



The governance of nanotechnology in the Brazilian context: Entangling approaches



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ABSTRACT

The present article discusses the governance of nanotechnology in the Brazilian context. By firstly identifying what we term as the *European* model of governance we conclude that the Brazilian policy and research environment of Nanoscience and Nanotechnology does not similarly emphasise Anticipatory Governance processes, based on anticipating future scenarios of controversies and risks and broadening the participation in the upstream phase of development. Instead, there has been a predominant concern on the promotion of competitiveness and a lack of debate of environmental, health and safety issues. However, we identify the Social Technology approach as a potentially distinct mode of governance in the Brazilian context. Although it has not hitherto been applied to the local or global nanotechnology governance practices, it shares many of the tenets of the Anticipatory Governance approach. We conclude with an entanglement of both approaches and propose the concept of Social Nanotechnologies, which we suggest to be a feasible research agenda for the governance of emerging technologies in semi-peripheral contexts such as Brazil.

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1. Introduction

The emergent concerns about the relations of Nanotechnology and Society have been a fertile ground of inquiry for the field of Science and Technology Studies (STS). Nanoscience and nanotechnology (N&N) are nowadays well acknowledged as a field where policy makers are welcoming innovative governance regimes, not only to promote the emergence of technological innovations and its economic benefits, but also to assure more desirable outcomes [1], or, using the common policy language, to assure a “responsible development of nanotechnology” [2,3]. The result has been a unique call for social scientists to integrate their research into N&N early stages of research and development (R&D). In this context, N&N has been a privileged arena for STSers to address its questions

regarding innovative models of governance of emerging technologies, which might better integrate the concerns of different stakeholders upstream in the innovation process.

Much STS research in Europe, but also to some extent in the United States, has focused on participatory and upstream assessments of emerging technologies (cf. [4–7]). Policy initiatives have followed this trend and, in the wake of strong public controversies, namely with the cases of BSE and GMOs, have sought to develop new participatory initiatives and to improve the dialogue between science and society. The development of nanotechnology has provided a fertile ground for such studies and initiatives. Although different countries’ research programs have their own specificities defined by the local policy, social and academic institutional settings, there are common methodological and theoretical assumptions delineating research agendas in European countries and the US. Frameworks such as the British “Upstream Public Engagement” [7], the Dutch “Constructive Technology Assessment” [8] and US’s “Real Time Technology Assessment” [5] try to modulate the

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development trajectories through different mechanisms of interactions among lay, expert and policy communities, aiming at further time horizons. Barben et al. [6] have entitled this new approach “Anticipatory Governance”, which is based on the tripod: foresight and scenario building; broader and more democratic participation; and the integration of natural and social sciences into the development of N&N. Even though scholars in the US and in Europe have advocated this approach, it has been in Europe that the focus on public engagement has been more actively addressed by policy-makers, with initiatives led by governments or parliaments, at regional, national and European levels [9,10]. We thus propose, for the comparative purpose of this paper, to name this approach as the ‘European view’.¹

Although this proactive orientation of the STS scholarship is increasingly publicizing stimulating results, its limitations are also progressively acknowledged. The advocated reflexivity, when turned to this process of integration of social science into ongoing N&N research, reveals pitfalls that have showed to be surprisingly prevalent [12,13]. After more than a decade of development, the moment appears to be characterized by an assessment of the “assessment regime” [14]. In this sense, the increasing debate about how to effectively democratize the N&N development is spread among different epistemological landscapes. Nevertheless, it has yet directed little attention to the applicability of the anticipatory governance approach to peripheral or semi-peripheral contexts of science and technology development.² Coherently, the major part of the critical analysis is focused at the embryonic experiences implemented in the Northern countries, mainly at the “centres of calculation” [16] of the global system of scientific production.

When it turns to the Global South, with remarkable exceptions [17–19], there is commonly a technocentric view that the nanotechnologies can solve urgent social and environmental problems [20,21]. Albeit STS have sufficiently pointed out the contextual character of scientific research [22,23], there is hitherto a necessity to better open the black box of the science and technology development at the boundaries of the global system, where distinct social, cultural and political interactions may require distinctive approaches to scientific governance.³

¹ We are aware that this view is not common to all European countries (cf. [11]).

² Nunes and Gonçalves [15] ask if Portuguese scientists are “Galileo’s stepchildren”, metaphorically suggesting the boundary zone where some countries are situated. They call this a semi-peripheral position, where there is a consolidated science and technology system, but local scientists are marginal descendants of the world system of knowledge production. They have contributed to the study of this blurred zone, where characteristics such as the unequal enrollment of research groups or institutions with transnational science, the almost exclusivist dependence of the researchers on public funds and the prevalence of the universities as the main locus of research and development are significant greater than in most of the leading countries of scientific production. We claim here that Brazilian S&T fits the same category.

³ Although this term could be ambiguously interpreted as “Science for governance” or “governance of Science”, we adopt it in the same way Irwin suggests [24].

The purpose of this article is to contribute to this discussion by critically analyzing how far this participatory turn has reached the Brazilian N&N research and policy environment. Employing the concepts of socio-technical imaginaries [25] and civic epistemologies [22], we argue that the anticipatory approach has not been incorporated into Brazilian governance practices due to specific institutional, political and cultural contexts. However, we propose that specific contributions of Latin American STS to the debate on the global governance of N&N can be identified in local policy initiatives. In this sense, our commitment here is to translate, not only from Iberian to English languages, but also between different knowledges [26] of responsibility in science and technology.

2. Anticipatory Governance: The European view

Technologies are not autonomously developed, following a linear channel that pushes from science or pulls from the market. Instead, STS scholarship has widely shown how they are the result of socio-technical interactions [27,28]. In this way, rather than assessing the impacts of ‘inexorable’ technologies, governments should foresee the future sites of controversy and try to modulate the development trajectories in order to improve social benefits and to avoid or minimize social dissatisfaction and risks [29]. To do that, the anticipatory approach has been a central toolcase for social scientists. Barben et al. ([6]: 984–985) identify three major challenges for its implementation: “the anticipation and assessment of nanotechnologies that are in the process of emerging; the engagement of publics that are mostly still latent; and the integration of broader considerations into R&D contexts that have been largely self-governing”. According to these authors, it is the “ensemble-ization” of different research fields such as technology assessment, public engagement and laboratory studies that could provide “integrated” information for modulating N&N innovations.

This is the core of what we call here the *European* approach to the governance of emerging technologies, to integrate future concerns and public feedback into the R&D micro and macro decisions. It is an attempt to shape, or to influence, science and technology development into a precautionary suit in the upstream phase of development [9,30]. This means bypassing the Collingridge dilemma⁴ [31] by promoting a reflexive attitude in the researchers, whereby a wider set of factors, linked to broader societal and environmental issues, are brought into their technical decisions [4]. In other words, even if the provisions of future socio-technical scenarios cannot be sufficiently accurate to justify immediate change, the results of interactive and participatory processes of foresight are “useful fictions” [4], as they should make researchers more aware of potential impacts – not only physical risks, but also controversial changes in social and cultural relationships – of the trajectories they follow. Thus, the success of this endeavor could be perceived, from a subjective perspective,

⁴ The impacts of technologies can only be consistently acknowledged in their late stage of development, but in this phase it is more difficult to accomplish any necessary changes.

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