

This article was downloaded by:[Laurent, Brice]
On: 13 December 2007
Access Details: [subscription number 788166729]
Publisher: Routledge
Informa Ltd Registered in England and Wales Registered Number: 1072954
Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Innovation: The European Journal of Social Science Research

Publication details, including instructions for authors and subscription information:
<http://www.informaworld.com/smpp/title~content=t713424882>

DIVERGING CONVERGENCES

Brice Laurent

Online Publication Date: 01 December 2007

To cite this Article: Laurent, Brice (2007) 'DIVERGING CONVERGENCES',
Innovation: The European Journal of Social Science Research, 20:4, 343 - 357

To link to this article: DOI: 10.1080/13511610701760804

URL: <http://dx.doi.org/10.1080/13511610701760804>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.informaworld.com/terms-and-conditions-of-access.pdf>

This article maybe used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

DIVERGING CONVERGENCES

Competing meanings of nanotechnology and converging technologies in a local context

Brice Laurent

Nanotechnology has become an important topic in public research programs in developed countries, especially with regards to its convergence with other emerging technologies. Based on the case of Grenoble, France, where nanoelectronics and nano-biotechnology research projects have been led since the late 1990s, and have been opposed by activist groups, this paper explores the construction of meanings granted to nanotechnology and, more generally, to the convergence of technologies. I describe two opposed visions of converging technologies, and show that these visions are constructed in the context of pre-existing oppositions in the local context, and larger scientific and political issues. These two visions articulate different meanings of convergence. I then turn to the mechanisms that were designed to engage a dialogue with the public in Grenoble. I show that these engagement mechanisms actually reinforced the oppositions, and that potential intermediaries (including social scientists) failed to act as mediators.

Introduction

Nanotechnology is today considered a major opportunity and key challenge for science policy in several countries. However, what it entails or might imply is still far from obvious and increasingly contested. Clearly, the term 'nanotechnology' is used to refer to a wide array of technological domains and applications with sometimes little connection between them (Schummer, 2004a,b). At the visionary level, nanotechnology is primarily framed in terms of 'the next industrial revolution' that will 'change human history at least as profoundly as the first' (Albus, 2003). Not everyone agrees: Dupuy (2004, 2006) links nanotechnology to the converging technology programme, which, in his view, has a 'metaphysical' agenda. This metaphysical programme is characterized by an 'ambition to re-make nature' and is bound to have a number of unintended consequences. Mid-way, scholars equally interested in technology and ethics call for the integration of ethical, philosophical and social concerns in nanoscience and technology and at all stages of research (see for instance Khushf, 2004). Public perception studies show an evolution of public perception from an enthusiastic excitement about the possible benefits of nanotechnology to a more cautious stance in view of potential risks (Cobb & Macoubrie, 2004; Gross & Lewenstein, 2005).

These various accounts do not adequately consider the construction of meanings by the actors themselves, and, especially, those involved in the support, production or

Innovation, Vol. 20, No. 4, 2007

ISSN 1351-1610 print/ISSN 1469-8412 online/07/040343-15

© 2007 Interdisciplinary Centre for Comparative Research in the Social Sciences and ICCR Foundation

DOI: 10.1080/13511610701760804

critique of nanotechnology. There are, of course, exceptions. For instance, Cobb (2005) analyses how the framing of issues influences public opinion about nanotechnology. Macoubrie (2006) links public concerns and trust in government by analysing 'the reasoning basis underlying concerns [about nanotechnology]'. This latter notion is close to what I focus on in this article. There is, however, a methodological difference. In this paper, my objective is to use an empirical case study as a basis for analysing how competing meanings of nanotechnology can be articulated by local actors, including lay people, officials and scientists. I will consider 'meaning', 'understanding' or 'framing' as the result of the connections that actors draw between the technical contents of scientific projects and local or broader concerns and expectations. My method is thus to 'follow the associations' that actors make (Latour, 2005).

The article builds on the example of Grenoble, a city in the French Alps, where nanotechnology research projects have been conducted on a large scale, but where opposition is growing among activists. This example is relevant since Grenoble is recognized as leading internationally with respect to nanoelectronics and nanobiotechnology. This position is advocated equally by scientists,¹ national and European policy-makers,² as well as local actors.

Even though my research dealt primarily with nanotechnology, its results are likely to be relevant more generally with reference to the emerging discourse on converging technologies. There are several reasons for this. First, some of the nanotechnology projects carried out in Grenoble are linked to biotechnological research, concerning especially medical applications. Second, the local actors use convergence to justify public funding or research orientations, or for commenting on the local situation. Links are often drawn with external discourses on converging technologies, especially those arising in the United States (Roco & Bainsbridge, 2002, 2006).

In what follows, I first give some background information about Grenoble and its development into a lead market for nanoelectronics and nanotechnologies. I then turn to the analysis of two competing understandings or framings of nanotechnologies, namely that of the local administrative and scientific officials, on the one hand, and that of activists, on the other hand. Thereafter, I describe some (unsuccessful) attempts to engage the two positions into a dialogue. I conclude with a synthesis and some suggestions for the study of public understanding of nanotechnologies and converging technologies.

Scientific Research and Activism in Grenoble

Scientific and industrial research in Grenoble has a long tradition, especially in the physical sciences. The *Commissariat à l'Énergie atomique* (CEA) is a major research institution in France, and one of its sites is in Grenoble. The Grenoble-based LETI is a CEA laboratory that comprises more than 1000 researchers. Whereas CEA activities are traditionally related to nuclear research, CEA's research strategy has diversified since the 1990s. In particular, biotechnology and nanotechnology are now priorities of the Grenoble-based CEA research centres. In addition, the Joseph-Fourier University, engineering schools and research centres are important actors in scientific research. Today, the main areas of research in Grenoble are micro- and nano-electronics, nanobiotechnology and robotics, in addition to traditional physical science domains.

Scientific and industrial research in Grenoble has received strong support from local administrations. The Grenoble city council, the Grenoble metropolitan area council

(nicknamed *La Metro*) and the Rhone-Alpes region have been providing funding for scientific projects. Collaborations between public and private institutions for micro- and nanoelectronics R&D were launched in the early 1980s (Robinson *et al.*, 2006). Micro- and nano-electronics R&D reached a higher level of development with the Minatec Research Centre, which aims at 'becoming Europe's top centre for innovation and expertise in micro and nanotechnology' (*Lettre Minatec 1*, 2001). CEA, *La Metro* and other public education and research institutions signed the agreement launching the Minatec Institute in January 2002. The official opening occurred in June 2006, and at the time of writing, Minatec employs about 1000 researchers and 1000 students who work primarily on nano-electronics and nanobiotechnology. Nanoelectronics is also the main area of activity of a collaborative project between private corporations. In February 2003, President Chirac opened Crolle 2 a joint research centre in nanoelectronics that was financially supported by local administrations and was established with funds from STMicroelectronics, Philips and Motorola.

Another core research area is that of nanobiotechnology. The Nanobio project was launched in 2001 by CEA and the Joseph-Fourier University, with the financial support of local authorities. Nanobio, which is part of the European Network Nano2Life, brings together engineers, physicists and biologists and has a broad portfolio of activities, from bio-imaging and bio-detection to surface chemistry. It works 'at the interface of biology and micro and nanotechnology' (Agence d'Etudes et de Promotion de l'Isère, 2003). In addition, the Joseph-Fourier University launched the Biopolis project in 2001 to host newly created companies from universities and research institutions. This incubator also received funding from *La Metro* and opened in the fall of 2002.

Since 2002, activists have opposed the scientific projects of the Grenoble area. Numerous texts have been published online and distributed in print. The activists have organized various kinds of demonstrations: they occupied a crane in 2003 during the construction work for the Minatec research centre, and organized various counter-events in pubs with movie projections and discussions about the dangers of nanobiotechnology. A parody of the local information bulletin was distributed in 2005: this hoax announced the dissolution of *La Métro* and the decision to democratize technologies in Grenoble. It was followed in June 2005 by a fake advertisement for Lybertis, an ID card that would contain all sorts of information about its carrier. In June 2006, a demonstration of about 1000 people was organized on the day of the official opening of Minatec. The organizers claimed it was the 'world's first anti-nanotechnology demonstration'.

In the following two sections, I describe the two distinct visions of nanotechnology and converging technologies, articulated by scientific and administrative officials and activists respectively.

Converging Technologies for Economic Development

Economic Development as the Main Objective of Technical Progress

The views of local administrative and scientific officials towards nanotechnology, nano-biotechnology and nano-electronics are important for appreciating the role scientific research plays and is expected to play in Grenoble. When they explain their support for the Minatec, Nanobio and Biopolis projects, officials stress the economic dimension of these research programmes. Biopolis is designed to host newly created companies from

academic research, Nanobio seeks to 'stimulate company creation and technology transfer',³ and Minatec is part of Minalogic, one of the Pôles de Compétitivité created by the French government in 2004 in order to foster university–industry relationships. The expected economic impact of technological development is clear in the case of an industrial project such as Alliance, which is a joint micro- and nanoelectronics research centre of industrial corporations. The opportunities thus opened for economic development are frequently referred to by national officials,⁴ and even more explicitly by local ones. In the information letter from the Minatec Research Centre, André Vallini, the president of the local council (Conseil General) of the Isère region (department), explains:

This unique pole in Europe will generate thousands of jobs during the next decade, with positive impacts for Isère as a whole. Minatec is thus emblematic of the new and ambitious economic policy of the the Isère local council (*Lettre Minatec no. 2, 2002b*).

Against the background of increasing worries about unemployment, the framing of new technologies as job creators is in line with the left-wing understanding of technical progress as an engine for social progress.⁵ The convergence of technologies is perceived as entailing safe promises for a positive future; as two CEA officials explain, 'the convergence of micro-nanotechnologies and nanosciences will be the reality of the next decade' (*Lettre Minatec 9, 2005*). This deterministic vision of technological development extends to the whole industrial landscape of the Grenoble area: 'Minatec represents an attitude and a frame of mind, the one that will ensure the diffusion, in our whole region, of new technologies in traditional industries' (*Lettre Minatec 8, 2004*).

The Continuity of the 'Grenoble Model'

New technological developments in Grenoble are embedded in existing institutional arrangements. Scientific research has a long tradition of excellence in the physical sciences (Pestre, 1991), and there is a strong collaboration between scientific and industrial actors as well as with the public administration (Caron, 2000). Louis Néel is often used to illustrate the tradition and continuity of the 'Grenoble model'. Louis Néel was a Grenoble-based physicist who received the Nobel Prize in 1970 for his work on the magnetic properties of matter. In his speech marking the inauguration of Minatec, André Vallini, president of the local council of Isère, explained how the new research centre was being launched in the spirit of Louis Néel:

Professor Louis Néel . . . said: 'I wish to develop a multi-disciplinary institution and link it to the whole set of regional industrial activities, as well as to the university and the CNRS'. It is this vision that has inspired the Minatec innovation centre, and that is why Minatec is situated on a square to which we gave the name of the 1970 physics Nobel Prize (Vallini, 2006).

Elsewhere, a CEA official explains how in Grenoble:

The local administrations are strongly involved in the emerging scientific issues. Everyone knows each other here, in the industries, in the labs, in the city council . . . So decisions are made quickly, and engagements are respected. . . . Grenoble is quite unique in this respect.⁶

This specificity of Grenoble is at the core of the so-called 'Grenoble model', which has been used as a reference for national policy for the development of innovation clusters.⁷ In the discourse favoured by local officials, the 'Grenoble model' is both integrated and comprehensive, the result of the past and a marker for the future. It is both a condition for the success of scientific projects and the reason for the continuation of scientific activity in Grenoble. Hence converging technologies are inscribed in a continuous process of scientific and industrial research, and are, at the same time, part of national initiatives (like the Pôles de Compétitivité) and European networks (for instance Nano2Life).

Technical and Organizational Convergence

The economic framing of nanotechnology, biotechnology and IT R&D tends to conflate the technical contents of the various S&T fields with the organizational aspects that render multi-disciplinary connections possible.

The Grenoble area offers today to nanotechnology actors a complete innovation system that associates nano-sciences, basic technological research, industrial R&D and also expertise in software technologies, biotechnologies and energy micro-sources (*Lettre Minatec numéro spécial*, 2002a).

The 'complete innovation system' refers to the technical contents as well as the close organizational relationships that are necessary between basic and applied research as well as between universities and industry. It often follows from this perspective that convergence can be brought about by supporting, in organizational terms, multi-disciplinarity. Jean Therme, director of CEA-Grenoble, underlines the importance of multi-disciplinarity and linking research to commercialization (Quiret, 2004) by talking about the need to '*organize* the NBIC convergence'⁸ (emphasis added).

Connection to External Discourses about Convergence

Although they refer to multi-disciplinarity and the erection of bridges between nanotechnology, biotechnology and IT research, scientific and administrative officials rarely use the expressions 'convergence' or 'converging technologies'. When advocating research projects, the promises of 'converging technologies' are frequently referred to (Quiret, 2004). But in official declarations, there is a tendency to distance oneself from 'converging technologies' as linked to the promise of 'human enhancement' as in the NSF discourse.⁹ The CT research being carried out in Grenoble is instead presented as following the incremental innovation path. Any breakthroughs achieved along the way will represent the result of long years of research. This is also a strategy to counter the criticisms of activist groups. According to public officials, the critique of activists is not relevant for the actual research being carried out in the Grenoble laboratories as it focuses on imagined technologies.

Converging Technologies as a Programme of Control

Activism in Grenoble: Against a 'Programme of Control'

Nanotechnology research in Grenoble has been strongly criticized by the activist group *Piece et main d'oeuvre* (PMO). PMO defines nanotechnologies, especially when linked to biotechnology and IT research, as 'necrotechnologies', that is to say technologies that have to do with 'death' (Greek: necros), thus entailing threats to human life. Indeed, scientific research in Grenoble is described by the activists as part of a global programme of control over nature and human beings (PMO, 2003). Converging technologies are perceived as either useless or threatening since they imply control and automation. Nano-biotechnology is considered a threat to the very nature of human life. This position is fuelled by frequent references to Ellul's and Illich's works, as well as Dupuy's 'metaphysical programme' of converging technologies (Dupuy, 2004, 2006).

PMO is composed of no more than a few activists. They are not the only activist group mobilizing against S&T but they are the most vocal one. Their main contribution has been the writing of texts analysing the Grenoble situation from their perspective. Published on the Internet and distributed during official events, these texts are carefully written and claim to be written following 'rational methods of inquiry'.¹⁰ PMO has no centralized structure and activists from other groups can join temporarily or be loosely affiliated.¹¹ Apart from text writing, PMO has not been directly involved in other forms of mobilization. Demonstrations fall under the remit of those groups mobilizing against nanotechnology under the anti-globalization banner.

All activists rely strongly on the internet to organize their activities. For instance, the Grenoble branch of Indymedia¹² is a privileged locus for gathering and circulating critical information about nanotechnology. The diversity of backgrounds, intellectual references and expectations of the activists that join the contestation makes it difficult to construct a coherent and long-lasting movement. On the other hand, its flexibility allows for temporary coalitions and the fast organization of events. The best example is the demonstration that was organized in June 2006 when Minatec was officially inaugurated. This was organized by a temporary group called 'Grenoble's Opposition to Necrotechnologies' (OGN), which managed to bring together for the final demonstration people from various movements, including the anti-nuclear movement 'Sortir du nucléaire', as well as anti-GMOs groups.

Another Vision of the 'Grenoble Model'

The activists' vision situates contemporary scientific development in the local context of existing social and technical relationships. However, the activists' articulation of the 'Grenoble model' is quite different from that of public officials. For them, the Grenoble model is not only (or even primarily) a success story in terms of technological and economic development, but rather an illustration of the increasing domination of market interests without public legitimation in view of the weakening of democratic processes of decision-making.

Hence, when discussing the close relationships between industry and basic research, activists point to how this is mainly the result of the significant engagement of private capital in military research. A symbolic figure like Louis Néel is thus deconstructed as a representative of unacceptable contacts between basic research and military and

economic interests (PMO, 2004). For the activists, nanotechnology research is a manifestation of another type of convergence, that of political, scientific, military and economic interests, which leads to decisions based on military or market interests, and, therefore, opposed to the general interest.

Decisions in Grenoble, the activists claim, are made by a small group of people without prior consideration of citizens' interests. Officials and scientists constitute what the activists call the *techno-gratin*, i.e. a small elite group that have close ties to one another. The case of the mayor of Grenoble, a former engineer in CEA and founder of a spin-off research centre, is often used to illustrate this situation. This criticism is reinforced by the connection to local events apparently not directly connected to technology itself. For instance, the activists' definition of the 'Grenoble model' includes references to past corruption scandals that involved high-rank local officials.¹³ Another example is the arrest of demonstrators by the police during the demonstration against Minatec in June 2006: this was interpreted as an attempt to enforce decisions about technology. As such, it was seen as another example of the programme of control inseparable from scientific research.

'Converging Fights': from Anti-nuclear and Anti-GMO Activisms

One of the activists' favourite mottos calls for 'converging fights against converging technologies'. It is interesting to describe the genealogy of these converging fights, and how they provide arguments for the current anti-nanotechnology activism. The Grenoble activists come mainly from the anti-nuclear and anti-GMO lobbies. Anti-nuclear groups have been active since the late 1970s and many PMO members and affiliates have participated in anti-nuclear demonstrations in Grenoble and elsewhere. Prior to turning against nanotechnology, PMO members were active against GMOs. The critique of nanotechnology relies in style and argumentation on both of these previous movements. The anti-nuclear movement was directed against a technocratic state; in similar vein, PMO activists are worried that contemporary decisions about nanotechnology are made without citizen input, just like when French nuclear policy was decided (Touraine *et al.*, 1980). The protest against GMO in France was closely linked to anti-globalization movements through farmers' associations and leading figures such as José Bové (Heller, 2002). Anti-globalization arguments used against GMO research and industry are also used in the case of nanotechnology. Through the anti-globalization discourse, the critique of technocracy has evolved, and no longer reflects only that articulated by anti-nuclear movements. The state is no longer the only enemy; multi-nationals and, more generally, market interests are equally dangerous.

Links to External Discourses about Convergence

Unlike local officials, PMO activists are keen to draw attention to the 'human enhancement' vision of converging technologies as advanced in the United States. This was used in the very first PMO texts to illustrate what scientific research in Grenoble could be leading to. More recently, the announcement of a new research centre in neurosciences that would use nanotechnology for brain stimulation¹⁴ was interpreted as the last step in the realization of convergence understood as a means of control over human beings (PMO, 2007).

A Dialogue between Different Understandings of Convergence?

Two Discourses of Nanotechnology and Converging Technologies

Table 1 compares the two framings of nanotechnology analysed in the previous sections. Various forms of convergence are combined in these discourses. The official discourse draws a link between converging technologies and converging institutions, while activists react to converging technologies through converging fights.

'Public Dialogue' as Another Locus for Misunderstandings

The opposition to scientific projects was not ignored by local officials. Without directly acknowledging the opposition to nanotechnology, the local councils commissioned various events for the purpose of raising awareness and public debate. These events have been variably described as 'dialogues', 'debates' or 'forums'. The most recent of these was organized in the period between September and December 2006.¹⁵ These attempts represent yet more sites in which the opposition between different perceptions of converging technologies manifests itself.

In seeking to engage in a dialogue with the public, local officials framed the possible social issues of scientific research in Grenoble in terms of risks and impacts of particular products, on the one hand, and ethical concerns, on the other.¹⁶ Ethical concerns are never clearly defined and often described with reference to the potential 'implications' of new technologies that need to be studied by the ethics committees of the various projects. Ethical concerns are therefore other types of risks that have to be dealt with by expert knowledge, and as such, not the object of citizen inquiry. Among others, Wynne (2003) shows how framing a technical situation in terms of risks is a way to limit the questioning of the issue at stake. In Grenoble, the understanding of the social issues of nanotechnology as expert knowledge has been a way to affirm the uniqueness of technical rationality (whether scientific, economic or ethical), in order to deal with the possible implications of the technology. In this understanding, the role of 'dialogue' is

TABLE 1
Two understandings of emerging technologies in Grenoble

	Officials' vision	Activists' vision
Objectives of technological development	Economic development	Programme of control through state and market interests
Local context	The Grenoble model as a model of efficient cooperation between local actors for the sake of technical and economic progress	The Grenoble model as representing a reprehensible collusion between science, politics and the market, and an illustration of non-democratic decision-making processes
Forms of convergence	Technological areas and public and private institutions that cooperate on interdisciplinary projects	Technological areas and 'converging fights': various forms of anti-technology critiques and corresponding social movements
Links to external discourses	No link between Grenoble and futuristic discourses of convergence	A direct link between Grenoble and American discourses of human enhancement

central, albeit primarily for ensuring that the citizen understands that the potential issues are dealt with in an appropriate manner by the relevant experts.

The activists have refused to adopt this understanding. They point out that it is not possible to consider the 'impacts' of technological research without questioning the whole enterprise. As expressed by Thomasson (2006), 'if nanotechnology has been criticized in Grenoble for four years, it is not because of its "possible abuse" or its "unwanted and unforeseen side effects", but because of the world view it represents'. Activists advocate the critical examination of how decisions are made in the local context and refuse to accept the classification of ethics as a form of expert knowledge. This is what PMO articulates through the notion of critical inquiry. The acknowledgment of the rationality of expert work, which is what the officials expect from public dialogues, is contradictory to the role of the citizen as critical investigator. Moreover, the framing of the issues at stake in terms of risks presupposes a citizen that needs to be convinced that potential dangers are taken into account. Activists have often been accused of being 'irrational' and 'obscurantist' and for drawing attention to risks that, in fact, do not exist.¹⁷ Yet as one of them wrote, the activists 'are not afraid, [they] are angry' (Thomasson, 2006). Their positions are tightly linked to criticisms against institutions, decision-making processes and public actions. As Marris *et al.* (2001) have shown in the case of biotechnology, the concerns are less framed in terms of risks than in terms of the capacity of official institutions to deal with emerging technologies.

The two competing framings of converging technologies are linked to different understandings of the role of the citizen. For the local council, the citizen is aware of the risks but also trusts that the experts will deal with these appropriately; for the activists, the citizen is always critical and ready to scrutinize official decisions. Consequently, the relevant scale for citizen action is not defined in the same way by the various social groups. Local officials think that citizen input or participation might be necessary with regard to regulation; however this is clearly the remit of the national level of government. In contrast, activists consider the local level as the best one for mobilizing against state decisions. This is primarily because the form of social critique they advocate focuses on local decision-making processes.

Is Mediation Possible?

The two competing visions of converging technologies described above are extreme positions. Other actors have middle-range positions and might be considered to be potentially playing the role of mediator. Although there is no vocal contestation formulated by scientists, as used to be the case in anti-nuclear movements (Topçu, 2006), the understanding of scientific research as an engine for local economic development is not fully accepted by all scientists.¹⁸ However, no formalized position other than the official framing of scientific research in Grenoble has been articulated among scientists.

The vision of the activists is not completely isolated in the political spectrum of the Grenoble scene. Far-left or ecologist political parties are often recognized as interlocutors. They criticize the use of public funding for projects involving private corporations, the lack of transparency in decision-making and the uncertainties about risks. But the most radical activists accuse these groups of adopting a far too narrow position, focusing only on the financial aspects of research, or of joining ranks only for the purpose of winning elections.

Social scientists involved in the public debates were also not able to act as mediators, even though they were brought into the process for precisely this purpose. The majority of the social scientists that took part in the debates came from Science and Technology Studies (STS) or were working for non-governmental organizations commissioned to organize the debates. Vivagora, an association engaged in raising awareness about contested science and technology issues, organized a series of public debates in the fall of 2006, seeking to 'identify the stakes and make recommendations'. The series ended with the publication of recommendations about the necessary regulations and the level of public participation that was considered relevant. However, local officials did not take Vivagora's positions seriously, at least not so far.¹⁹ The decision to establish a new institute to carry out research in nanosciences was not preceded by any public debate or raising awareness campaign, unlike what was recommended by Vivagora.

Activists' positions are in many respects close to those of STS scholars. Consider for example the following quote:

It would be disastrous to get rid of the question of our relationships to technology by saying once again that "techniques are neutral, the issue is to use them in a good way". . . . Every technology implies a set of norms and representations, a particular way to understand the world.²⁰

This can be read as a reformulation of the classical 'artefacts have politics' stance advanced by Winner (1986). Moreover, the critical inquiry methodology that PMO advocates is similar to the constructionist approach endorsed by many STS scholars.

Nevertheless, an important difference lies in the different understanding of neutrality. Activists understand neutrality as keeping away from any form of involvement with state representatives. This also implies not accepting funding from public authorities. Therefore, activists are critical of social scientists' involvement in 'projects' paid by the local council, and refused the most recent invitation to participate at a public debate. According to PMO, these debates represent nothing more than poor 'communication' or 'public relation' devices, the sole objective of which is to prevent citizens from engaging in real social critique from an independent perspective (PMO, 2006). Social scientists are thus 'mercenaries' who participate in the positive construction of converging technologies.

The attempts so far made to involve citizens in the debate on S&T and, specifically, nanotechnology have failed. These attempts were not successful in conciliating opposed views about converging technologies and their implications. On the contrary, they could be said to have contributed to polarization.

Conclusion

This paper has illustrated how nanotechnology, and, more generally, converging technologies can be variably perceived in a local context. These different perceptions are, furthermore, so wide apart that dialogue is often impossible or at best problematic.

Officials' positive view of technology builds on the latter's role for innovation and, based on this, economic development. The success and growth of Grenoble builds very significantly on this model. Local politicians consider nano-electronics and

nanobiotechnology as opportunities for the region to become a world-class leader in emerging technologies. Activists propose a competing analysis of the Grenoble model, in which the corruption of science by economic interests and the resulting decline of democratic legitimacy are denounced. The criticisms against converging technologies are linked to the critique of local institutional arrangements.

According to Huet (2006), the debate on CT, like previous debates on S&T, is often reduced to an apposition between 'pro' and 'anti'. For example one can read in a newspaper article: 'The same decoy – a shadowy vision of a "convergence of micro-electronics, biotechnologies and cognitive sciences" ending up producing omniscient and omnipotent nano-objects – is the basis of "pro" and "anti" discourses' (Huet, 2006). However, the Grenoble case suggests that this is a far too simplistic argumentation. First, the labels 'pro' and 'anti' assume that there is a technical issue to be debated. Yet it remains unclear to all involved what is covered by converging technologies or, even, nanotechnologies. Second, the issues at stake are constructed in connection with existing social and institutional relationships. Therefore, the references to the future of technologies cannot be rejected but must be analysed as part of the problematic relationships between different groups. It is part of the scientific strategy to promise a lot from future research, while embedding proposals in traditions or existing models. Yet both the promise of major advances and the links drawn to the past are not necessarily uncontested. The activists use past crises to question the future management of new technologies, while expressing concerns about the futuristic visions that were already the basis of the promises made by scientists.

Focusing on a single case study raises the question of the relevance of this particular example for the global understanding of issues linked to converging technologies. In many aspects, Grenoble is particular. Its value as a 'model' for science–industry relationships makes it specific, but at the same time representative of how the notion of convergence is embedded in a local context and understood differently among actors. The Grenoble case provides a local example that shows what meanings are given to converging technologies in the context of existing social institutions. Although common ideas of inter-disciplinarity and organizational synthesis define what the convergence of technologies is, the meanings constructed by the actors when they fund, advocate for, participate in, or criticize research programmes points to a variety of expectations and understandings of the local institutional setting.

Finally, the study has shown how we as social scientists or STS scholars ought to reconsider our analytical frameworks. First, on the analytical level, studies of public perception need to go further than looking at mere perception and concentrate instead on meanings and how these are construed and reproduced. Equally, it is no less important to problematize the official understanding of converging technologies as compared with that of activists. Second, on the practical level, the public dialogues organized in Grenoble prove that public debates are not always an efficient way for managing, let alone reducing, protest. If such debates are perceived as entailing a hidden agenda, they might even have quite the opposite result, namely, increasing protest or contributing to polarization between opposing views. Mediation might be necessary but it is neither straightforward nor politically neutral.

NOTES

1. For instance, Grenoble is used as an example in Thomas and Acuna-Narvaez (2006).
2. See for instance the references to scientific research in Grenoble in the nanoelectronics and nanoscience for medicine reports of the Parliamentary Office for the Evaluation of Scientific and Technical Choices (Office Parlementaire d'Evaluation des Choix Scientifiques et Techniques, 2003, 2005).
3. These words are those of Geneviève Fioraso, a municipal councilor, who talked about Nanobio in a session of the municipal council on 27 November 2006 (Conseil municipal de Grenoble, 2006, 'Pôle d'innovation nanobiotechnologies "Nanobio" – Convention de fonctionnement du pôle', Grenoble, 27 November 2006).
4. See for instance President Chirac's speech for the inauguration of an industrial research unit within the Crolle 2 project on 27 February 2003.
5. The majority of elected officials of the local decision-making bodies belong to the Socialist Party.
6. Interview with A. LeRoy, Grenoble, 15 January 2007, our translation.
7. See for instance the reference to the example of Grenoble in a report to the Prime Minister about competitiveness by MP Christian Blanc (2004).
8. See also Jean Therme's strategy as described by Mangematin *et al.* (2005).
9. For instance, during his speech for the inauguration of Minatec, André Vallini made a brief reference to the possibility that 'the nanotechnology–biotechnology convergence render[s] even possible the improvement of human performance' but explained that 'we are not there yet'.
10. *Ibid.*
11. PMO is very reluctant to give information about the identity of its members. All the remarks about PMO come from interviews with PMO members (15 and 17 January 2007), as well as a radio broadcast (Chao, 2006).
12. Indymedia Grenoble is part of a global network (Independent Media Center, Indymedia) created after the demonstrations in Seattle in 1999 and devoted to independent information on an anti-globalization agenda (Morris, 2004).
13. Alain Carignon, mayor of Grenoble from 1983 to 1995 was involved in a corruption scandal and sentenced to jail for 5 years.
14. Among other institutions, CEA and the local university will participate in a new institute for nanosciences, which will receive financial support from local administrations. The institute opened in September 2007 (see its webpage: neurosciences.ujf-grenoble.fr).
15. See Laurent (2007) for a more complete account on these attempts.
16. See Wynne (2001) for an analysis of the separation between risks and ethical concerns.
17. The mayor of Grenoble published an article on his blog in 2006 in which he used these words (Destot, 2006). The title of this text alone ('Grenoble, symbol of public debate and of trust in scientific progress') is indicative of the different understandings of the Grenoble model.
18. In particular, the *Sauvons la recherche* movement of researchers has criticized national S&T policy for its emphasis on innovation rather than knowledge and research. However, this criticism has not been articulated against local officials in Grenoble. At another level, a concern about potential hazards due to the production of nanoparticles was expressed by CEA technicians during the public debates, but this too did not give rise to an alternative vision or framing of nanotechnologies.

19. The role these recommendations should play is even an object of interrogation within the NGO that organized these debates.
20. This quote comes from the hoax the activists distributed in Grenoble in 2004. These words were supposed to have been said by the president of *La Metro*.

REFERENCES

- AGENCE D'ETUDES ET DE PROMOTION DE L'ISÈRE (AEPI) (2003), *Les Biotechnologies. Une convergence de disciplines pour les sciences de la vie*, Grenoble, AEPI.
- ALBUS, J. (2002), 'Engineering of mind to enhance human productivity', in Roco, M. & Bainbridge, W. (eds), *Converging Technologies for Improving Human Performance*, NSF/DOC sponsored report, Arlington, VA, pp. 283–294.
- BLANC, C. (2004), *Pour un écosystème de la croissance*, Rapport au Premier Ministre, Paris, Assemblée Nationale.
- CARON, F. (2000), 'Le dialogue entre la science et l'industrie à Grenoble. La science et l'industrie, un mariage de raison', *Revue pour l'histoire du CNRS*, 2.
- CHAO, A. (2006), 'Nanotechnologies: refus de modernité ou d'inhumanité', Radio broadcast, France Inter, 2 June 2006.
- COBB, M. (2005), 'Framing effects on public opinion about nanotechnology', *Science Communication*, Vol. 17, No. 2, pp. 221–239.
- COBB, M. & MACOUBRIE, J. (2004), 'Public perceptions about nanotechnology: risks, benefits and trust', *Journal of Nanoparticle Research*, Vol. 6, No. 4, pp. 395–405.
- DESTOT, M. (2006) 'Grenoble, symbole du débat public et de la confiance dans le progrès scientifique', Available at http://micheldestot.blogspot.com/le_blog_de_michel_destot/innovation/index.html.
- DUPUY, J.-P. (2004), 'Quand les technologies convergeront', *Futuribles*, 300.
- DUPUY, J.-P. (2006), 'Do we shape technologies or do they shape us?', paper presented at the Stanford Center for Biomedical Ethics, 10 May 2006.
- GROSS, J. B. & LEWENSTEIN, B. (2005), 'The salience of small: nanotechnology coverage in the American press: 1986–2004', paper presented at the 2005 conference of the International Communication Association.
- HELLER, C. (2002), 'From scientific risk to paysan savoir-faire: peasant expertise in the French and global debate over GM crops', *Science as Culture*, Vol. 11, No. 1, pp. 5–36.
- HUET, S. (2006), 'En route pour la nanosphère', *Libération*, 10 June 2006.
- KHUSHF, G. (2004), 'The Ethics of Nanotechnology. Vision and Values for a new Generation of Science and Engineering' in National Academy of Engineering (ed.), *Emerging Technologies and Ethical Issues in Engineering*. Papers from a Workshop, October 14–15, 2003. The National Academy Press.
- LATOUR, B. (2005), *Reassembling the Social. An Introduction to Actor–Network Theory*, Oxford, Oxford University Press.
- LAURENT, B. (2007), 'Engaging the public in nanotechnology? Competing visions of public engagement', paper presented at the Mephistos conference, Los Angeles, 7–9 April 2007.
- LETTRE MINATEC NO. 1 (2001) AEPI, available at <http://www.minatec.com/cgi-bin/charge.pl>
- LETTRE MINATEC, NUMÉRO SPÉCIAL (2002a) special issue, AEPI, available at <http://www.minatec.com/cgi-bin/charge.pl>
- LETTRE MINATEC NO. 2 (2002b), AEPI, available at <http://www.minatec.com/cgi-bin/charge.pl>
- LETTRE MINATEC NO. 8 (2004), AEPI, available at <http://www.minatec.com/cgi-bin/charge.pl>

- LETTRE MINATEC NO. 9 (2005), AEPI, available at <http://www.minatec.com/cgi-bin/charge.pl>
- MACOUBRIE, J. (2006), 'Nanotechnology, public concerns, reasoning and trust in government', *Public Understanding of Science*, Vol. 15, pp. 221–224.
- MANGEMATIN, V., RIP, A., DELEMARLE, A. & ROBINSON, D. (2005), 'The role of regional institutional entrepreneurs in the emergence of clusters in nanotechnology', Université Pierre Mendès-France, GAEL, Working Paper.
- MARRIS, C, WYNNE, B., SIMMONS, P. & WELDON, S. (2001), *Final Report of the Public Attitudes to Biotechnology in Europe Research Project*. FAIR CT98-3844 (DG12-SSMI), Lancaster, Centre for the Study of Environmental Change, Lancaster University.
- MORRIS, D. (2004), Globalization and media democracy: the case of Indymedia, in Schuler, D. & Day, P. (eds), *Shaping the Network Society*, Cambridge, MA, MIT Press, pp. 325–352.
- OFFICE PARLEMENTAIRE D'ÉVALUATION DES CHOIX SCIENTIFIQUES ET TECHNIQUES (2003), *Microélectronique et Nanotechnologies : une chance à saisir*, Paris, OPECST.
- OFFICE PARLEMENTAIRE D'ÉVALUATION DES CHOIX SCIENTIFIQUES ET TECHNIQUES (2005), *Nanosciences et Progrès Médical*, Paris, OPECST.
- PESTRE, D. (1991), *Louis Néel, le magnétisme et Grenoble*, Paris, Editions du CNRS.
- PMO (2003), 'Nanotechnologies, maxiservitudes', available at <http://rezal404.org/pmo/spip.php?article71>
- PMO (2004), 'Louis Néel à Grenoble. La liaison militaro-scientifique', available at <http://rezal404.org/pmo/spip.php?article70>
- PMO (2006), 'Et maintenant le tsunami de la communication', available at pmo.erreur404.org/tsunami_de_la_communication.pdf
- PMO (2007), 'Grenoble, institut des nanosciences, ou comment nous manger le cerveau', available at rezal404.org/pmo/IMG/pdf/Neurotechnologies.pdf
- QUIRET, M. (2004), 'Nanotechnologies, les Européens accélèrent', *Les Echos*, 9 September, p. 11.
- ROBINSON, D., RIP, A. & MANGEMATIN, V. (2006), 'Technological agglomeration and the emergence of clusters and networks in nanotechnology', Université Pierre Mendès-France, GAEL, working paper.
- ROCO, M. & BAINBRIDGE, W. (eds) (2002), *Converging Technologies for Improving Human Performance*, NSF/DOC sponsored report, Arlington, VA.
- ROCO, M. & W. BAINBRIDGE (2006), *Managing Nano-bio-info-cogno Innovations: Converging Technologies in Society*, Springer, Dordrecht.
- SCHUMMER, J. (2004a) 'Societal and ethical implications of nanotechnology: meanings, interest groups and social dynamics', *Techne*, Vol. 8, No. 2.
- SCHUMMER, J. (2004b), 'Multidisciplinarity, interdisciplinarity, and patterns of research collaboration in nanoscience and nanotechnology', *Scientometrics*, Vol. 59, pp. 425–465.
- THOMAS, T & ACUNA-NARVAEZ, R. (2006), 'The convergence of biotechnology and nanotechnology: why here? Why now?', *Journal of Commercial Biotechnology*, Vol. 12, No. 1, pp. 105–110.
- THOMASSON, S. (2006), 'Nous n'avons pas peur, nous sommes en colère', available at <http://pmo.erreur404.org/spip.php?article80>.
- TOPÇU, S. (2006), 'Nucléaire: de l'engagement 'savant' aux contre-expertises associatives', *Natures Sciences Sociétés*, Vol. 14, pp. 249–256.
- TOURAINÉ, A., HEGEDUS, Z. , DUBET, F. & WIEWORKA, M. (1980), *La prophétie anti-nucléaire*, Paris, Le Seuil.
- VALLINI, A., 2006, 'Discours pour l'inauguration de Minatec', Grenoble, 2 June 2006.

- WINNER, L. (1986), 'Do artifacts have politics?', in Winner, L. (ed.), *The Whale and the Reactor*, Chicago, IL, The University of Chicago Press, pp. 19–39.
- WYNNE, B. (2001), 'Creating public alienation: expert cultures of risk and ethics on GMOs', *Science as Culture*, Vol. 10, No. 4, pp. 446–4481.
- WYNNE, B. (2003), 'Risks as globalizing "democratic" discourse? Framing subjects and citizens', in Leach, M., Scoones, I. & Wynne, B. (eds), *Science and Citizens, Globalization and the Challenge of Engagement*, London, Zed Books.