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Have STS fallen into a political void? Depoliticisation and engagement in the case of nanotechnologies

François Thoreau
Pierre Delvenne[1]

Abstract

In this paper we trace some of the key points in the history of Science and Technology Studies (STS). In particular we outline the inherently political dynamics of the field. Against We underline two emerging patterns in the curse of STS: the one of "depoliticisation" and the one of increasing "engagement". We address the case study nanotechnologies and discuss their intertwined history with the STS. This allows us to point at the risk that the increasing institutionalisation of STS and the political mandate that frames and stabilizes the field's relationship to the technological developments would create a political void. We conclude that STS research is at a crossroads. It is facing an important empirical turn, which may deprive it from its political significance, and constantly redefine its institutional constraints. STS has to continuously question its underlying political assumptions (as it occurs more and more regarding public participation) and to make it explicit.

1. Introduction

Research has politics. There is little need to show that academic research is often oriented towards further purposes. For instance, according to Wallerstein, the concept of "development" was

1 The authors both work at the STS unit of the SPIRAL Research Institute, University of Liege, Belgium. François Thoreau is Aspirant (PhD student) from the F.R.S.-FNRS and Pierre Delvenne is Chargé de recherches (postdoctoral researcher) from the F.RS.-FNRS. Contact: fthoreau@ulg.ac.be, pierre.delvenne@ulg.ac.be.

elaborated post World War II by the social sciences, in relationship with colonialist perspectives. Ultimately, it would foster the instauration of an idea of the modern world as unique (rather than divided between modern occident and non-modern Third World) and induce the idea of progressive steps to take toward progress. In this perspective, the concept of "development" would serve the geopolitical interests of powerful nation-states, thereafter conceived as models toward which the undeveloped nations could tend. This model, promoted by the US government, was actually adopted and advertised for this very purpose by the USSR authorities (WALLERSTEIN, 2006, p. 24-26), while it was heavily (and rightfully so) criticized by dependency theorists (VERNENGO, 2006).

As an area of research that could possibly be qualified as a whole field of research, Science and Technology Studies (STS), do have politics as well. Many scholars from multiple disciplines, ranging from history and philosophy of science to political science and economics are nowadays gathered around the study of science and technology. This field is essentiellially interdisciplinary, although important disciplinary boundaries still remain in practice. Its history is written in a very short-term perspective, since the theoretical foundations of the field as such were established back in the 1960s and until the late 1980s, when they reached a first level of maturity with the introduction of the Social Construction of Technology (SCOT) approach (BIJKER, HUGHES; PINCH, 1987).

Tracing roughly the key points in the history of STS (part 1) would allow a better understanding of where the field comes from. Based on those elements, we will outline the inherently political dynamics of STS. Doing so, we will underline two emerging patterns in the curse of STS: the one of "depoliticisation" and the one of increasing "engagement" (part 2). Of course, those two patterns are theoretical constructs that do overlap a great deal in reality, and are even paradoxical in many respects, although they are complementary as well and probably part of a broader overall picture of the STS field. From this departure point, we will address the case

study of a particular set of technologies that have a particular and deeply intertwined history with the STS: nanotechnologies (part 3). In this part, we highlight the features of nanotechnologies and the responsive challenges addressed by these to the STS community. As a conclusion, we will see how the political dynamics of the STS as a field are crucial and relevant for the development of nanotechnologies and how deeply intertwined those concerns are, especially in the perspective of the governance mechanisms which attempt to frame and regulate nanotechnologies.

2. An short political history of STS

a) Implicit politics and deconstruction

The overall history of STS actually started with a strong political commitment, an academic response to the political and environmental contestations of the 1960s and 1970s. By this time, "STS" research, even not labelled as such, was ongoing in many places and different forms, such as history or philosophy of science and/or technology. The first attempts to bridge together those works under the acronym STS – that would then stand for *Science and Technology in Society* – was more characterised as a "movement" (CUTCLIFFE; MITCHAM, 2001, p. 2). Those scholars would mainly advocate social change and thus would explicitly politicize their works. The very fuel of this movement was what Cozzens called "*STS, The Problem*", that is the basic underlying assumption that, broadly speaking, "*science and technology are in society, and that they do not sit comfortably there*" (COZZENS, 2001).

The political commitment of this period could be translated as a reaction against determinism. Sharing the common ground of a problem implies to seek for solutions to solve it. The first mandatory step was therefore to demonstrate the *possibility* of social change. This can be linked together with the broader scope of the global issues that were increasingly rising by this time.

Societies would be spectator of the development of overwhelming forces, a subtle combination of stronger and stronger economics, politics, and political economy. Such same forces would later underpin the neo-liberal movement through the highly symbolic "There Is No Alternative" (TINA) doctrine of Britain's Prime Minister, Margaret Thatcher. One could probably trace back the politics of STS to this willingness to undermine determinisms and other "TINA-like" doctrines.

Science and Technology, as epistemologically conceptualized by some representative figures of the STS movement, would be envisioned as significant parts of the developing and expanding forces that drives societal change. It was a matter of articulating a sound critical perspective on technological developments, as in the tradition of Marcuse, Anders, Mumford or Ellul, but to avoid a certain reification of the essence of technique, as Feenberg convincingly demonstrated (FEENBERG, 1999). In short, early STS work can read as a willingness to reintroduce different "options" or "possible worlds", to elude those "no alternative" pictures that societies could only suffer without any possibility to interfere with, or only partly.

Therefore, departing from this rough politics, one might see the development of a radical epistemological tradition as a logical step or an attempt at refining theoretically and conceptually what probably was more of an intuition. In order to establish the possibility to change the curse of technological development, its contingency must be made explicit, which implies a deconstruction of the foundational myths that lies behind. First STS scholars then had a grasp on critical perspectives in epistemology developed by both Popper and Kuhn (POPPER, 1963; KUHN, 1962), who marked the field with their "intellectual imprint", even if some caution is needed when it comes to the actual endorsement by those authors of, say, epistemological relativism (SEE RIP, 1999).

Their epistemologies proved precisely useful in order to allow for a critical stance towards unquestioned scientific and technological dynamics. They would proceed to the mandatory

deconstruction of such concepts as "knowledge" that would establish their "contingency" (BERGER; LUCKMANN, 1966; SISMONDO, 2004, pp. 51-64) or, later on, of "scientific facts" (LATOUR; WOOLGAR, 1979) and knowledge-driven technological artefacts. This intrinsic contingency is still currently one of the central tenets of nowadays' STS (HACKING, 1999). This move was politically loaded, at least to some extent, with the idea to problematize some central features of modernity as opposed to local, situated or "indigenous" forms of knowledge. In an short answer article[2], Latour makes it clear that, while he was researching in the early 70s in Abidjan, he figured he would rather come to terms with the most central and unquestioned figures of modernity, such as "science", instead of formulating yet another critique of "capitalism", "imperialism" or "colonialism" from a western-centric point of view. Latour explicitly states that his works do address issues of domination, but as a background, in a more subtle and subversive way: "y penser toujours, en parler jamais" [always think about it, never talk of it (LATOUR, 2001).

In this perspective, "scientific facts", for instance, are understood not much as a given than a mere construct, in the sense that they result from patient elaborations, "inscriptions" are shaped through complex practices and interactions (LATOUR; WOOLGAR, 1979). This subversive statement eventually deconstructs the modernist reification of science, as if it was taken-for-granted. The same "deconstructionist" approach helped undermine as well the trajectories of technological determinism.

b) Constructivism and intervention

These grounds paved the way toward "constructivist" theories, which were built upon such epistemological bases described above,

2 This short piece answers some critique formulated against Latour's *Politics of Nature*, by French authors working in the anthropologist perspective of Marcel Mauss (those debates were published in the journal MAUSS – that stands for "Mouvement anti-utilitariste en sciences sociales", or anti-utilitarian movement in social sciences).

from the 1980s onward. The *Social Construction Of Technology* (SCOT) approach was inspired by those epistemologies and the developments in the sociology of knowledge, and laid down the foundations for developing a sociology of technology and technical artefacts (BIJKER, HUGHES; PINCH, 1987). The SCOT approach would shape further attempts to understand the dynamics of technological development, such as the large sociotechnical systems (and how they "gather momentum" – HUGHES, 1987 and 1994).

In the reading that we want to suggest here, those classical developments that lie at the very roots of STS as a research field, provided a powerful rationale for intervention from social sciences into technological developments. The first move was to elaborate a better understanding of the social processes underlying the technological developments. Even further, it has been to re-politicize technological artefacts (CALLON, 1984; LATOUR, 1999). Such approaches allowed for investigating into the "interstices" of sociotechnical developments, the mutual co-production of science, technology and society, which became the very idiom of STS (JASANOFF, 2004) and provided a rationale for, eventually, legitimizing intervention from STS scholars straight into technological developments. If co-production of social and technological orders is generally admitted, then there is room for STS.

Ever since, many debates in STS bring about the question of intervention. Every now and then, the role of STS scholars and STS expertise is questioned and still sustains important debates (i.e. WEBSTER, 2007; NOWOTNY, 2007; WYNNE, 2007). Mostly, those debates are concerned with how STS should engage with the policy world, rather than if they should do so. Webster delineates "intervention spaces" which he claims ought to be invested by STS scholars in current policy frameworks (2007; 462), while Wynne rather calls for establishing the grounds for institutional reflection (2007). They all encompass a sense that a greater variety and plurality of voices shall be heard in policy-making processes, de facto ending the mantra of "speaking truth to power" (COLLINS AND EVANS, 2002: 236; IRWIN, 2008: 583).

In what follows, we do not try to analyse whether or not STS should intervene, neither if it has any legitimacy or actual means to do so. We do not question how they should proceed and through which ways STS could contribute, or not, to achieve goals such as the governance of new and emerging technologies. What we want to do is to carry on a political reading of STS development and point out to an interesting paradox; while STS got institutionalised as a research field and strived towards political relevance, which it partly achieved, it nonetheless appears that it lost part of its initial political load, as we shall demonstrate in the case of nanotechnologies.

3. Emerging patterns depoliticisation and engagement

a) Depoliticisation

First of all, STS – the Movement (Science and Technology in Society) turned into a known and recognised field of academic research, STS (Science and Technology Studies) with its epistemological approaches and inherited methodologies (from different established disciplines that together form and inform STS – the field). To turn STS into a field, scholars had to specialize themselves, develop countless empirical studies and dismiss some of its former political dimensions, by getting closer to academic neutrality (SCLOVE, 2001). Whereas former scholars used to be politically engaged, in militancy or activism, the traditional research tools inherited from classic disciplines such as history, philosophy or sociology, progressively took over this inner political stance. The common standpoint was the recognition of a "Problem", in Cozzen's terms, in the way science and technology were interfering with society. Although the acknowledgment of this problem was a political statement in itself, it needed to be theorised, conceptualized, demonstrated, articulated, and translated by "neutral" research tools. The research activity progressively took

over the explicit political commitment and activities. This turn to more descriptive, usually fine-grained empirical analysis and descriptions would be later on analysed as a quite significant shift in the curse of STS. Bijker, one of the founding fathers of the field concluded that the interests in STS issues were formerly politically motivated and that, nevertheless, on-going researches were leading toward a "the highway of *institutionalized academic work*" (BIJKER, 1995, pp. 279-280 – author's italics).

In this sense, one may argue that STS research depoliticised itself by developing an over-empirical approach, sticking too much to the fieldwork. Latour always rejected, and rightfully so, a critique formulated from above the field and projected onto it (LATOUR, 2005), but always kept in mind the necessity to retrace the web of practices that could put the objects back into politics (LATOUR, 1999). Feenberg puts it in another way: "*Where the old determinism overestimated the independent impact of the artifactual on the social work, the new approach* [namely, the SCOT or constructivist approach] *has so disaggregated the question of technology as to deprive it of philosophical significance. It has become matter for specialized research*" (FEENBERG, 1999, p. 12). So, the contrasted trend is as follows: the more STS research became specialised and institutionalised, the more it engaged with current institutions (with the normative statement underlying public engagement), perhaps at the cost of its political load. This trend would undoubtedly take over the former commitments at the beginning of the field, more politically motivated and essentially oriented toward education (RIP, 1999).

Countless attempts were made in order to positively understand the dynamics of the development of new technologies in society. New ways of understanding the innovation processes would contribute to open actual institutional spaces for doing things differently. Therefore, new attempts to have the overall process of technological development interfering with "social insights" could be carried on and have been successfully so.

b) Engagement

That STS somehow got depoliticized might seem counter-intuitive. On the same period they got institutionalised, one could testify in society at large a widespread and increasing awareness of all the concerns arose by scientific and technological developments lead to a growing pressure towards greater intervention from social scientists. This awareness helped STS to push further a participatory agenda and multiple forms of engagement.

A constructive engagement with on-going sociotechnical developments has been the aim of most of public participation exercises vastly undertook during the 1990s onward. This can be analysed as a shift from the somehow 'passive' deconstruction (simple analysis) to a rather 'active' construction, with the explicit will to bring actual outcomes in the decision-making process with regards to new technologies. According to Bijker, his trend is globally embedded in the path toward what he calls "policy studies" in science & technology, which explicitly aim at informing the decision-making process (BIJKER, 1995). In a recent call for contributions, Arie Rip and Daniel Sarewitz refer to the field of "Science Technology & Policy Studies", instead of "STS", which points out to the central place occupied by policy.

Policymakers and scholars then got involved in numerous "public participation" exercises, involving the laypeople and getting benefit of their "non-expert" expertise. In a society dominated by rational and scientific rationality, it becomes increasingly important, for instance, to confront and debate value-laden "risky" policies, so as to ensure some equity in their distribution (BECK, 1986). In the same fashion, within STS, soon enough it became clear that if science and technology (the main producers of Beck's modern risks) were value-laden, then the values had to be unpacked and publicly debated. Of course, public debates already occurred back in the 1970s, for instance about the development of biotechnologies (LAURENT, 2009). Still, we argue this was more intuitively set up than the more systematic participatory methods established in the 1980s and the 1990s to involve the public (at large) directly in decision-making processes (E.G. JOSS; BELLUCCI, 2002).

Anyway, these participatory approaches, usually reflected by qualitative methodologies and participatory research design – such as focus groups, Delphi methods, science shops or, say, consensus conferences – proved to be somehow limited. Sometimes, the framework of the participation was often the one of the "deficit model" and the social scientist would be solely committed to the public acceptance of the innovation or as sole means to restore trust in science and technologies. According to this model, the public needs to be engaged because of its ignorance and what it does not understand is driven straight from what it doesn't know. If well informed, then it will accept further new technological developments. (WYNNE, 2006). Sometimes, despite a very fruitful and meaningful intervention, further steps would be missing to engage further with the outcomes of such public participation exercises, for instance in a broader dialogue or intertwining with research and development (R&D) processes (MACNAGHTEN; AL., 2005). Fisher demonstrated that in the case of the Human Genome Project, notwithstanding the considerable formal engagement of public authorities with respects to societal dimensions (the *Ethical, Legal and Social Impacts* – ELSI – framework), the many insightful engagement and participatory exercises lead to a very limited political outreach (FISHER, 2005). Engagement tends to get more and more sophisticated through *ad hoc* frameworks designed to address (and possibly capture) dynamics of technological change (e.g. Technology Assessment [TA] approaches and practices: Real-Time TA – Guston & Sarewitz, 2002; Constructive TA – Schot & Rip, 1997). So, STS research is increasingly committed to engage public and new and emerging technologies in-the-making.

In line with what we stated in the introduction, these new approaches do matter. They correspond to a more normative stage, in which it is supposed and – at least implicitly assumed – that a public debate actually needs to be held or that broader societal concerns have to somehow catch up with the scientific and technological developments. In addition, as this has now become clear in recent STS publications, public engagement initiatives may be considered

as a "public good" but these exercises are always locally enacted and need to be analysed according to their political contingencies (MACNAGHTEN; GUIVANT, 2011).

So, on the one hand we see a considerable amount of specialized and very empirical-descriptive trends at play in the development of STS. On the other hand, we showed the extent to which STS scholars rely on these analyses and, all in all, on a rather constructivist epistemology to offer a constructive contribution and engagement around questions of S&T. There is no contradiction to it. Simply, it all happens as if the political / radical stance of early STSers was somehow dissolved into the design of ever-more sophisticated participatory design and public engagement. The question of the "political" thus needs to be re-assessed in light of the increasing institutionalisation of STS and the political mandate which frames and stabilizes the relationship of STS to the technological developments at stake. There is so a risk to fall into a political void, even though TA practices and STS have never been more salient and mainstream in public policies with nanotechnologies.

3. Nanotechnologies: responding tomorrow's uncertainties

a) From "Nanotechnology" to "Nanotechnologies"

Nanotechnologies are an interesting case both for the STS community and for an informed reflection upon STS discipline as such and its political *ethos*. Roughly, almost none human being could get a glimpse of the overall research going on under the label "nanotechnologies". Formerly called "nanotechnology", the term generally evolved toward the plural form, acknowledging the existence of a "plurality of nanotechnologies" (BARBEN; AL., 2008). Furthermore, we argue that this small semantic shift actually reflects way more than just a question of singular or plural. It reflects

upon deeper uncertainties and complexities that arose in the nanotechnologies case.

Roughly, nanotechnologies are related with all the materials, devices and systems located at the nanoscale, that is one billionth of a meter. To detect (1981) and manipulate (1989) atoms at this infinitely tiny scale was made possible by the development of a very precise technological instrument, the STM (scanning tunnelling microscope). The interesting potential of nanotechnologies lies in the radically new properties of the matter at this scale. The promises are numerous: medical breakthroughs (nanosensors that could "smell", seek and destroy cancer cells, enhancing aged cells to have a better diagnosis of, and ultimately prevent, Alzheimer's disease), cheap and clean energy, water-cleaning processes, or a global reduction of pollution by the reduction of raw materials needed for production, etc.[3].

The interest of policymakers in the development of "nanotechnology" came first from Senator Al Gore's *Science for National Interest*, a report released in 1994. Following this, strategic plans were adopted in order to launch nanotechnology programs and no to be distanced by other "technological zones" (BARRY, 2006). The Japan Government has been involved in this crucial issue since 1992 (*Atom Technology Project*), but the first massive public investment initiative originated from the USA, with the *National Nanotechnology Initiative* launched in 2001. This program was granted $ 300 millions, growing every year until it reaches a provision of $ 1,6 billion for 2010[4]. The European Union funds nanoscience and nanotechnology through its "*Nanosciences and nanotechnologies: an Action Plan for Europe 2005-2009*", with a public budget of about € 3 billions[5]. Nanotechnologies take benefit of important investments from public authorities.

3 http://www.nano.gov/you/nanotechnology-benefits (last visited 2012-3-5).

4 http://www.nano.gov/sites/default/files/pub_resource/nni_2010_budget_supplement.pdf (last visited 2012-3-5).

5 See European Commission, "EU Policy for Nanosciences and Nanotechnology", <http://ec.europa.eu/nanotechnology/policies_en.html> (last visited 2012-3-5).

Basically, the history of the nanotechnologies is the history of a deep divide between two sides (for an account "from the within" the community of nanotechnologists about this divide, see e.g. Joachim & Plévert, 2008). The first side includes the partisans of the "bottom up" approach, which consists in the construction of a new molecule from the scratch. They would envision their research as mostly fundamental and believed that this approach (building molecules atom by atom) would provide humanity with a greater understanding of the matter and huge savings in the use of raw materials. One of those advocates of the "bottom up" approach was Erik Drexler, a leading scholar in the field of nanotechnologies, author of *Engines of Creation. The Coming Era of Nanotechnology*. This book was popularised through the popular fear of the "Grey Goo" scenario (self-replicating molecules that would autonomously proceed to their own replication, turning everything into "grey goo" and eventually destroying the whole world). This somehow dystopian view (although very anecdotic in Drexler's overall positive appreciation of nanotechnology) happened to cause the public dismissal not only of Drexler's theories (the Grey Goo) but also of Drexler himself (RIP & VON AMEROM, 2009). This public dismissal was actually undertaken by the actors who became the mainstreaming representatives of the second side, who advocated a more "top-down" approach of nanotechnology. The key idea there was to carry on with further miniaturisation of transistors and already known devices to a point where those artefacts would *de facto* reach the nanoscale. This was closer from industries' capacities and perspectives for a better-ensured return on investment. This view of technology was the one promoted and advertised by the US' *National Nanotechnology Initiative* (2001). So, the (short) history of nanotechnologies is primarily the one of a divide, of a mainstreaming controversy (SHEW, 2008). That does make sense as the outcomes of the R&D processes for nanotechnology are yet far unknown and actually unlikely to be fully knowledgeable.

Since nanotechnologies are totally out of reach for common human senses, they absolutely need to be mediated through the use of a dedicated instrument, the STM – which makes them very inherently rooted with uncertainties and makes it hard for laypeople to have a grasp on what actually are and means "nanotechnologies". This happens especially at an early stage of development – called "upstream" – whereas people have no clue of the emerging patterns and dynamics of the new technology.

b) Nanotechnologies and the public sphere

Typical of the development of nanotechnologies is the existence of various and multiple controversies in the public sphere, or to be more precise, the expectation of such controversies by both policymakers and nanotechnologists. This is clearly related to the case of biotechnologies, whereas strong public controversies happened, especially about GMOs. So, from the very beginning, numerous actors claimed for lessons to be learned, from the biotechnologies development to the nanotechnologies one (DAVID & THOMPSON, 2008). Combined with the popularisation of dystopian imaginaries (as in Michael Crichton's Prey), this eventually lead to a fear of controversy and a political willingness to prevent them by any means, causing a phenomenon that Rip coined as a "nano-phobia-phobia" (RIP, 2006).

In addition, nanotechnologies' evolution into the public sphere is deeply intertwined, up to reaching some stage of confusion, with the political and interventionist intent of STS outlined above. First of all, the development of nanotechnologies coincides chronologically with the recognition of STS as an established research field which is legitimated to intervene in complex issues around new technologies. The capacity to manipulate the atom at the nanoscale was made available by the end of the 1980s, at a time the SCOT approach was just released. From there, the constructivist viewpoint would be widely used and popularised as the main paradigm in STS. On its side, nanotechnologies would become "the next industrial

revolution" (US, *NATIONAL NANOTECHNOLOGY INITIATIVE*, 2001) and fulfilled with promises and expectations. According to Rip's analyses, an almost exactly concomitant "yuck" followed this "wow" hype. It was the consequence of an instantaneous deconstruction of the advertised myth of nanotechnologies by STS scholars. In this respect, different elements – previously mentioned – point out to which extend nanotechnologies were taken very seriously by the forming STS community, from the scratch: let us mention the different elements that shape an early "history of nanotechnologies", let alone the general context of "nanophobia-phobia", which heavily relies on the STS literature and previous technological controversies, as GMOs (RIP, 2006).

Secondly, nanotechnologies were deeply studied through the empirical methodologies driven from the SCOT approach and constructivist epistemologies, and in that respect they accompanied the dynamic of institutionalisation of the academic field of STS from scratch, with programs devoted to societal dimensions of nanotechnologies funded accordingly. For instance, as we shall see later on, the amazing amount of works performed with regards to the latter points to the increasing difficulty to think of, let alone reflect upon, the broad political stakes raised by nanotechnologies' development. Too many uncertainties tied with the nanoscale and the hardly unforeseeable status of tomorrow's nanotechnologies make it yet harder to define a shared political account about them.

Important research projects as regards to societal concerns of nanotechnologies were funded (e.g. the project DEEPEN at Durham University, EU); dedicated research centres were set up (e.g. the Center for Nanotechnology in Society, at Arizona State University and University of South Carolina, US); specific publications were dedicated to the study of societal issues of nanotechnologies (e.g. Nanoethics, Springer, NL); some volumes focused on the sole question of nanotechnologies, either through a series of Yearbook on their own (Yearbook of Nanotechnology in Society, CNS-ASU) or through specific issues (e.g. the 27th Yearbook of Sociology of

Science, entitled *Governing Future Technologies. Nanotechnology and the Rise of an Assessment Regime*); furthermore, these initiatives somehow resulted in the recent creation of a specific scientific society, the S.NET (Society for the study of Nanosciences and Emerging Technologies). All those elements concurred with, and participated in, a dynamic of institutionalisation made of ever-deepening specialisation. For that reason, it became harder to entertain the politics of the object "nanotechnologies" as such, and this situation therefore drove to a depoliticisation of STS research.

Despite that impressive variety of initiatives, one may question the extent to which trajectories in nanotechnologies significantly diverged from what has planned for them. For instance, a recent report from Mihail Roco, the architect of NNI, *et al.*, elaborates on the advancement of the "convergence" of emerging technologies, including nanotechnologies (as initially formulated in ROCO & BAINBRIDGE, 2003), and constantly assesses the trajectory of what nanotechnologies achieved and what remains to be done, with respects to the initial planning. There is few space and, frankly, quite a disconnect between those roadmaps and their implementation agenda, on the one hand, and the narrow perspectives allowed on governance and "responsible innovation", on the other. And yet, the latter is devoted to governance mechanisms and questions on how to achieve responsible governance, and do not really question the definition of "societal needs" proposed in the previous chapters (ROCO and al., 2010). We see this occurring as part of a broader trend towards the increasing categorisation of issues, duly separated one from the other and categorized according to their relevant field of expertise, including STS. In nanotechnologies, this is made salient and explicit through the categorisation that occurs between HES (health, environmental and safety) and ELSA (ethical, legal and social aspect). Rooted in public policies, these dimensions are being segregated one from the other, leading to a questionable "division of labour", where society belongs to social scientists, thus enabling "real scientists" not to deal with those (Thoreau, forthcoming).

4. Conclusion

In this paper, we outlined a brief political history of STS and showed how current STS research was tending to demagnetise its initial radical perspectives on technologies in society. First of all, the constitution of the academic field of research tends to specialize and narrow the scope of empirical research. Second, in the actual state of research, more STS engagement means more embeddedness into public policies in science, technology and innovation. It thus leads to some necessity of constantly reassessing the political adequacy of such engagement. By failing to do so, STS might fall into a "political void", and consequently agree to turn down its subversive capacities for the sake of being "constructive", epistemologically and politically.

Our example with nanotechnologies exemplifies this paradox or, at least, somehow contradictory pattern, and it demonstrates the relevance of the questioning we suggested, in light of current evolutions. We feel that there is an increasing need to come back to the broader picture and politics that surrounds the development of emerging technologies, especially nanotechnologies (see Bensaude-Vincent, 2009). External pressures and policy mandates call for "responsible innovation[6]" and urge social scientists to take an active part in the governance of new technologies. This is currently redefining the work and responsibilities of social scientists (SEE BARBEN & al., 2008; MACNAGHTEN & al. 2005).

We argue that STS research is at a crossroads. It is facing an important empirical turn, which may deprive it from its political significance, and constantly redefine its institutional constraints. This is why it has to continuously question its underlying political assumptions (as it occurs more and more regarding public participation) and to make it explicit. In a nutshell, wherever it tends to get depoliticised in spite of growing engagement, STS research has to re-politicize itself.

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6 See for instance the US *21st Century Nanotechnology Act* of 2003.

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