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# Deep Search Engines : From Trust to Tracks

## *A Technology Assessment Perspective Revisited*

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### **1. THE TWO GENERATIONS OF TA : FROM PROSPECTIVE EXERCISE TO SOCIAL CONSTRUCTIVISM**

Along the three last decades, the technology assessment has evolved both regarding its concept of technology-society interactions and its political or societal responsibilities. Traditionally, it is used to differentiate two main ages in technology assessment.

The first generation of TA relies on the concept of technological options dealing with an integrated evaluation of the various social impacts and drawing scenarios for society. Anticipation of future changes and democratisation of the political decision making process are at the core of TA activities. This first generation was marked by a sort of technological determinism, that sustains a vision of an autonomous technology, with its inner logic that affects in a predetermined and thus in a non-negotiated way the future of our Society. In this frame, the role of TA was to make prospective exercise in order to advice the politics and the so called public about sustainable and socially acceptable technological choices. This institutional organization of TA with clear and separated roles attributed to the various actors (politics decide, engineers design, public accept or not) appeared hard to keep regarding some empirical evidences.

As well underlined by Bijker (1994)<sup>i</sup>,<sup>1</sup> the clear separation between deciders, designers and users is an illusion when considering the socio-dynamism of technological deployment.

*"Since the 1980s, sociological and historical studies have developed a constructivist analysis of technology in contrast to the standard image of technology that was largely "technological determinist." The idea that technology is socially shaped, rather than an autonomously developing force in society or a primarily cognitive development, is not entirely new, but its present momentum and precise formulation are quite recent. Social shaping models stress that technology does not follow its own momentum nor a rational goal-directed problem-solving path but is instead shaped by social factors. Demonstrating the interpretative flexibility of an artifact makes clear that the stabilization of an artifact is a social process, and hence subject to choices, interests, value judgements--in short, to politics." (Bijker 1994)*

As well explained by Rip(1995)<sup>ii</sup>, the basic idea of Constructive Technology Assessment is

*"is to shift the focus of TA away from assessing fully articulated technologies, and introduce anticipation of technology impacts at an early stage in the development. Actors within the world of technology become an important target group then, but the insight of recent technology studies - that impacts are co-produced in the implementation and diffusion stages - implies that technology actors are not the only ones to be involved. Within the world of technology, the preferred strategy for CTA is to broaden the aspects and the actors that are taken into account. More generally, one should work towards societal learning in handling, and sometimes managing, technology in society" (Rip 1995)*

This CTA is clearly based on the micro analysis of technological cases and articulated on a dual vision of the technology as both socially shaped and shaping the society. If the determinism can be seen as the major critique of the first stage of TA, the relativism related to the micro cases analysis is one of the major risk of the second generation since the assessment is dependant on the values and on the interests of the various actors involved in the technological dynamics. This focus made on the actors, their values and their interests together with a commitment to a descriptive methodology make this constructive assessment of technologies a bit disappointment regarding its political and ethical commitment to the Society. In other word, there is a sort of liberalism that clouds this approach suggesting that the "good" or the "fair" comes out of the social network

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involved in the technological construct. In this constructive approach, STS scientists do consider that their responsibilities regard only the social reflexivity generated by their description of the technological dynamism and its social construction.

## **2. THE THIRD GENERATION: A REVISITED AND MILITANT TA**

We claim as social scientist for a next generation of technology assessment less neutral or more political and ethical in its approach of the technologies. Following Introna (2005)<sup>iii</sup>, we consider every technological artefact as a micropolitics, as a script that incorporates social and political orderings, norms and values. The role of this revisited TA is to make this script transparent by explaining the different closures that shape its conception. This exercise of transparency needs some support to explore the script and to assess it. To a certain extent, to the normative project supported by the technology we have to oppose other norms and values. If we do not explore those scripts with those explorative principles in hands, we just describe the technologies as they are decided and appropriated by actors.

But is this sufficient to be sure that our society remains human? In a way, this constructive approach, by setting that we are all actors of a technological construct, deny that those technological artefacts are dominated by vested and well organized interest, introducing an unbalance game of power. How to get out of the micro-carcen in which the constructive TA seems to remain to address societal issues and to extend the deliberation to a larger audience? For all those reason, we claim for a more militant posture or figure of STS scientists when assessing technologies. This militant figure suggests that we have some values to defend which even if it is a very de-considered position in a general context still marked by the supposed neutrality and objectivity of sciences.

The first age of TA was macro and heavily marked by a technological determinism and by institutional settings, the second age was micro and strongly marked by a sort of relativism due to the constructive frame. What is missing in these two generations of TA is a 'moral or ethical framing' based on principles to conduct the exploration of the considered artefact.

Let us briefly question the status and the meaning of those ethical principles.

According to Ladrière (1997)<sup>iv</sup>, ethics is based on ability or capability. It is not a theoretical or normative abstract knowledge that one could define and transfer to others. But it is a *praxis*, an ability to face a situation ethically.

This position is very close to those ones developed by Dewey (1916 -1975)<sup>v</sup> who underlines that the permanent search of universal and fixed norms into ethical approach can be compared to the quest of certainty in epistemology, which is at the source of so many problems badly defined and solved. In that sense and according to Ladrière (1997), the role of the so-called STS experts is not to decide in place of the concerned actors but to make the deliberation possible and to enlighten it by clarifying the ethical questions raised by the micropolitics at work.

Ladrière (1997) and Dewey (1916-1975) suggest that we never affront an ethical problem from a "tabula rasa", without using some ethical references or principles transmitted by the tradition. But for Dewey (1916-1975) as for Ladrière (1997), these principles are not fixed rules that could, as in a cooking recipe, tell by themselves what to do, how to act, determining quasi mechanically the fair way or the ethical course for our decision and action. For Dewey (1916-1975), these principles are explorative or analytical tools useful to enlighten a situation and to assess the various points of view expressed by the concerned actors. Dewey (1916-1975) admits that general ideas such as justice, dignity, or fairness are of value as tools of inquiry to question and forecast unknown ethical puzzles. They have no intrinsic normative force but constitute a sort of moral background that may help facing an unknown moral situation.

What should be those explorative principles?

In our TA practice, two explorative principles shape our analysis of technological artefacts : The first principle relates to the autonomy of the subject and the second, to democracy, these two terms being intrinsically related by a process of co-originality each being a necessary (but not sufficient) condition for the other.

Let us first introduce very briefly to our concept of autonomy. This concept may appear very vague if we do not define it in a sort of fleshy and pragmatic approach. This is what is done by Sen and Nussbaum (1993)<sup>vi</sup> with their concept of capability. The authors define the concept of capability by raising the Aristotelian question: What activities characteristically performed by human beings are so central that they seem definitive of the life that is truly human? The answer consists in the identification of the ten fundamental capabilities that make the life human. Those capabilities help to understand the two faces of the autonomy as freedom from unreasonable constraints (from the state or from others) on the construction of one's identity and autonomy as control over (some) aspects of the identity one projects to the world..

Very related to the autonomy, is the second explorative principle: the democracy. Here again, the concept is very broad and very little operational for this explorative exercise. Along with Sen (1999)<sup>vii</sup>, we define the democracy by the three critical ways in which it enriches the lives of the citizens.

*« First, political freedom is a part of human freedom in general, and exercising civil and political rights is a crucial part of good lives of individuals as social beings. Political and social participation has intrinsic value for human life and well-being. To be prevented from participation in the political life of the community is a major deprivation. Second... democracy has an important instrumental value in enhancing the hearing that people get in expressing and supporting their claims to political attention (including claims of economic needs). Third...the practice of democracy gives citizens an opportunity to learn from one another, and helps society to form its values and priorities... In this sense, democracy has constructive importance, in addition to its intrinsic value for the lives of the citizens and its instrumental importance in political decisions.» (Sen 1999)*

According to this approach, democracy is at the same time the condition for the autonomy of human individuals and conditioned by this autonomy.

### **3. DEEP SEARCH ENGINES FROM DEMOCRACY TO AUTONOMY**

Based on these two explorative principles, let us examine the major issues related to the deep search engines.

#### **DEEP SEARCH ENGINES AND DEMOCRACY**

Analyzing search engines as micropolitics means that this artefact is not only to be considered as a searching tool but also as an embedded social or political orderings. This is very clear when doing any research on the WEB with the help of different search engines. The result is at each time very different even if some websites keep on scoring on the first pages and other remain hidden being not indexed at all or classified in so low ranking that no user consults them. This is not neutral and this not only technology but mostly politics. This political vision of search engine is very accurately addressed by Introna and. Nissenbaum - 2000)<sup>viii</sup> when telling :

*"Make no mistake: These are political issues.' What those who seek information on the Web can find will determine what the Web consists of-for them. We fear that technological limitations and commercial interests may conspire to disenfranchise those outside the mainstream and those who lack the resources or knowledge to promote their Web presence."* (Introna and. Nissenbaum 2000, P.169)

The social shaping of those search engine and therefore their non neutral requirements and specifications has been very well demonstrated by Cho and Roy (2004)<sup>ix</sup>. Exploring different engines, they point out that :

*"most existing search engines use a "link-popularity" metric, called PageRank, to measure the \quality" of a page [21]. Roughly speaking, the PageRank metric considers a page \important" or of \high quality" if the page is linked to by many other pages on the Web.1 For example, Google puts a page at the top of a search result (out of all the pages that contain the keywords that the user issued) when the page is linked to by the most other pages on the Web [5].2 In short, "currently popular" pages are re-peatedly returned at the top of the search results by*

*major search engines. The problem of this popularity-based ranking is that it is inherently biased against unknown pages. That is, when search engines constantly return popular pages at the top of their search results, more Web users will "discover" and look at those pages, increasing their popularity even further. In contrast, a currently-unpopular page will not be returned by search engines (or ranked at the bottom), so few new users will discover those pages and create a link to it, pushing the page's ranking even further down. This "rich-get-richer" phenomenon can be particularly problematic for the "high-quality" pages that were recently created. Even if a page is of high quality, the page may be completely ignored by Web users simply because its current popularity is very low. This situation is clearly unfortunate both for Web page authors and the overall Web users. New and valuable pages are ignored just because they have not been given a chance to be noticed by people."*(Cho and Roy 2004, P.20)

If we approach those search engines as filters or as scripts that mediate our access to information and knowledge, and therefore our vision of the world, we can consider them, along with Giddens (1984)<sup>x</sup>, as structures that condition our interactions. As structure, search engines cover three dimensions: *meaning* since they operate a certain orderings of the world, *power* since they introduce an implicit distribution of power between information operators and *norms* since they sanction good operation and attitude to be indexed and well ranked by the search engines.

How Democracy is concerned by those new artefacts? Three main democratic issues are at stage when examining search engines: equity and respect of the minority, subsequently the diversity of this new public sphere and at last the question of the transparency of the regulation that supports its organization.

The equity of chance to exist and to be consulted on the WEB scene is the first and most evident issue raised by the "link popularity" metrics applied in most of the engines. This questions the diversity of the Web as public sphere and the chances for the minority's voices to be heard.

Most of search engine's providers claim for the fair representativity of what you get when using their metrics. For instance, Google invokes a sort of direct and participatory democracy that "warrant" that 'best' sources of information are always offered to those interested in.

*"Google works because it relies on the millions of individuals posting websites to determine which other sites offer content of value. Instead of relying on a group of editors or solely on the frequency with which certain terms appear, Google ranks every web page using a breakthrough technique called PageRank™. PageRank evaluates all of the sites linking to a web page and assigns them a value, based in part on the sites linking to them. By analyzing the full structure of the web, Google is able to determine which sites have been "voted" the best sources of information by those most interested in the information they offer. This technique actually improves as the web gets bigger, as each new site is another point of information and another vote to be counted."*

But, the "good intention" of search engines operators regarding the fairness of their metrics can be disrupted by both their commercial strategy of selling good positions in their top slots and the technical strategy of some announcers using their competencies to artificially escalate the ranking to the top.

Introna and Nissenbaum (2000) conclude that seekers will likely find large, popular sites whose designers have enough technical savvy to succeed in the ranking game.

Hence, it raises a second critical issue regarding the "tyranny of the majority" and the normalization or uniqueness of social vision that could emerge from this process. Let us just recall, the social network theory deployed by Granovetter (1983)<sup>xi</sup> that demonstrates the strength and the importance of the weak ties both for the individual and societal wealth. This issue is still reinforced by the strong concentration of the sectors largely dominated by few major search engines' players.

The transparency is the last but certainly the major issues raised by this matter. Most of users do ignore how the ranking is operated and often consider it as the true response to their queries and an 'objective' vision of the world. This ignorance is still reinforced by the strong intellectual rights that protect the search algorithms and subsequently the poor public information about the metrics and methods published by the operators on their websites. Though, this information is critical for the trust of people regarding the information they get but also for the role the Web could play in setting sound democratic deliberation.

This brief assessment of search engines claims for a better regulation of them in order to warrant their fair participation to the democracy. This regulation can follow three paths, according to the regulation's theories of Williamson (1981)<sup>xii</sup> : the pure market regulation, the state hierarchical regulation and the network one, namely heterarchy.

Let us first examine the free market dynamics regulation. This is the one at work currently and the one claimed by the major operators as the best practice to warrant the diversity and the users 'satisfaction. But as well demonstrated by Introna and Nissenbaum (2000), search engine and Web at large are all except of a true free market where customers, based on transparent information, can express their preferences among clear and readable alternatives. Most of lay users do not have any transparent information on how do these engines work and less again the technical capability to draw a comparative regarding the ranking metrics used by them. Moreover, as seen previously, those free market's rules are still disrupted by opportunist attitudes both of the operators and of powerful Web pages' providers. To regulate those effects, operators usually claim for a sound self-regulation of the sector by adopting deontological codes of conduit. But this regulation remains heavily dependant to strong corporatist and commercial interests and more fundamentally raises questions regarding the so called privatization of what should be considered as a public space.

To restore the trust, some users prefer to turn themselves towards social networks to whose they belong and believe. Those networks play a role of intermediaries or of gatekeepers between end users and the global Web. But here again questions must be raised regarding the scattering effects of this strategy on the Web public space rendering difficult the sound democratic deliberation between those intermediary scenes and their troops. This raises also questions regarding the risks of some "replis identitaires" for the social cohesion and development of the Society.

The last regulatory path is the hierarchical one passing by the hand of democratic states. What could do a national state in front of a global and international scene operated by transnational actors? And should a public actor intervene in this private sector? To answer those questions, it is important to consider the World Summit on the Information Society declaration of Geneva<sup>xiii</sup> setting the Web as a global public good. Public means, as well underlined by Pouillet (2007)<sup>xiv</sup>, accessible for everyone and giving to everyone a true capacity to actively participate in the Information Society.

So to maintain Internet as a global public good, Internet must be regulated. Even if this public regulation is difficult, at least state should play an active role to foster the transparency of the patterns and metrics used by the search operators in order to make their scripts as readable as possible. This could be done through different accessible policies: the certification that consists in giving a public label to search operators that give a transparent information about their metrics and ranking processes. It could also consist in public engine helping users to compare what they get and get not when using a specific engine and how to foster their chances to be ranked in good position. This policy of transparency is already at work in order domain considered as public good but highly liberalized as it is a case for electricity, for instance.

## **DEEP SEARCH AND AUTONOMY**

Let us move now to the other side of the medal, the autonomy of the users as citizens. Most of the search engine offer now new devices to contextualize and personalize the delivered information. One of the value added of the search engine regards all the data collected on the WEB habits of the end-users to shape profiles and preferences in order to push personalized and contextualized information to the users. This can be considered as empowering the citizens but this has, as always, its reverse effect. Let us just remind the story of AOL which in 2006 gave, by error, access on line to its whole data basis displaying more than 36 millions of queries made by the 500.000 AOL users. With this error, the world discovered the backstage of the search engines. All these collected data

serve to infer from the current searching and consuming acts of an end-user its profile and its future preferences as the ones of people sharing statistical similarities to him or her. This management of profiles and preferences is always presented at the benefit of the end-users increasing the efficiency of his or her search trajectory. But it, at the same time, constitutes an obscure iron numeric cage that constraints the users' freedom and their self-determination's capabilities.

Two points have to be addressed here: first the lack of transparency in the way those profiles and preferences are generated and managed. In line with this first point is the lack of individuals' capacity to manage their numerical tracks becoming more and more "prisoners" of a story and of a social identity on which he or she has no more control.

This issue is traditionally addressed by legal considerations regarding the privacy. In a recent article, Kessous (2009)<sup>xv</sup> demonstrates that the traditional regulations of privacy appear really inefficient to address this issue.

Let us consider his argument. For Kessous (2009), this regulation has first endorsed a hierarchical pattern with national and international laws and bodies aiming at protecting the privacy and the individual freedoms. This public regulation appear quite difficult and sometimes vane or weak in a global context marked by a strong liberalization and an absence of effective world regulation.

The second path is the market one based on the free will of the actors supported by the informed consent's concept on one hand and the opt-in and opt-out mechanisms on the other. This market regulation raises political issues regarding the concept of justice since it provokes a social de facto asymmetry between the "haves" and the "haves not" the capabilities to act this free will in order to protect their privacy and their autonomy. But this market mechanism can also appear counter-productive for the search engines' operators since their systems of preferences and profiles usually give a clear primacy to the acting or clicking body as the ultimate access to the truth rather than to the subject and to his/her rhetoric or expressive capacity. In this search context, the *clicking bodies* are considered as more objective, more reliable and informative than the *thinking or speaking persons* and as more revealing of the "true" personal identities, personalities and lifestyles than whatever the individuals may tell or express. This "body paradigm" introduces a sort of paradox in the regulation inspired by the liberal frame of the "free will".

The third path suggested by the author is based on the technico-political empowerment of the citizens by providing them with technical facilities to write themselves their story and their identity by managing their numeric tracks. Kessous (2009) names those technologies as "Maoïst cleaners"<sup>2</sup> giving the opportunity to people to "reset" their profiles, to cut some out-dated or prejudicial links to restore their intellectual rights and the reversibility principles on their social identity and life story. For the author, if the hierarchical and market paths are necessary to protect the privacy rights of people they are not sufficient to restore their autonomy and self-determination capabilities. This requires new technical innovations to support an effective political empowerment of the citizens.

## CONCLUSION

The global economy is often synonym to the end of the national States placed in a sort of asymmetric equation to confront with large and well organized transnational corporations. Does that mean that there is no more space for an effective responsibility of the national states to protect their citizens? As well underlined by Stiglitz (1996)<sup>xvi</sup>, Government definitely has a place but it must know its place.

The deep search engines' example demonstrates that there are still large margins for pro-active roles of the national State in guiding their citizens in the so-called Information Society. These roles do concern education and innovation: education by encouraging learning programs that help people to better understand and decode those new search windows by which they have access to information and to knowledge; innovation by investing in research programs supporting projects

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<sup>2</sup> This term was suggested to E. Kessous by F. Pallu in reference to the dethroned dignitaries of the Maoïst regime who were effaced on the official pictures of the regime.

based on "ethical value-added" engines but also projects to empower the citizens for the management and the control of their tracks... and hence rendering them their property and human rights on their identities.

<sup>1</sup>Bijker, Wiebe. (1995) Democratization of Technology :Who are the Experts? In <http://www.angelfire.com/la/esst/bijker.html> (accessed Dec. 2008)

<sup>1</sup> Rip, Arie (1994), Science & Technology Studies and Constructive Technology Assessment, In <http://www.easst.net/review/sept1994/rip> (accessed Dec. 2008)

<sup>1</sup> Introna, Lucas. "The Ethics of Things". Working Paper, Lancaster University Management School, WP 2003/090, 19p.

<sup>1</sup> Ladrière, Jean. *L'éthique dans l'univers de la rationalité*. Namur : Artel / fides, 1997.

<sup>1</sup>Dewey, John. *Démocratie et éducation*. Paris : Armand Collin, 1975 (1st edit : 1916).

<sup>1</sup> Nussbaum, Martha and Sen, Amartya (eds). *The Quality of Life*, Oxford: Clarendon Press; New York: Oxford University Press. 1993

<sup>1</sup> Sen, Amartya (1999)., Democracy as Universal Value in *Journal Of Democracy* (1999) :10.3, PP. 3-17

<sup>1</sup> Introna, Lucas and Nissenbaum, Helen. "Shaping the Web: Why the Politics of Search Engines Matters" , In *The Information Society* (2000) : 16- n°3, pp. 169-186

<sup>1</sup> Cho, Junghoo and Roy, Sourashis. "Impacts of search Engines on Page Popularity", In *Proceedings of the World-Wide Web Conference (WWW)*, May 2004, PP20-29

<sup>1</sup> Giddens, Anthony *The Constitution of Society : Outline the Theory of Structure*. Berkley: University of California Press, 1984

<sup>1</sup> Granovetter, Mark. M. GRANOVETTER (1983), "The Strength of the Weak Ties: A Network Theory Revisited" , *Sociological Theory*, Vol. 1, PP. 201-233

<sup>1</sup> Williamson, Oliver, E. "The modern corporation: origins, evolution, attributes", In *Journal of Economics Literature* (1981): 19, PP. 1537-1568

<sup>1</sup> WSIS (2003), Geneva Declaration of Principles, World Summit on the Information Society, December 2003 – [http:// www.itu.int/wsis](http://www.itu.int/wsis)

<sup>1</sup> Poulet, Yves. (2007), "Internet Governance : Some Thoughts after the two WSIS", In *The Information Society : Innovation, Legitimacy, Ethics and Democracy*, edited by Goujon, Philippe; Lavelle, Sylvain; Duquenoy, Penny; Kimppa, Kai and Laurent, Véronique., pp. 203-224, Springer, 2007

<sup>1</sup> Kessous, Emmanuel. « La privacy dans les univers numériques : trois rationalités de la confiance ». In *Variations sur la Confiance*, Edited by Lobet-Maris, Claire ; Six, Benjamin and Lucas, Robin. Bruxelles : Peter Lang édit. To be published 2009

<sup>1</sup> Stiglitz, Joseph. "The Role of Government in Economic Development". In *Annual World Bank Conference on Development Economics*. Washington DC.1996

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