It could also be argued that its lack of formal structure would prevent any valuable data mining from such corpus. The examination of the perceived benefits of these classification modes, however, could bring some nuances to this early assessment.

In fact, some of folksonomies' identified weaknesses are also among the key reasons of their popularity. For example, the absence of hierarchy is undoubtedly problematic but it also lowers the barriers of access to the creation and use of classification. To make a query within a folksonomy, the user does not have to go through the process of acquiring a mental map of the hierarchal structure of some classification tree. He or she does not need to think about the semantic accuracy and deal with possible synonyms to have access to results that could turn out as meaningful. The simplicity of free typing and loose associations is a lot easier than making a decision about the degree of match (Mathes 2004). In practice, classical taxonomies are very limited when it comes to dealing with a very large and fast-evolving content pool. In these cases, which cover many basic every-day life internet uses, the obligation to learn a complex, hierarchical controlled vocabulary would just be too costly for many users in terms of time and cognitive effort (Mathes 2004). In stark contrast, within large tag pools, basically any word (even misspelled or contracted such as in SMS language) will bring some results more or less loosely related to the intended query. To narrow down uncertainties linked to folksonomy's messy classification, people often use a combination of several tags which could lead to more precise results. Tag combinations are powerful and flexible tools that allow building original hybrid categories, which are directly inspired by the contributors' representations. Practitioners involved in knowledge management issues have already identified folksonomy as a potential field to enhance existing knowledge sharing platform (Lund et al. 2005). In contrast with the heavy management required to build metadata platforms and semantic web initiatives, folksonomy offers a rough but easier way to implement navigation tools.[4]

The use of the tag-induced folksonomies does not go without raising problems, in particular, because of its lack of precision, among others (Guy and Tonkin 2005). Within the framework of our study, these inaccuracies, mistakes or ambiguities do not constitute a setback but, on the contrary, they are a means of revealing the complexity, the creativity and the diversity of the points of view regarding the description of a common field of interest. We think that this somewhat chaotic diversity also belongs to the above-mentioned principle of uncertainty that, in the practice of foresight studies, should not only be understood as 'the uncertainty about the future' but also about the present. In the context of everyday life, uncertainty could also be related to diverging interpretation, approximations, groping and hesitations of people and this is also true when they participate in presenting future activities.

3. Method

Since 2005, the 'Web 2.0' as quoted by Tim O'Reilly (2005), has become a trendy notion with fuzzy boundaries, synonymous for many with a paradigm shift of the internet evolution. Nonetheless, its definition remains problematic as it covers a vast array of heterogeneous, technical (Ajax, Soap, API Services, mash-ups, etc.), social (folksonomy, user as contributors, social mimetic services, etc.) and organisational processes (mass service of micromarkets, radical decentralisation, etc.). This notion is also used as a generic means to describe the evolution of the internet functionalities, services and use at technical, economical and social levels. Furthermore, the success of the term was such that the '2.0' tag started to proliferate and is now more and more used to describe innovation as a whole, even when it has limited connections with the web. The lack of a stabilised simple definition of what actually is 'Web 2.0', does not prevent this concept from being extraordinarily popular among the people involved in information technology. However, some observers do not hesitate to question whether this concept has any substance and specificity, if it is only a marketing label aimed at giving a new youth to technologies and processes that have already existed for a long time, but suffered from the burst of the internet investment bubble (Travers 2007). Beyond such controversies, this notion interested us because the proliferation of multiple uses of the term 'Web 2.0' expresses a plurality of visions of the future of information technology, which is what we were looking for.

The interest in the question of Web 2.0's definition does not only refer to theoretical stakes. As a conceptual frame it also operates as a tool, an enabling frame providing a specific context from which it is possible to build strategies and mobilise resources (Shuen 2008). For example, this definition of what covers Web 2.0 plays a big role for innovators as a mean to foster financial partners' interest or media and customers awareness about the idea of a new generation of services. As such, the label 'Web 2.0' operates in start-ups as a flag for rallying potential business allies. In this perspective the fast and somewhat blurry evolution of this field does not only constitute an obstacle (to scan the landscape of existing initiatives) but also an opportunity to propose their own vision of the future in order to present their intended activities as strategic part of it.

For a better understanding of these individual bottom–up future scenarios, we have done a systematic analysis of the description of the core business of over 250 self-proclaimed Web 2.0 start-ups. We elected to focus on start-ups because, as newcomers, they have to present and defend their activities as being at the core of significant future evolution, in order to attract further financing resources or customers, but before looking at the corpus of those descriptions and the hints they could provide about some kind of spontaneous and distributed foresight we had first to consider the nature of what we intended to track.

In order to find folksonomies related to our topic, we have gathered a corpus of how start-ups, which explicitly refer to this notion of 'Web 2.0', are characterised mostly by third party commentators. We built a database of folksonomic descriptions of start-ups from different online directories which provided such functionalities. Concretely, we have collected the terms used to describe the activities of start-ups in order to produce an open thesaurus organised only by the representations and the associations made by the contributors of these folksonomic classifications. We did not proceed to any selection according to the field in which these start-ups propose their services nor did we make any assessment of the viabilityof the projects or their stage of development (restricted beta, beta, running, etc.). The geographical locations of the initiatives were also not taken into account and we only kept as the only relevant element of classification the date when the folksonomic assessment of these companies was made.

Folksonomic descriptions were collected on various web sites that maintain a list of Web 2.0. starts-ups in order to widen the size and the diversity of data collection. The sites were pre-selected according to the three main criteria. The first one is the existence of folksonomic descriptions as some sites dealing with Web 2.0 start-up do not include a tagging function. The second is the consistency of the corpus as many websites were short-lived initiatives and did not provide enough material for the full selected time frame. The last criterion is the existence of a generalist corpus as a few directories are specialised in one subtype of starts-ups and thus provide a narrow vision of the field. The three selected websites[5] also offer a diversified folksonomic production modes and merge descriptions produced by the teams in charge of the sites, descriptions provided by the starts-ups themselves or descriptions generated by users who describe and assess the potential of the various projects.

Among the examined cases (500) in three main lists, we have selected a set of 250 companies according to the date of their folksonomic description. We have divided our corpus into two groups following a single rule: the first group is formed by the first 125 start-ups described after November 2005 and the second group is formed by the first 125 companies described after the beginning of 2007. The sample of cases was done in order to follow two main requirements. The first one was to obtain two groups of identical size, which allow for a comparison of the density and the diversity of proposed descriptions. The second requirement was to have several distinct groups that remain relatively close in time (the gap between the last description of the first group in June 2006 and the first description of the second group in January 2007 is less than seven months) in order to grasp the pace of the observed phenomenon.

On this basis we have built a chart of the terms used and how they are connected to each other (co-presence within the same description). We did not intend to produce an exact picture of the state of the Web 2.0, but only to grasp how what is projected to exist at a specific time is depicted and how it is changing over time.

4. Results

In our first analysis, the results show a strongly contrasted situation between the two groups of start-ups that we have selected. Whereas the number of studied cases is identical, the structure of the relations is definitely more packed for the most recent group.

The means of describing the potential and the possible applications of 'Web 2.0' has grown considerably in a few months. In the case of the start-ups described in 2005–2006 (Figure 1), the pattern is quite structured. Among the most important terms, i.e. those that obtain a central position within the cloud of quoted elements, we can point out: [1] communities; [2] social bookmarking; [3] collaboration: [4] data storage (download-hosting); [5] e-commerce; [6] search engine.

This structuring, which we cannot examine here in detail, is strongly built through a series of 'traditional' terms borrowed from 'classical' domains (e-commerce, virtual communities, etc.) that have existed for almost a decade. Whereas the concept of 'Web 2.0' was still young, the majority of the references related to an older model of using the internet. This is especially striking when we consider how many terms, which were to strongly organise the same field a couple of months later, are connected only to a subpart of the network. For example, 'share', which is among the most cited terms in 2007, is mainly related in 2005–2006 to 'photo sharing' within the group 'storage'.

Less than a year later the situation radically evolved and the diagram – obtained by exactly the same method – shows a quite different and more complex landscape of notions (Figure 2).

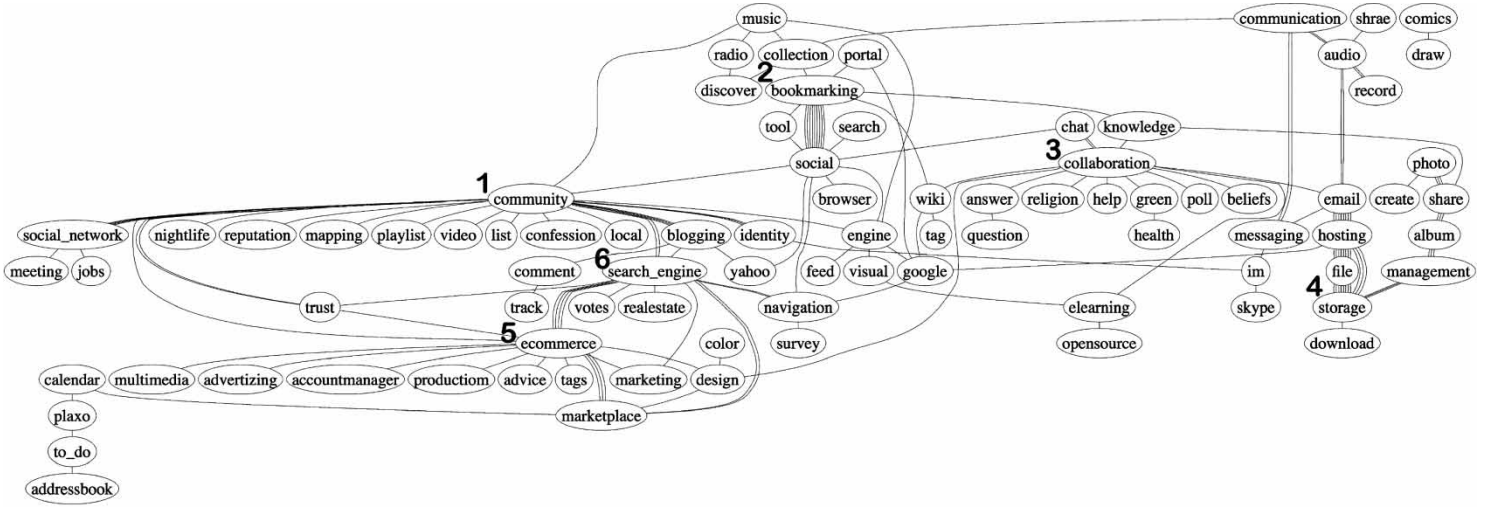

Figure 1. The map of folksonomic items used to describe 125 start-ups in 2005–2006.

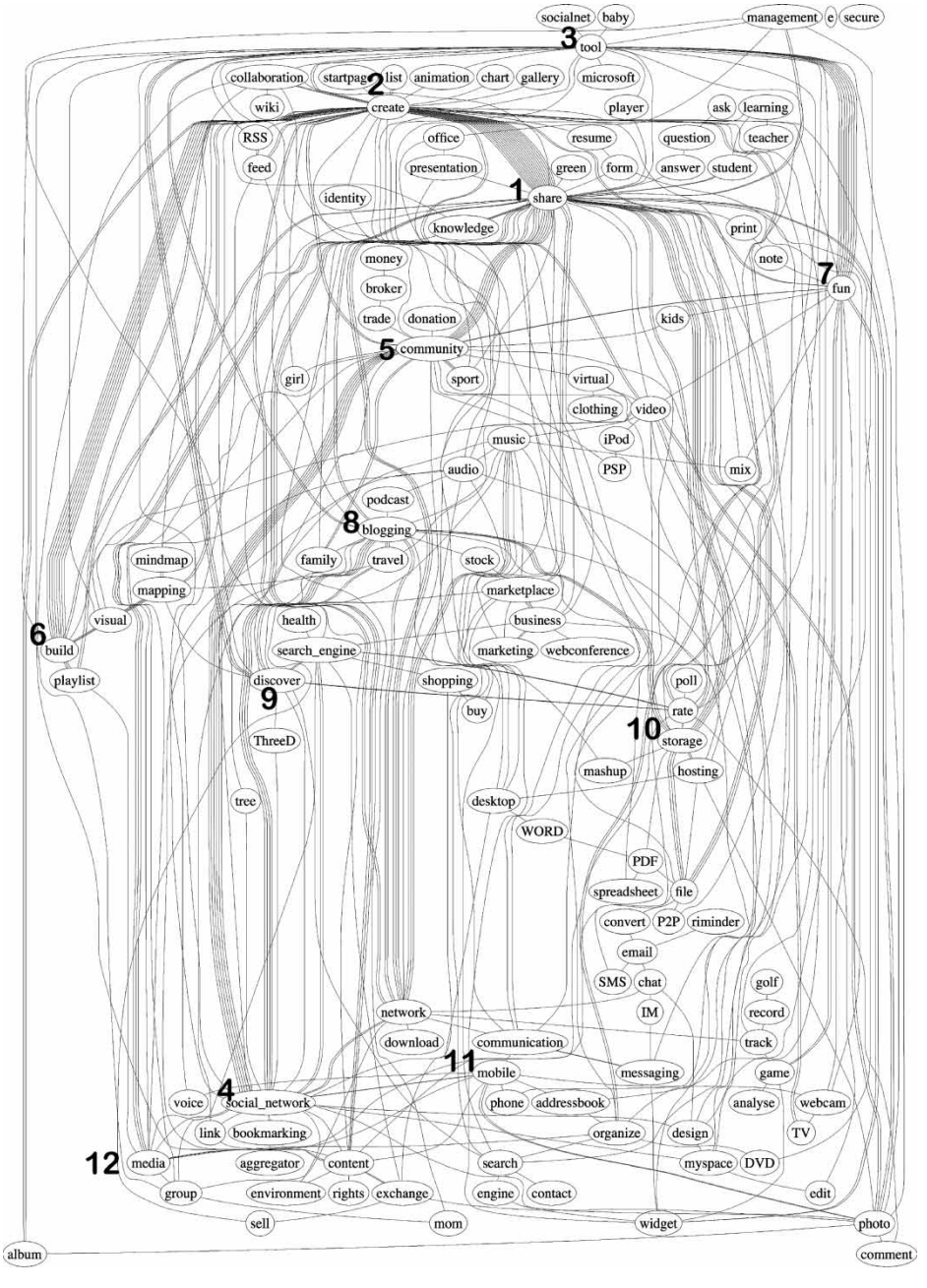

Figure 2. The map of folksonomic items used to descibe 125 start-ups after 2007.

The general structure is more difficult to outline as the amount of the relations between the descriptive elements has proliferated. It is however still possible to distinguish the appearance of new attractors. The terms occupying a central position are:

[1]	share	[7]	fun
[2]	create	[8]	blogging
[3]	tools	[9]	discover
[4]	social networks	[10]	storage
[5]	community	[11]	mobile
[6]	built	[12]	media

We have noticed that the majority of key terms used to describe the Web 2.0 start-ups were completely renewed. One can make the assumption that the movement observed between the two groups underlines the fact that a process of social learning and appropriation of the possibilities of these technologies is taking place. Looking at both maps gives the impression that only limited links exist between them. A closer analysis shows however that certain terms are actually transformed and have morphed into other terms. For example, the concept of *community* is present in the two maps, but, in the second one, some dimensions which were a subset related to *community* have become a specific trend (*social networks*). What we can observe is not only the disappearance of some elements as a valid means to describe on going evolution, but also the fragmentation, reconstruction and the strengthening of some notions through more specific descriptors.

Whereas the first group rested, essentially on categories and relations between categories clearly established in the former model, the second group suggests a dissimilar situation with the appearance of an original main cluster. This main cluster is built through strong connections between the terms 'share', 'create', 'tools' and 'build'. This new core could be interpreted as a major shift and we can make the hypothesis that this field is developing its own models of how to consider future innovation. The increased link density and the absence of semantic islands are also indicative of a resilient crossing between the various descriptive elements. Even if it were possible to distinguish some centrality, the interconnection of those elements is less univocal than in the earlier group. We would argue that, in the interval which separates the two groups, we witnessed the emergence of a platform made of a set of interrelated themes from which it is possible to envision the dynamics of a series of future developments.

As we have already mentioned, our goal in this paper is not to try and draw up an exhaustive range of possible future trends of Web 2.0. We are looking, more specifically, at how representations of the future evolve through our analysis of the folksonomics' categories applied to a series of start-ups. Beyond the subjective representations of each actor, we have obtained a glimpse of a broader landscape, more complex, and more chaotic, which is in perpetual reconfiguration. In a foresight perspective, this landscape is interesting because it represents the present state of a dynamic network which is constructed on how people try to address the future (in our case promote the activities of start-ups). In consequence, what is meaningful in these maps is not related to the presence of any specific elements but rather to the synergies that are built between various elements. These synergies, constructed and enacted by heterogeneous actors, define a perimeter from which future trends can spread. We believe that such maps could offer a fruitful background to observe how critical mass phenomenon processes (Ball 2004) or that crowds' wisdom as described by Surowiecki (2004) could play their part in the shaping of the future. Our approach which focuses on 'user driven' semantic offers an original perspective of the landscape of the future which innovation promoters build, together, through the framing of their own activities.

5. Conclusions

Beyond the search for hypothetical seeds of change, we were interested in a better understanding of how collective representations of the future could emerge through a multitude of prospective strategies. We have defended the idea that an approach in terms of folksonomic clusters could be adapted to accomplish such a task. The study presented in this paper is still in an exploratory stage and we are quite conscious of the limitations of the suggested approach which cannot claim to take into account (but could track) unanticipated shifts and disruptive innovations. Nonetheless, we think that this method could provide some clues toward a better understanding of the processes linked to the emergence of change within a community of specific actors. Its main feature is to offer a way to track the dynamics leading to future trends within a heterogeneous whole which composition and inter-connexions is unceasingly reconfigured by the actors themselves. This folksonomic approach is flexible and offers an alternative solution to draw up cartographies of fields which escape an exhaustive formal description. In other words, by delegating the definition of the observation framework to the actors themselves, the described approach does not only set these actors as the focus of prospective analysis but also set them in the middle of the actual definition of this future. From our point of view, this is just the first step of an overall research programme that aims at reflecting how the concept of the mutual shaping process, popularised in the STS field, can be interpreted in a foresight perspective in order to explore how the future is built by, but also builds, the present.

In our view, the agenda for further research in this field should simultaneously deal with methodological questions and operational issues regarding the strategic use of this type of data in actual practices.

At the first methodological level the aims will be to improve the production and the analysis of folksonomic maps by identifying more relevant corpuses and developing better tools for data processing. Our first results were presented in the form of two snapshots but it would be interesting to a track, in simulated real-time, the evolution of the observed fields. A better comprehension of folksonomy's dynamics will also necessarily pass by a qualitative analysis of their producers in order to understand how these actors describe emergent processes and how they adapt these descriptions according to the context evolution.

At the operational level further research should be conducted to assess how these maps can provide guidelines for action and function as collective watch systems. We have to keep in mind that folksonomies are not stand-alone products. The building of a folksonomic 'space' engenders the creation of a community of users which, in turn, offers many advantages not only to the users but also to the project promoters. Popular websites such as *Google, del.icio.us* or *Digg*, which work as scanners of Web content are partially built on a huge folksonomic thesaurus for whatever is considered by each user as 'interesting'. In the same philosophy but with the specific public of scientists as a targeted audience we find sites like *Connotea*, launched in 2006, which let the users store and arrange scientific article references with tags. Provided that it is a success (i.e. adopted by a significant number of scientists), such a service could give to their promoters an extraordinary insight into how scientists map their knowledge and build/update their reference lists and even how they work. The business of large scale folksonomy-based services is already up and running and needs to be explored. This exploration should lead to further scientific investigation such as, for example, how such private or public thesauruses could be used to identify fast evolving fields and work as early detection tools. It will also raise the question of what kind of knowledge is extracted from these massive folksonomic pools and, ultimately, how this knowledge could be harnessed to actual strategies.

Notes on contributor

Dr Olivier Glassey is a sociologist who studies online mass collaboration and emergent collective behaviours in several domains (virtual communities, social networks, Wikipedia, etc.). He is leading the research unit Social Studies of Science and Technology in the Observation of Science, Policy and Society at the University of Lausanne.

Notes

1. The sociology of scientific knowledge (SSK), the social shaping of technology (SST) and the social construction of technology (SCOT).
2. These authors suggested an adaptation of the symmetry principle as defined by Bloor (1976) in the field of sociology of science: the demand that true and false beliefs (or, in the case of technology, both devices that work and those that fail) – should be analysed in the same terms.
3. http://del.icio.us/help/tags.
4. For an example of the use of folksonomy deployed within some large companies, see Fitzgerald (2006).
5. The online directories used to build our database that was providing tags for the description of the start-ups were: http://www.go2web20.net/, http://web2.0slides.com/, http://www.buzzshout.com/.

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