# Breaking the Consensus: A Perspective on Technological Governance from Brazil

Julia S. GUIVANT[a] and Philip MACNAGHTEN[b]
[a]*Department of Sociology and Political Science*
*Federal University of Santa Catarina (juliaguivant@gmail.com)*
[b]*Department of Geography*
*Durham University (p.m.macnaghten@durham.ac.uk)*

**Abstract:** A consensus exists in the science and technology studies literature concerning the importance and need for public participation in the governance of emerging and controversial technologies. Our argument is that public participation needs to be situated more sociologically by taking into account critical questions of national political epistemologies, and by understanding new relations between the global and the local in innovation trajectories. We aim to contribute to a growing literature on critical public engagement studies through bringing two empirical examples from the Brazilian context into focus: on genetically modified organisms and nanotechnology.

**Keywords:** Political culture, public participation, governance, studies of science and technology, globalization

## Introduction

There is a growing literature in science and technology studies (STS) emphasizing the importance of public participation in the governance of emerging and controversial technologies. It would appear that an academic consensus has been crystallized on the political value of public deliberation as a necessary element in the new scientific governance, assisting in the articulation of public concerns (at an upstream stage) and in the future direction of socially robust innovation trajectories. This broad understanding appears to be shared both by mainstream sociological analysts, such as Ulrich Beck and Anthony Giddens, as well as by more specialist science studies scholars (for classic texts, see Callon et al. 2001, Jasanoff 2005a, 2005b, Wynne 1996).

From the perspective of social scientists studying the governance of controversial technologies from the perspective of Brazil, it can be tempting to develop a linear imaginary: that in the consideration of technological innovations such as genetically modified organisms (GMOs) and nanotechnology, the national context was simply "less developed" in relation to public consultation and engagement than their European and US counterparts. Of course, this criticism of the evolutionary approach raises its own challenges. How is one to understand the specificities of a national context without falling in a nationalistic methodology? To avoid this problem the approach adopted in this chapter is to analyse the national situation in relation to other national contexts, following the idea of a cosmopolitan social science. In spite of its political importance, public participation cannot be assumed as a panacea for top-down scientific politics or

as a universal strategy. We aim to contribute to a growing literature that is adopting a more explicitly sceptical analytic approach to public engagement by stressing the limits of the mainstream public engagement narrative from the Brazilian context.

We analyse three elements of the mainstream public engagement narrative: i) how it idealizes relations between lay and expert knowledge; ii) how it idealizes participatory strategies for governance (without questioning the limits of participation, the possibility of uninterested public to participate, the difficulties in translating consultation into policies, and the potential use of participation as an instrument to legitimate the approval of political decision); and iii) how it idealizes the reflexivity of public institutions (which is assumed as a global and universal process).

In the first section, we focus on public participation from the perspective of social science theory. In the second section, the focus is from the perspective of science and technology studies. In the third section we consider some important criticisms of participative governance from within this literature. Finally, we develop the argument that the "participatory turn" is not a global phenomenon; neither is it an inevitable effect that follows scientific controversies. And, as it will be shown in the case of Brazil, the way in which the GM controversy was handled has, if anything, reinforced traditional and technocratic forms of scientific governance.

## 1. Trust and the democratization of science

Giddens and Beck have contributed to a thesis on reflexive modernity characterized, in part, by a growing disbelief in some experts systems, arising mainly when technological innovations generate controversies on account of uncertainties in relation to their future risks (for seminal texts see Beck 1992, 1999, 2008, Beck et al. 1994, Giddens 1990, 1994, 1999). The concept of "risk society" refers not only to the fact that modern life brings new forms of danger facing humanity, but especially to new systems of relations between lay and expert knowledge in a context in which the estimation of risk is largely imponderable. In high modernity, science is no longer the undisputed motor of progress and social betterment; scientific knowledge has become disenchanted, not least due to the fact that it has aided the manufacture of risk and social ills. Such a dynamic has, in addition, permeated everyday life decisions, such that individuals have to re-appropriate expert knowledge under conditions of indeterminacy, reinterpreting and transforming knowledge in spaces of increasing intimacy (such as how to choose what to eat, how to bring up children, how to construct life narratives, and so on). That is, all aspects of life have become permanently negotiated, dependent on new information, reviews of previous knowledge and arguments in conflict. In high modernity, tradition has not been replaced by scientific certainty, but by radical doubt.

For both Giddens and Beck, it is impossible to resolve the challenge of manufactured risks by science and technological innovation alone, given their ambivalent role in the construction of those same said risks. Both authors appeal to a reflexive mode of political decision-making, premised on a radical redefinition of social relations between expert scientific knowledge and lay expertise. Beck (1999), in particular, has developed a political theory of social action through the concept of subpolitics, which he has developed in particular through an analysis of the controversy over GMOs. In this case, Beck located the beginning of the "normal chaos of risk conflict," in which clashes and contradictions between experts and counter-experts manifest themselves and end up propagating a mistrust in expert-systems among consumers (Beck 1999, p. 107). But

how is subpolitics to be implemented? How should manufactured risks be governed within the political process? The model that appears to be advocated by Beck is a deliberative one, in which inclusive forums are set up for negotiation between government authorities, corporations, unions, political representatives, public and other entities or individuals. These forums would not necessarily seek consensus, but would be better equipped to take precautionary and preventive measures, integrate doubts, show who are the winners and losers, constitute the issue as a public issue, and thus finally, improve the pre-conditions for political action.

In the face of these arguments, some aspects need to be examined in some detail (Guivant 2001):

- What is meant by the "demonopolization of science"? For Beck (1999), it is a process characterized by the reflexive opening from within of its guiding assumptions, which are then subjected to public scrutiny and accountability, coupled with the politicization of scientific decision-making spaces through the inclusion of a wider set of actors.
- How is "the public" to be conceptualised? For Beck (1999), the public is synonymous with "sovereign people," involving both lay people and dissident-experts.
- What is meant by "democratization"? According to Beck, it is associated with "the production of accountability, the redistribution of burdens of proof, division of powers between the producers and the evaluators of hazards, public disputes on technological forms for science and business, science and the public sphere, science and politics, technology and law, and so forth" (Beck 1999, p. 70).
- How can "democratization" be realized? Back to Beck: "The public sphere in cooperation with a kind of 'public science' would act as a secondary body charged with the 'discursive checking' of scientific laboratory results in the crossfire of opinions. Their particular responsibility would comprise all issues that concern the broad outlines and dangers of scientific civilization and are chronically excluded in standard science. The public would have the role of an 'open upper chamber.' It would be charged to apply the standard 'How do we wish to live?' to scientific plans, results and hazards." (Beck 1999, p.70).

The answers highlighted above are a reflection of the approach that repeats itself in Beck's publications. The demonopolization of experts however does not necessarily imply a democratization of decision-making processes, because neither lay people nor experts tend to oppose each other as homogeneous blocks (Guivant 2002). The question "How do we wish to live?" may also command various responses that are dependent, inter alia, on how social actors are constituted in heterogeneous and varied networks. Responses to a pre-determined issue, therefore, may be partial, ephemeral, context-specific, and with local, regional, or national specificities. These contingent and heterogeneous forms of alliances may be found both among those in favor and those against a given technology and its potential risks.

This point adds complexity to how one may visualize the alternatives proposed by Beck. The complexity of conflicts and tensions identified in risk society seems to vanish in thin air when we ask what there is beyond it. The proposed solutions remain highly generalized, and therefore may seem closer to utopia than to a viable reinvention of politics. This is, in part, admitted by Beck when he analyzes the alternatives to the

dominant technological model, and notes that his proposal may seem contrary to current realities and closer to what Giddens (1998) calls a "realistic utopia."

## 2. The problematic consensus in science and technological studies

The heightened mistrust of science and scientists that is presented by Beck and Giddens as characteristic of reflexive modernity is a critical part of the milieu for the growth of public engagement research, reflected broadly in the literature of science and technology studies. Public engagement emerged as a political response to a number of high-profile scientific controversies that took place in the UK and Europe throughout the 1990s, ranging from food scares, dioxin contamination, BSE and GMOs. Following the failure of technocratic forms of expertise, and the concomitant growth of public distrust in science following the highly visible failures of major technologies, a more deliberative model emerged in which the public (and other social actors) had a more formative role in technological governance and assessment. A prototypical articulation of the role of public engagement is provided by Bucchi and Neresini (2008, p. 449): "public participation may be broadly defined as the diversified set of situations and activities, more or less spontaneous, organized and structured, whereby nonexperts become involved, and provide their own input to, agenda setting, decision-making, policy forming, and knowledge production processes regarding science."

Behind the appeal to public engagement lies the assumption of the value of embracing lay tacit knowledge and intuition. For example, in the work of Wynne (1996) and some previous work by Irwin (1995), a sophisticated and rich criticism of scientific knowledge is provided where it does not appear to correspond to forms of knowledge, perception, and practices of lay people, or in broader terms, the public (including experts in dissent). But, in some way, it is surprising to find such trust in "the public," treated as a homogeneous category, uncontaminated by the opinion of experts. It is a kind of "myth of popular democracy," according to Collins and Evans (2007). They criticized this idealization of lay knowledge, focusing in particular on the analysis conducted by Wynne (1996) concerning the value of local knowledge of the farmers in Cumbria in relation to the experts concerning the risks of nuclear contamination following Chernobyl.

It is interesting to note that related criticisms can be found in the earlier literature on rural social development. The contribution of Norman Long (1992, 1999) is one of the most important in that area, with his deconstruction of the idealized vision of local knowledge and what he defined as populist strategies for local farmers' participation. The concept of knowledge, as multi-layered and fragmentary, and the introduction of the idea of power as a continuous negotiation process, allowed him and his colleagues to develop a creative and stimulating theoretical and methodological approach. The recognition of its importance can be seen in the revisions of the proposals of farmers' participation in rural development in many studies (for example, see Scoones and Thompson 1994). The debate continued with new criticisms of the formula for public engagement in different articles published in the provocative book edited by Cooke and Kothari, *Participation: The New Tyranny?* (2001). Not only did public participation come under scrutiny, but so did the assumption that local knowledge was in itself better (or otherwise idealized) in comparison to expert knowledge. It took some time to establish an explicit dialogue and exchange between this perspective in rural development studies and scholarship in social studies of science. The interrelations can clearly be

fruitful, as was shown in the book *Science and Citizens*, organized by Leach et al. (2005).

Returning to the specific field of STS, let's take now as an example one article: the introduction to a special issue on "Beyond Speaking the Truth? Institutional Responses to Uncertainty in Scientific Governance," in the journal *Science, Technology and Human Values* (vol. 35, no. 6, November 2010). Here we can find the idealized assumptions about public engagement. The introduction, written by Braun and Kropp, starts by stating that, for many years, the field of science and technology studies has been criticizing "elitist, technical, and positivist models of scientific governance" and proposing a broader participation of citizens and more reflexivity in the institutions related to science and scientific governance. No disagreement with those statements. Although the authors recognize that there are still "important continuities that need to be exposed and addressed" in relation to "the old elitist, technical, and positivist models," they go on to argue that "scientific governance has begun to move beyond the idea of science speaking "truth to power" . . . and is developing institutional responses to the existing plurality of scientific and normative viewpoints, and more sophisticated accommodations of uncertainty in many issue areas" (Braun and Kropp 2010, p. 772). The authors explain that the aim of the journal issue is to explore the different forms of scientific governance that are developing in areas such agriculture, biotechnology, and biomedicine, especially to demonstrate how reflexivity has begun to be incorporated into the governance of emerging technologies, which are in a grey frame of uncertainty.

Following the presentation of the main argument, we meet the type of assumptions that will be subjected to analytical scrutiny:

> "Science and scientific expertise have lost their reputation as providers of objective and unbiased knowledge that lies outside of interests and power configurations and escapes moral and social influences. Adherence to scientific knowledge, then, is "no longer a credible policymaking strategy" (Hajer and Wagenaar 2003, 10). Political decision-makers consequently feel that they cannot safely bank on the authority of science as an effective way of closing down policy issues and debates." (Braun and Kropp 2010, p. 773).

The above quotation reflects the widely held assumption that science and scientific expertise have lost their reputation. However, this is a very restricted geographic phenomenon. As we will demonstrate later, in the Brazilian context this is not the case at all. This same criticism can be applied to the statement that scientific knowledge is no longer a credible strategy. Again, this is a very strong generalization, which in effect shows the Eurocentrism of the argument. Finally, it is difficult to identify in many non-European national contexts the purported reality that political decision makers feel unsafe to garner support from scientific authority to settle policy debates.

The authors support their position by making references to various research initiatives that have observed the rise of a "'reflexive governance of knowledge,' in which debate and contestation characterize not only the production, regulation, or application of certain areas of scientific knowledge, but also, crucially, the ideas and institutions that structure those debates" (Braun and Kropp 2010, p. 774). Following some German examples, they propose that the "'participatory turn' in scientific governance could be understood at a more general level as forming an institutional response to problematizations of the forms of interaction between science, politics, and society. The fact that governments and scientific institutions have experimented with forms of public involvement, engagement, and participation can be understood as a response to the per-

ception that the existing relations between science, society, and politics have become problematic" (Braun and Kropp 2010, p. 774).

## 3. Some internal criticisms to the consensus

While the consensus on public engagement is pervasive, it is not monolithic (Delgado et al. 2010). In this section, we evaluate some critical commentaries that have sought to avoid an idealization of public engagement and local knowledge as a public good.

Joly and Kaufmann (2008) have argued that the demise of the so-called "deficit model," the acceptance of dialogue and the institutionally recognised need for "upstream engagement" in science and technology, especially concerning nanotechnology, can be considered a major success for STS scholars, whose research has contributed, in part, to this change. However, while Joly and Kaufman applaud this move, they nevertheless identify a more problematic change of role of the STS scholar, from a position of the distant and critical observer to the role of expert in social engineering or adviser to policymakers. This move, they assert, has been largely unnoticed by STS researchers who have not scrutinised some important limitations as well as the implicit framing assumptions of the concept. Based on an analysis of nanotechnology innovation in the Grenoble area in France—one of the major "nanodistricts" in Europe—the authors found that the "upstream engagement" concept was still embedded in a linear model of innovation and thus not very useful to anyone pursuing the co-production model of technological innovation. For them, this observation is especially true "when socio-technical networks are already aligned by powerful actors and a worldwide agenda as in the case of nanotechnology" (Joly and Kaufman 2008, p. 225). For public engagement to have a larger impact on decision-making, they suggest an alternative approach, which combines Actor-Network Theory (ANT) as an analytical tool with the reflexive and ongoing implementation of public participation. They further suggest that "public engagement is probably one of the critical loci where STS scholars must reflect on the articulation between the knowledge they produce and public policies in action" (Joly and Kaufman 2008, p. 225). This is a good point, but still only a partial response in building a more complex framework of analysis of the "participatory turn."

Ottinger (2010) points to the factors that shape the ability of citizen science to actually influence scientists and decision makers. Using the case of community-based air toxics monitoring with "buckets," he argues that citizen science's effectiveness is significantly influenced by standards and standardized practices. On one hand, standards serve a boundary-bridging function that affords bucket-monitoring data a crucial measure of legitimacy among experts. On the other hand, standards simultaneously serve a boundary-policing function, allowing experts to dismiss bucket data as irrelevant to the central project of air-quality assessment. The article thus calls attention to standard-setting as an important site of intervention for citizen science-based efforts to democratize science and policy, but also goes into an interesting criticism of lay knowledge.

A third form of critique has been developed by Bickerstaff et al. (2010), who have identified different models of engaging publics in matters of science not only in terms of the processes applied but also in terms of the organization-specific decision-making cultures, the problem contexts, and the framings of expertise. The institutionalization of dialogue—in other words, how dialogue is (or is not) performed—depends on ways that accord with existent social patterns that reproduce organizational culture. Ways in which different types of institutional and organizational setting facilitate and/or under-

mine the expression of particular types of expertise, and the corresponding impact on organizational practices, policies, and decision-making procedures, provide a broader contextualization of the issue of reflexive institutions.

Macnaghten and Chilvers (2012) provide a related critique. Based on an analysis of the relationship between public concerns, as articulated in public engagement initiatives, and issues of governance, they stress the importance of mapping across individual dialogues to examine underlying governance concerns that drive public responses. In doing this, they show how so-called "upstream" or anticipatory questions about the purposes, direction, control, and governance of emerging technologies (Wilsdon and Willis 2004) are also important in engagement situations more readily associated with "downstream" or "risk governance" domains (Felt et al. 2007). Furthermore, they argue that responding to public questions of trust and concerns about governance is not simply a matter of communicating better or involving more. It requires a broader appreciation of the science governance system in which public dialogue forms only a part, including the diversity of routes through which public values can shape science and technology as well as modes of public accountability, scrutiny, and transparency. They observe that governance responses are often out of step with public concerns, and that STS research needs to understand better the processes that mediate institutional response, and that may catalyse more reflective, relational, and transformative forms of institutional learning.

Finally, Leach et al. (2005, p.3), in the introduction of the book mentioned earlier, highlight the need to identify the complexities and varieties of synergies that exist between expert and lay knowledges, the new dynamics of the global and the local in the construction of hybrid forms of public and private control of science and technology, and how these transcend increasingly national boundaries. In the same book, the article by Leach and Scoones (2005) focuses explicitly on the relations between science and citizenship in a global context, and makes an important contribution by stressing the global processes that relate risk, science, and society in a comparative context. Looking at the local specificities, they question a number of generalizations about citizenship and political participation, and identify different traditions of participation including the liberal, the communitarian, and the civic republican. These are important criticisms, but still a partial response to the complex relations that now are taking place between the local and the global, and how these are structuring scientific governance in ways that can be radically distinctive across various national contexts.

## 4. The far side

One exceptional study in the analytical treatment of public engagement in the STS literature is Sheila Jasanoff's (2005a) comparative study of how the debate on GMOs was managed differentially by the United States, the UK, Germany, and the European Commission. Her analytical perspective allows her to examine the intimate relationships between the stories and inventiveness that took place in the life sciences and the inventiveness that took place in the political sphere in the search for new forms of assessing and regulating the processes and products of genetic engineering. Those stories do not end there because the politics of biotechnology serves as a theater for observing democratic politics in motion and for interpreting how such politics reflects distinctive national political cultures. As Jasanoff explains:

"how knowledge comes to be perceived as reliable in political settings and how scientific claims, more specifically, patterns as authoritative. Put differently, civic epistemology conceptualizes the credibility of science in contemporary political life as a phenomenon to be explained, not to be taken for granted." (Jasanoff 2005a, p. 250).

This is a central point: the need not to take for granted civic epistemology. Elsewhere we have analysed, using a related conceptual framework, the differential reaction to GMOs between Brazil, Europe, and the United States (Guivant 2009). In the US there was simply no issue; in Europe there was both controversy and social learning—the search for and implementation of a process of science democratization; while in Brazil there was controversy but without democratization. In Brazil, debates on both sides of the issue appealed to a technical discourse of risk, assuming that science could be mobilized to support either case (that GM was safe or that it was not safe; that it would benefit or harm the environment/biodiversity). This can be described as the linear model of science-policy: that science can and should determine policy (Pielke 2007). Thus, in the period following the noisy confrontation between antagonistic actors, the standard model of science was reinforced; this contrasts with the UK/European context where science adopted a more listening and humble tone, as part of a new rhetoric of transparency and openness, and where institutional forms of public engagement became part of the new scientific governance. Thus, to understand the Brazilian debate on GMOs, one needs to understand the persistence of Brazilian political culture, characterised as stubbornly elitist and traditional, and where even the action of political parties and the public sphere (including social movements) remain far removed from most people's everyday lives.

The stubborn character of Brazilian civic epistemology can be witnessed even in the face of formal attempts at public participation, which hitherto have made little inroads in fostering the development of the "participatory turn." In April 2001, Action Aid Brazil and Esplar organized a Brazilian Popular Jury on GMOs in Fortaleza as a citizens' space for deliberation on GMOs. It was composed of eleven small farmers and consumers, and the situation reproduced the dynamics of a trial to assess the impacts of GMOs on human health and the environment. This model was repeated in September 2001 in Belem (PA), and then again in March 2004 in Porto Alegre (RGS). Across all events, the Brazilian Juries arrived at unanimous anti-GM positions. To reach the verdict, each jury examined six popular items from the trial of twelve witnesses (Monsanto did not attend): the problem of hunger in Brazil and worldwide; access to food and food security; the existence of adequate scientific evidence to ensure the safety of GMOs to human health and the environment; the provision of advice on the commercial release of GMOs with civil society participation; and sufficient information to allow the right of choice of consumers and farmers. However, the methodological rigour with which these events took place remains in question. The explicitly anti-GMO stance that arose from the deliberation was at least in part a reflection of the ways in which the processes were framed, scripted, dramatised, and populated—as part of a policy of mobilising support for an anti-GM position—rather than a genuine exploration of public values and policy options (Guivant 2009). The agenda of the coalition against GMOs assumed a strategy for public mobilization, but not for public engagement. To understand this, we need to ground our analysis in the specific civic epistemology that permeates the perception of science and the public among different social actors.

## 5. Nanotechnology and the learning processes

In the UK, there exists an institutional recognition of the need for proactive public involvement in debates about the social and ethical dimensions of science and technology. Policy discussions have focused on the need for "upstream" forms of public engagement to improve the social robustness of innovation processes at the design stage (Wilsdon and Willis 2004). The Royal Society/Royal Academy of Engineering report on nanotechnology is a good example. The report acknowledges that "[m]ost developments in nanotechnologies, as viewed in 2004, are clearly 'upstream' in nature"; therefore, it concludes that "a constructive debate about the future of nanotechnologies should be undertaken now—at a stage when it can inform key decisions about their development and before deeply entrenched or polarised positions appear" (The Royal Society and The Royal Academy of Engineering 2004, p. 64). Other documents (Department of Trade and Industry 2000, House of Lords 2000, Royal Commission on Environmental Pollution 1998) highlight equivalent positions, and the call for further public engagement and research on nanotechnological risk research persists.

In the Brazilian context, there exists no similar document from scientists, politicians, or industry representatives. The conflict in relation to GMOs left the public indifferent and the technocratic assessment regime intact. It is necessary to consider here the different contexts of transparency and accountability that exist in Brazil. In Brazil, for example, there is increasing regulatory control of pesticide residues in food, but still the information is limited and not well communicated. And the list can go on. In the context of the many proximal risks that shape everyday life in Brazil, the unknown risks associated with GMOs appear as a distant concern. In addition, just as "the public" is a social category marginal to the concerns of everyday life, so too is that of "the consumer." The marginalization of "the consumer" as an important actor in the political imaginary can be explained by the association of the term "consumer" with the elite of the Brazilian population. So again, we have a very clear difference in the way in which European NGOs, in particular, have targeted action at consumers, as citizens, and in Brazil, where consumption has been less considered as a space for the construction of citizen rights.

## 6. Comparative research in Brazil and the UK

In 2009, the authors undertook a research project aimed at comparing public perceptions to nanotechnology between equivalent public groups in Brazil and the UK (for a detailed analysis, see Macnaghten and Guivant 2010). Using a focus group methodology, conducted in North East England and, subsequently, in Florianopolis, Santa Catarina State, Brazil, groups of publics were selected around commonalities of lifeworld experiences seen as likely to be of relevance in creating positions on nanotechnology (critical distinctions were faith, relations to the body, agency, community involvement alongside standard demographics of age, gender, and socio-economic status). Some key findings are set out below.

For our Brazilian groups, the idea of technology tended to be seen, by and large, as the source of salvation and social betterment, rather than as the creator of risks and manufactured uncertainty. There was little critique of technology as a system, and thus little sense of any need to scrutinize or critique the actors involved in its social production. Scientists were seen as trusted actors and as part of a still-to-be-realized process of

social improvement. From a Brazilian perspective, due the socio-technical system being seen as self-correcting, there was little sense of any need for oversight, either by government or by techniques of public engagement. In our UK groups, we identified a contrasting dynamic. Without exception, all our UK group discussions ended in tragedy, offering the opinion that, under real-world circumstances, nanotechnology would generate profound and complex dilemmas that were predicted to exceed our ability for collective control and negotiation. To justify this position, our UK groups appealed to five complex and intersecting narratives: that nanotechnology would constitute a "Pandora's Box" of secrets that, once opened, would release a whole host of human evils; that the technology had the potential to severely "mess with nature" and disrupt what it is to be human; that while the technology held desirable promises of perfection and improvement, we would need to "be careful what we wish for"; that the technology would exacerbate existing inequalities; and that, in relation to all these dynamics, regular people would be impotent and "kept in the dark" (for more detail on these narratives, see Davies et al. 2009).

Thus, the challenges for promoting successful societal debate on nanotechnology are likely to be determined in different ways in the UK and Brazil. In the UK, in the face of a public already sceptical with science and its capacity to inculcate a better future, public deliberation is a necessary element in constituting a more socially robust science. Scientists and policymakers have to engage with the narratives of technoscientific failure and the conditions under which they endure in the public realm. In Brazil, by contrast, the debate requires a different configuration of actors and assemblages. We need to consider what can happen in a context where neither the scientists, nor the politicians, and even less the public identify themselves as having a "stake" in the debate. Is it still valid for science and technology studies to speak in favour of public deliberation per se, or is a more nuanced treatment of the contribution of "engaged citizens" in the new scientific governance required (Irwin 2006)?

In face of the results identified in those focus groups, a further research project was conducted to investigate specifically the perception of nanoscience and nanotechnology among environmentalists. This research consisted in seven interviews in 2009 with representatives of environmental NGOs from Santa Catarina State. Among the results we identified a positive attitude of trust towards science and scientists (Cassiano 2010). This appeared in the way the respondents valued the production of scientific knowledge, its results and artefacts. Most of the respondents evinced positive attitudes towards the development of new technologies, since the search for new discoveries was seen as an inherent and positive aspect of the scientific endeavour. This attitude of trust also materialised when respondents were confronted with discussions that indicated the possibility of nanotechnology posing risks to the environment and human health. Cassiano (2010) concluded that though science is viewed as a cause of environmental problems, it is also considered the main source that can provide solutions to many of them. The uncertainties and controversies are seen as part of the development of science and thus are not considered as problematic.

Another final research project aimed to analyze perceptions among sellers and consumers of nanocosmetics: cosmetics that use nanotechnology in their production (Nunes 2009). Nunes choose the cosmetic companies Avon and Natura because both of them sell nanocosmetics, and also due to the fact that both use the same direct sale system (door to door). The research took place in 2008, in Florianopolis, Santa Catarina. The data was collected through interviews with ten consumers and ten sellers of each company (for a total of forty interviews). Her focus was not only on analyzing risk per-

ceptions in relation to the nanocosmetics, but also on undertaking an analysis of life-styles and the level of information known about the products. Nunes identified that all sellers considered it important that the public have access to information, and that they should know whether cosmetics are nanostructured or not. However, they all believed that if their customers had access to information on possible risks posed by the use of these products, this would not affect its consumption, because the perception of beauty was seen to be worth any possible long-term risk. What prevailed in their responses was the logic of product efficacy and the fear of aging, understood primarily as the loss of beauty. Ultimately, Nunes (2009) found that nanocosmetics are often perceived as the most affordable and painless possibility of modifying the body.

## 7. Conclusions

In this article, we have offered analysis of three relatively modest research initiatives conducted in Brazil that concern the perception of risks, benefits, and visions of nano-technology. We make no claim to generalize from these research projects to the Brazilian situation overall. However, they allow us to raise questions about what can happen in a context where neither the scientists nor the politicians, and even less the public (considering here different social sectors, stakeholders, etc), are interested in the debate on the risk and benefits of emerging technologies. Is it still valid to speak of the institutional reflexivity or the participatory turn?

There is a need for a different conceptualization of technological governance and its relation to globalisation, one that, rather than merely contrasting Western and non-Western countries, takes into account the specificities of local and regional dynamics when confronted by the same problems, with specific and mixed alliances between groups of experts and lay people, and the articulations between actors representing various forms of subpolitics and those representing conventional forms of politics. In this regard, it is crucial to define more precisely what is understood by subpolitics, and by alternatives to risk society, avoiding idealized approaches to the position of non-experts, and reductionist or simplistic approaches to quantitative estimates of risk, which do not identify some transformations now taking place in relation to emerging technologies. Technological governance must be analysed in relation to the political culture of a nation-state. In this article we focused on Brazil, but our hypothesis is that a not very different perspective can be found in other Latin American countries.

Taking into account the main arguments of this article, we conclude with the need for constructing a more complex perspective on the relations between the global and the local/national—a perspective that is able to take into account differences of political epistemology, and that promotes scholarship on the global and local/national networks through which technological governance is performed.

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