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Perfecting European democracy

Science as a problem of technological and political progress

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Working Paper 15-CSI-02
April, 2015

Pour citer ce papier / How to cite this paper:

Laurent, B. (2015). Perfecting European democracy. Science as a problem of technological and political progress. i3 Working Papers Series, 15-CSI-02.

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Perfecting European democracy

Science as a problem of technological and political progress

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Abstract

Science policy has become a consequence as much as an engine of European integration. This paper argues that European construction is a process whereby science and democracy are jointly problematized as matters of progress and perfectibility. In turn, framing science and democracy as matters of progress participates in the making of Europe as a political, economic and moral entity worthy of public support. This paper identifies three operations that make science a problem of both technological and democratic progress, namely the construction of nanotechnology as an "experiment" for the connections between science and European publics, the writing of the GMO controversy as a narrative of "failure" of science/society relationships, and the "integration" of values in science through the current objective of responsible research and innovation (RRI). Experimenting with nanotechnology, writing a narrative of failure about GMOs and integrating through RRI are processes that are by no means neutral. They contribute to base the European research policy on the selection of a few technoscientific "challenges". These challenges are deemed to be worthy of public support as they are expected to respond to the needs of a general European public, a public whose political representation thereby ceases to be a problem of electoral politics. As the European polity is imagined in the terms of continuous democratic progress, it is also meant to be purified from un-orderly publics or alternative technological trajectories.

Key words

Europe – science policy – progress – democracy

Introduction

The European Union is the outcome of a process that is still very much in development. This process was conceived from its inception as a matter of perfecting a collective of (at least) three identities: a geographical space torn apart by devastating wars and longing for peace, a market that could benefit from the extension of the circulation of economic goods, a political entity where liberal democracy would finally triumph. The idea of progress was at the core of the European project and closely articulated with the rapid economic growth experienced by Western European countries in the post-war decades. Progress, there, was as much economic as it was political and moral, as it associated the extension of markets with the development of liberal democracy and a collective concern for lasting peace.

The imaginary of progress was part of a landscape made of the decades of economic growth in Western Europe combined with a cold war situation within which what mattered was the extension of liberal democracy. Science and technology were to be contributors to the progress, and topics for the European coordination to work with. A telling example is that of Euratom. Created as a vehicle for the development of “atoms for peace” within a cooperation framework associating European countries, Euratom quickly faced the issue of the crucial role of nuclear energy for national policy choices (Barry and Walters, 2003). In this case, phrasing the problem of cooperation for non military use of nuclear energy meant problematizing the sovereignty of participating states eager to maintain control of what they considered sensitive areas, indeed integral components of their *grandeur* (Hecht, 1998).

This chapter argues that European construction is a process whereby science and democracy are jointly problematized as matters of progress and perfectibility. In turn, framing science and democracy as matters of progress participates in the making of Europe as a political, economic and moral entity worthy of public support. For science and technology within European institutions are issues of public support, and require the enrollment of a citizenry that is not pre-given. That technological development is also a project of political imagination, defining authority, power relationships and channels of democratic legitimacy has been demonstrated by STS scholarship (e.g. Barry, 2001; Ezrahi, 1990; Jasanoff, 2004, 2005; Jasanoff and Kim, 2009). Euratom, for that matter, is a relevant example, whereby the public to enroll is made of a heterogeneous set comprising member states negotiating their sovereignty, and publics imagined as consumers in need for cheap and accessible energy (yet potentially reluctant to nuclear energy).

The articulation of technological development and political imagination reaches an even deeper dimension as recent technological developments act on human beings themselves. Biotechnology and, more recently, nanotechnology promise to make technological intervention hinge upon living organisms themselves. By transforming "life itself" into an area of human intervention, these technological areas articulate scientific and political progress in that the world they construct is thought anew – made of new techno-economic objects, institutional arrangements, markets, and eventually human beings (see Jasanoff, 2005; Rose, 2007). These domains of technological development have been at the core of the European science policy. As this paper will argue, the European programs in these domains are specific, in that they are as much (if not more) devoted to the perfectibility of the European collective than to that of the individual.

This movement is inscribed in the gradual Europeanization of science policy. Research became a component of the European Commission's activities with the 1986 Single European Act. This important institutional evolution occurred as issues about the European public of science were emerging. As the first framework programs for the conduct of European research policy were introduced, European opinion polls were also applied to science in order to measure the European public opinion. Since then, the concern for the development of European research has been tightly connected with a concern for the public support from the part of European citizens (Felt, 2010). Refinements of science communication initiatives at the European level, including the more recent participatory exercises, show that ensuring technological progress in Europe is also a matter of turning passive European publics into active scientific citizens. Eventually, and as this chapter will explore, the narrative of joint progress, both technological and democratic, participates in the making of Europe itself. Analyzing this requires to take this narrative not as a given but as an outcome of processes that need to be accounted for. This means that narratives of progress emanating from the European institutions cannot be taken at face value. But it also means that critical perspectives on the effective realization of this progress cannot be taken for granted either.

For instance, scholars have discussed the incomplete transition from the "deficit" to the "dialogue" model (Hagendijk, 2004), or shown that public dialogue, by *not* questioning the overall framing of public issues, did not manage to use public engagement in a transformative way (Wynne, 2006). Others regret that the "opportunity" that nanotechnology would offer is not truly realized (Macnaghten et al., 2005; Kurath and Giesler, 2009). These critical interventions, while of clear interest for any student of democratic practices in Europe,

participate in the construction of narratives of democratic progress and share an objective of democratization through dialogue, only under a negative mode ("the democratic objective has not been reached *yet*"). Both the positive and the critical mode of the discourse of joint technological and democratic progress share the same way of phrasing the problem in need of addressing. They both consider that there is a known direction toward which technological and political development should go. In contrast, what is of interest for us here is, in Michel Foucault's words, the *problematization* of European science, European polity, and eventually Europe itself, in the terms of progress and perfectibility. Problematization, for Foucault, points to the set of processes whereby acceptable public problems and a range of expected solutions are defined (Foucault, 1984). These processes pertain to the manufacturing of individuals, collectives, and concerns solidified in various instruments and discourses. This chapter proposes to analyze the problematization of European science as an issue of joint technological and democratic progress. To do so, I identify some of the mechanisms by which the narrative of joint progress takes shape. I discuss three of these mechanisms: the experiment, the narrative of failure, and the integration of research policy.

In the following, I start with empirical sites where perfectibility is problematized, and explicitly so because it conflicts with extra-European definitions of the problems to solve. These sites are related to nanotechnology, which was framed as a « European experiment ». I then turn to two other groups of sites where joint technological and democratic progress is made a European objective. Biotechnology, and GMOs in particular, have been described as a failure of public acceptability, market harmonization, and public engagement. Making such a narrative of failure is an operation that deserves analytical attention, as it actively defines the expected direction of scientific and democratic progress. Finally, I turn to the recent call for "responsible research and innovation" (RRI) within European research policy, and show that it illustrates attempts at integrating the "values and needs" of the European public in ways that are consistent with a general objective of "excellence".

Experimenting with nanotechnology, writing a narrative of failure about GMOs, and calling for integration through RRI are three operations that make science a problem of both technological and democratic progress. These mechanisms are by no means neutral. They shape certain imaginations of the European future at the expenses of others. As the European polity is imagined in the terms of continuous democratic progress, it is also meant to be purified from un-orderly publics or alternative technological trajectories. As it makes excellence a key term, and the accountability toward a general European public a central concern, it also disqualifies other forms of politics. It is thus extremely important to be able to

characterize the type of European ordering that three operations I describe below result in. Doing so will offer analytical material to identify what the European narrative of joint perfectibility produces.

1. Experimenting with nanotechnology

Defining nanotechnology as an experiment

In the mid-2000s, two publications of the European Commission ("Towards a European Strategy for Nanotechnology" (2004) and the "Nanosciences et nanotechnologies" Action Plan (2005)) made nanotechnology a priority of the European science policy, which would be conducted in connection with "publics" and "stakeholders". While the American nanotechnology programs insisted on the "improvement of human performance" (Roco and Sims Bainbridge, 2003), the European program would be pursued for the sake of an "inclusive" European society. This difference was discussed in a report commissioned by the services of the Directorate–General for Research to a group of scholars, and for which philosopher of science Alfred Nordmann acted as a rapporteur. This report argued that nanotechnology was an opportunity to "shape the future of European societies" thanks to close connections between technological development and the expectations of European publics (Nordmann, 2004). In doing so, the difference from the American imagination of technological development was made explicit. Rather than perfecting the individual, the European converging technologies would perfect the collective. They would participate in the integration of European societies.

This ambitious objective meant that innovative instruments were to be designed, so that joint technological and political progress could be realized. This required that nanotechnology be constituted as an experimental moment, a "European experiment" – this expression was Alfred Nordmann's (Nordmann, 2009) - through which both technological development and the democratic involvement of European publics in the making of desirable futures could be rethought. Nanotechnology was then described as an "extraordinary opportunity for the social sciences" (Macnaghten et al., 2005), which could participate in the orientation of technological development.

The European experiment was developed into new regulatory instruments targeting scientific research. A good example is the "Code of Conduct" produced by the DG Research, which encouraged European researchers to limit the exposure to nanomaterials, restrain from

engaging into “human enhancement”, and engage in dialogue with lay publics (EC, 2008). The Code did not define such crucial terms as “nanomaterials” and “human enhancement”. It was purely voluntary, though was also considered a necessary condition for research projects to receive European funding[1]. It attempted to introduce ways of anticipating potential safety risks without constraining public regulation, while being conceived as a platform for a continuous dialogue involving European institutions, member states, researchers and European publics (von Schomberg, 2009).

Through this initiative, scientific development was conceived as a matter of technological progress as well as an issue of democratic perfectibility. As the Code inscribed the reluctance of the European institutions to display objectives related to “human enhancement” (as in the United States), it also proposed to make nanotechnology an experiment in the transformation of the democratic legitimacy of scientific research. What was to be enhanced then, was not the individual who would be transformed by technology, but the whole European polity, expected to collectively reflect on a technology that was in turn expected to be acceptable for all. Using a voluntary instrument such as the Code is characteristic of an intervention that aims to transform individual researchers, research institutions and member states in an indirect manner, by suggesting rather than imposing, and using detours such as introducing conditions for benefiting from research funding. Success, then, was explicitly considered in an experimental manner, depending on whether or not this initial test would have to be refined and adapted, possibly to broader domains than nanotechnology. Such an intervention is, in part, an outcome of an interpretation of the subsidiarity principle, according to which ethics is not a primarily area of regulatory action of the European Commission. It also defines both the direction of democratic progress and a practical path to follow it.

This articulation of the support for technological development with the democratic progress of Europe was further conducted in science communication initiatives. One of the first of them was a European project called *Nanodialogue*, initiated in 2006 and which gathered a few European science museums[2]. Among its objectives was the test of new formats of representation in the science museum in order to meet a “democratic ambition” (this expression was used during the project’s meetings). Democratic ambition related to the expected transformation of the role of the science museum in the involvement of European publics in science policy. As sociologists and historians of science have demonstrated, the

[1] Interview, DG Research, February 2010.

[2] The empirical material about *Nanodialogue* is based on interviews with several participants in the project (including the coordinator) and archives from the Grenoble *Centre de Culture ScientifiqueTechnique et Industrielle*, which was one of the project partners.

construction of the "informed citizen" through scientific communication is at the core of the publicization of science in the museum (Bensaude-Vincent, 2000, 2001; Hilgartner, 1990). Yet for the participants in the *Nanodialogue* project, the democratic nature of science museums representing nanotechnology for the sake of European publics was not primarily related to the scientific information transmitted to the visitor. For them, the "democratic ambition" meant that science museums had to represent the "ethical, legal and societal aspects" (ELSA) of nanotechnology, while making the exhibit an opportunity for dialogue between the European institutions and European publics.

Thus, the circle-shaped *Nanodialogue* exhibit presenting the technical components of nanotechnology was meant to expose the ELSA associated with each of these components, including the safety risks of nanotechnology objects or privacy issues related to the use of nanoelectronics in chips. In order to implement "dialogue" itself, *Nanodialogue* involved sociologists specialized in public participation in science, including Simon Joss, a notable contributor to the field (cf. Joss and Durant, 1995). These sociologists were in charge of organizing focus groups in the various museums, based on which the opinion of the "European public" about nanotechnology was presented at the European Commission at the end of the project.

The museum professionals and sociologists did not consider that *Nanodialogue* was entirely satisfying. There were long discussions among the partners about the relevant format through which ELSA were to be represented, and occasional disagreements about whether or not they should hold a significant space within the exhibit. The sociologists thought that the focus groups provided a "snapshot" of the European public opinion about nanotechnology that could not pretend to scientific robustness[3]. In the end, the "opinion of the European public" was not very surprising: it was mainly framed as a hope to see nanotechnology realize "benefits", particularly in the medical domain, while controlling the potential risks. It would not be difficult to demonstrate how the instruments used to measure this "public opinion" actively shaped it[4]. But the description of the construction of public opinion through tools like focus groups is less interesting here than the experimental format of *Nanodialogue*. The project tested ways of communicating science in museums and, perhaps even more importantly, a way of conceiving of the nature of European democracy wherein it would be

[3] Interview with S. Joss, London, April 2009. Because of limited funding, the practical organization of focus groups was delegated to the museums. The sociologists in charge only distributed guidance booklets.

[4] The guidance booklets distributed to the focus group moderators thus invited them to question participants about the "benefits" and "risks" of nanotechnology – a framing that inherently constrains the opinion eventually produced by the focus group.

politically legitimate because of non-electoral mechanisms of representation targeted a "general public", and "European" because of the various locations of the sites where samples would be collected.

From the nanotechnology experiment to a European "technical democracy"

The test, for that matter, was relatively successful. After it was completed, *Nanodialogue* was used as a topical example in training programs in public participation conducted by sociologists (including some of those who participated in *Nanodialogue*) and funded by the European Commission[5]. After the conclusion of the project, the participants in *Nanodialogue* were actively involved in the work conducted within the European Commission about the future orientations of the public communication of nanotechnology (EC, 2007). These discussions eventually lead to the report written by Matteo Bonazzi, a civil servant at the "Nanotechnology and Converging Technologies" Unit of the DG Research (Bonazzi, 2010).

Bonazzi's report defined the European priorities regarding the communication of nanotechnology. It framed the future calls for projects in this area. As *Nanodialogue*, it made the communication of nanotechnology a matter of dual representation- of nanotechnology ELSA on the one hand, of European publics on the other. Thus, Bonazzi's report addressed less the content of what was to be communicated than the forms of exchange. It said nothing about nanotechnology but only proposed a short list of simple (almost simplistic) messages:

- *" nano is **not** magic;*

- *nano is **a new phase of technology** exploiting nanoscale effects;*

- *it deals with new **beneficial applications and markets**, impacting on **health, safety, privacy, ethics and the socioeconomic divide;***

- *it **must and can** be controlled and driven conscientiously."*

(Bonazzi, 2010: 106, emphasis in the original)

For all their simplicity, these messages pointed to a particular direction: "impacts" were what was to be communicated, particularly those related to the "benefits" but also the health,

[5] In the United States, science communication professionals saw a European specificity in the role devoted to science museums. During an interview, the official in charge of a network of American science museums engaged in nanotechnology communication explained that the production of a public opinion expected to inform policy-makers was for her not a concern of the American science policy institutions. Mentioning *Nanodialogue*, she viewed this as a crucial difference between European and American science museums.

ethical and socioeconomic effects of technological development. In the perspective suggested here, technological development is not thought of as an autonomous force, but as a topic of conscious collective intervention. The *Communicating Nanotechnology* report indeed proposed to connect the representation of ELSA and the measure of public opinion, making technological progress a matter of gathering publics for ensuring substantial collective support by providing information about expectations and concerns. Science communication then, was less about the representation of science for the sake of a passive public then about gathering public opinions.

This shift was summed up by Matteo Bonazzi as an evolution from "public understanding of science" to the "scientific understanding of the public" (Bonazzi, 2010: 20). For Bonazzi, this shift was a test for European democracy, now required to transform science communication and its connections with research policy. Eventually, the report proposed to make Europe a "technical democracy". Used without reference to the work of the STS scholars who introduced the expression in order to point to situations where the constructions of issues and concerned publics go hand in hand (Callon et al., 2009), Bonazzi's technical democracy is close to market studies. "The same way we conduct market surveys to understand trends in public opinion" (Bonazzi, 2010: 66), the future European technical democracy will be able, so it is argued, to identify trends in the evolution of public opinion, describe the varieties of European publics, and adapt both its communication strategy and its priorities in technological development. Technological and political progress could then be realized thanks to sophisticated instruments through which the European public opinion would be "monitored on a continuous basis" (Bonazzi, 2010: 152).

This last proposition is an attempt at fleshing out the democratic experiment that nanotechnology was expected to lead to. This experiment eventually occurred at several levels. Nanotechnology was construed as an opportunity to test at a large-scale science policy that would anticipate potential negative externalities of technological development and the controversies that these externalities could induce. Based on an instrumentation (such as the code of conduct or focus groups) expected to demonstrate the European specificity of technological development, this experiment is uncertain, as it may or may not transform European research policy or correctly anticipate the controversies related to technological development. It is, an any case, an operation that makes science a matter of joint technological and political progress, under modalities expected to be tested before potential extension to the whole of European research policy.

2. Narrating GMOs as a failure

Solving a "confidence crisis"

Talking about "experiment" as a way of problematizing technological development in Europe echoes a series of works analyzing European policies as examples of "experimental governance" (Szyszcazk, 2006) or "democratic experimentalism" (Dorf and Sabel, 1998; Eberlein and Kerver, 2004). These works point to the use of non-legally binding coordination devices (such as the Open Method of Coordination) through which general regulatory choices can be adapted to local particularities, at the level of individuals, companies or member states. They make experimentalism a form of policy-making, ensuring a higher level of democratic legitimacy and efficiency. In this body of work, experimentalism is conceived as an answer to situation of failure – that of the rigidity of constraining law, or the poor democratic legitimacy of existing regulatory interventions.

The nanotechnology experiment was also expected to respond to a situation of failure. The *Communicating Nanotechnology* roadmap postulated the existence of a "confidence crisis" requiring that the relations between science and European publics were rethought. This diagnosis was not isolated. The 2011 Innovation Union Competitiveness Report, for which commissar for research Geoghehan-Quin wrote a preface, explained that as "the percentage of European citizens that trust science and technology to improve their quality of life decreased over the last five years", there was "a genuine expectation for science to reorient its efforts to contribute to addressing the societal challenges of our time" (EC, 2011b: 12). While the diagnosis of crisis fueled the need for experimenting (as in the case of nanotechnology), it also contributed to the problematization of science as a matter of joint technological and democratic progress – "democratic" in that it would provide answers to practical concerns voiced by the European citizens.

The diagnosis of a "trust" or "confidence crisis" has roots in the evaluation of public controversies related to technology. It stems directly from a set of works devoted to the public opinion of science in Europe, mostly based on the *Eurobarometer*. The *Eurobarometer* is an opinion study conducted in all member states. It is conducted by polling institutes, commissioned by the European Commission, and is analyzed by public opinion specialists participating in the design of the instrument. *Eurobarometers* devoted to science and technology, as well as a particular domains biotechnology are regularly conducted, with the aim of measuring both the level of public trust and that of public knowledge.

The *Eurobarometer* is a polling device quantifying the European public opinion through the use of macro categories. With it there is no hope of grasping the subtle variations in

individual reasoning about technology. Qualitative studies indeed demonstrate the complexity of public perceptions of controversial technologies such as GMOs (Marris, 2001) which the *Eurobarometer* fails to account for since it makes invisible the ability of lay publics to voice sophisticated political positions about technological change. This limit is not surprising considering the effects of polls on the construction of public opinion (Blondiaux, 1998). Yet the *Eurobarometer* is of interest here as a performative instrument, constituting both the publics and the problems of science communication in Europe (Jasanoff, 2005; Law, 2009). In doing so, it solidifies a general problem of "trust" at the price of eliminating the subtle construction of local perceptions (for a canonical example, cf. Wynne, 1992). By the same token, it also makes it necessary to experiment with the public uptake of science so that trust can be reconstituted on the one hand, and to characterize what went wrong in particular domains on the other.

Making GMOs a case of failure

It is through the *Eurobarometer* that the diagnostic of a trust crisis is connected to a narrative of failure about technological progress in particular domains. Biotechnology, and GMOs in particular, have been one of these domains, perhaps the most explicit. Starting from the late 1990s, the *Eurobarometer* displayed both a falling rate of positive perception of technological development in general, and of biotechnology in particular. But the "failure" was even deeper since traditional interpretations also failed to explain the trust crisis. Thus, and as the *Eurobarometer* regretted that the European public had a "surprisingly limited" level of understanding of science (EC, 2000b), the trust crisis could have been explained in the terms of a deficit of understanding – what sociologists have labeled "deficit model". But the coordinators of the first *Eurobarometer* devoted to biotechnology (1991) were among the first critics of the deficit model[6], and the successive *Eurobarometers* eventually undermined the explanatory power of the deficit model. Thus, the results of the 1996 *Eurobarometer* were used by sociologist George Gaskell, a public perception of science specialist and coordinator of many of the biotechnology *Eurobarometer* studies, to demonstrate the absence of correlation between the level of technical knowledge and the degree of acceptance of technology (Gaskell et al., 1996). The narrative of failure was further developed as dialogue mechanisms targeting biotechnology were organized at the European level (Bengtsson et al., 2010) or within member states (Boy et al., 2000; Heller, 2003). While the *Eurobarometer*

[6] For instance, John Durant, a public understanding of science specialist and co-author of the first report based on a biotechnology Eurobarometer, was one of the first critics of the deficit model (Evans and Durant, 1995).

identified better perceptions of science after 2010, it still made GMOs the “Achilles’ heel of biotechnology” as “the wider picture is of declining support across many of the EU Member States – on average opponents outnumber supporters by three to one, and in no country is there a majority of supporters.” (Gaskell et al., 2010: p.7). Finally, “GM food is seen as unnatural and makes many Europeans ‘uneasy’ “ (Gaskell and al., 2010: p.7). This “unease” was seen as a sign of the failure to make GMOs acceptable to European publics. But this failure was only one among many. Another was the fragmentation of European publics. The *Eurobarometer* displayed strong differences in the perception of GMOs across European member states. This can be seen as parallel to a regulatory fragmentation, which, since the late 1990s, had made member states adopt different positions regarding the authorization of production and trade of GMOs – which eventually forced the European Commission to authorize member states to use safeguard clauses for them to be able to refuse GMOs, potentially against the opinion of the European Food Safety Agency (EFSA) (Wickson and Wynne, 2012).

Thus, the narrative of failure drew together various elements. It made biotechnology and GMOs an issue of failed public acceptance, failed explanatory power of the deficit model, failed attempts at pacification through “dialogue” or “public engagement”, and, as a result, failed harmonization of the European regulatory landscape. Within this general narrative of failure, the development of GMOs in Europe failed to engage European publics, and failed to produce a consistent polity in Europe. It made it impossible for the European democracy to make technological development a matter of collective discussion about the future. Thus it is in the context of this general narrative of failure that both European officials and social scientists see nanotechnology as an opportunity to transform the relations between technological development and European publics. The value of the European experiment that is nanotechnology is grounded in the hope that failure may be avoided: experimenting is conceived as an answer to a situation diagnosed as failed technological and social development.

The narrative of failure is shared by both the European institutions and their critics. From the viewpoint of the European Commission, science communication initiatives, including under the dialogue format that attempted to replace more traditional pedagogical initiatives, failed to ensure the general acceptance of GMOs and the harmonization of the European political and economic space at both regulatory and public perception levels. For scholars interested in GMO related controversies, the attempts at introducing dialogue failed to question the overall framing of GMO issues outside of risk considerations that do not envision any significant transformation of the agro-industrial sector (Levidow and Carr, 2009; Wynne, 2006), whereas

safeguard clauses at member state levels do not question the uniqueness of centralized scientific expertise produced at the European Food Safety Authority (EFSA) (Wickson and Wynne, 2012).

However, narrating the public treatment of GMOs in Europe as a failure is an operation that is not to be taken for granted. One could think of alternative narratives, in which the fragmented European situation would be the outcome of successful social mobilization making GMOs a topic of collective concern, and which, by making coexistence (between GM and non-GM, between various national approaches) a central objective, would propose an original democratic construct. Narrating the GMO case as a failure has a direct effect in determining the direction of expected progress for technology and European democracy. It implies that perfecting the European polity is about harmonizing markets and following certain technological paths rather than others. By qualifying particular technical and political trajectories as failures, it also defines what are the expected and necessary directions of progress.

3. Integrating values through Responsible Research and Innovation

Integrating values in European research

There are sites where the narratives of the GMO failure and that of the nanotechnology experiment meet. Consider for instance a report written in 2013 by a group of experts for the DG Research of the European Commission, and devoted to the *Options for strengthening Responsible Research and Innovation* (EC, 2013). These experts were academic scholars and civil servants who had been involved in the reflections about the ELSA of nanotechnology. In this report, they mentioned the experiments undertaken by the European Commission with nanotechnology's publics (EC, 2013: 11). For them, these experiments offered a way forward, which they contrasted with the GMO case, construed once again as a European failure. They discussed the notion of "responsible research and innovation" (RRI) as a label for a European science policy that would ground technological choices on the expectations and concerns of European publics, and anticipate the controversies related to technological development. Throughout this 2013 report, the code of conduct for nanotechnology communication projects appeared as tests through which the failure of GMO could be fixed and European research policy transformed.

Within RRI, technological development is problematized as a matter of joint technological and political progress through an operation that is neither the isolated experiment of

nanotechnology, nor the narrative of failure of the European GMOs, but extends to the whole of European research policy. RRI has indeed been heralded as a general objective by DG Research (EC, 2012). Still a vague concept, it is explicitly invoked and discussed in practical terms by researchers working at the boundary between academic research and intervention in science policy. The request to do so stems from the European Commission itself. Thus, the official in charge of the European Research Area (ERA) at DG Research spoke to experts in these terms during a workshop devoted to RRI:

> *We need your help to define responsible research and innovation. After several years of research on the relation between science and society, we evidenced that we need to involve civil society very upstream to avoid misunderstanding and difficulties afterwards (…) We cannot guarantee the social acceptability for anything but the more we have dialogue the easier it is to understand the potential obstacles and to work on them (...) Your advice is important to help us build a policy for the years to come, notably for the Common Strategic Framework that will begin its life in 2014 and for the European Research Area.*[7]

As the authors of the Options for Strengthening RRI report, the experts to whom this request was addressed had been involved in the transformation of nanotechnology into a democratic experiment. Some of them were academics who had seen in nanotechnology an opportunity for social science to transform European research policy (Macnaghten et al., 2005) and engage in an approach that would make "responsibility" a component of European science (Owen and al., 2012). Others were European civil servants and had multiplied public intervention-supporting instruments such as the voluntary code of conduct (von Schomberg, 2009; 2011; 2013). In these explorations, what emerged of RRI, beyond the plurality of what was gathered within this broad programmatic discourse was the objective of integration, that of the "values and needs of the public" within the "trajectory of innovation" (Owen and al., 2012).

Whether or not this objective was (or promises to be) satisfactory met for the actors involved is not what matters here. I am more interested in what it says about how science is problematized as an issue of joint technological and democratic progress in Europe. And progress within RRI connects the concern for the integration of public values and needs in science and technology with the organizational integration of technological and public communication issues. Consider the institutional evolutions within the DG Research of the European Commission. After 2010, the budget of the "Science and Society" domains was

[7] Quoted in Owen and al., 2012

significantly reduced[8] and the *Science in Society* unit of DG Research disappeared shortly afterwards[9]. Members of the late *Science in Society* unit presented this evolution as a component of the general re-organization of the European science policy under RRI:

> *"Science in Society" disappeared as such but… "Responsible Research and Innovation" emerges as a governance concept and cross-cutting requirement*[10]*.*

That RRI, presented in the previous excerpt as a "governance concept" becoming a "cross-cutting requirement", displays in the DG Research technocratic language the extension of the problem of the relations between science and the European public to the whole of European science policy. For members of the DG Research, this made it necessary that program officers intervene in purely scientific as well as science communication projects. This institutional evolution is an outcome of the experiment conducted with and by nanotechnology[11], and rephrases the problem of joint technological and political development within operations of integration – an integration that unifies the whole of European science policy under the banner of "responsibility".

Integration for the sake of excellence

Integration is of course a common trope within European institutions and a general objective of European construction. Within RRI, integration connects technological development with the progress of European societies by considering that the problem of the public government of research and that of the identification of public values and needs are one and the same. As such, it echoes previous attempts at using science and technology as engines of integration in Europe, while also introducing important differences.

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[8] From 51,5 million euros in 2010, the budget was reduced to 45,7 million euros in 2012.

[9] Within the Directorates-General of the European Commission, a "unit" is a team of about 20 people. That Matteo Bonazzi did *not* belong to this unit is significant: he considered that as a sign of the "integration" of science communication within the technicalities of research policy (Interview, May 2010).

[10] Presentation "Responsible Innovation", *Science in Society Unit*, June 2012.

[11] In this description by the former members of the *Science in Society* unit, nanotechnology was mentioned as a crucial step, ensuring the transition from previous attempts at bridging the gap between science and European publics, to the definition of RRI as a central component of the whole European science policy. Thus, a chronology leading to RRI was presented as such by the civil servants of the soon to disappear Science and Society unit: "*2000 Science, Society and the Citizen in Europe; 2001 Science and Society Action Plan; 2002 Science and Society (FP6); 2007 Sciences in Society (FP7); 2008 Code of Conduct Nanotech, 2011 Proposal for Horizon 2020; 2014 Horizon 2020 starts"*. This chronology started in 2000 with the follow up of the Lisbon strategy targeting the relations between science and European publics. It went on with the successive funding programs for scientific research in Europe, marked a step with the code of conduct and eventually reached "Horizon 2020" that replaced the previous framework programs.

One of the most significant previous cases of the use of science for integration objectives was the 2000 Lisbon strategy and the subsequent programs aiming at developing the "European Research Area" (EC, 2000). The Lisbon strategy was expected to make Europe a "knowledge-based economy" able to compete in the international economy thanks to the high level of its scientific research. It made science and technology engines of political and economic integration in ways that treated them as a collective undertaking on the part of all member states. All of them were required to reach a target level of R&D spending. This indicator became both the sign of the uniform European transformation that it aimed for, and a visible means of controlling its success. Success, however, proved elusive: the targets were not reached in many of the member states. After the mid-2000s, the outcomes of the Lisbon strategy were regarding as disappointing by the European Commission itself (EC, 2005).

RRI, and the version of integration it proposes, is inscribed within the post-Lisbon European research policy, formalized in a program called *Europe 2020* (EC, 2011b). *Europe 2020*, and its component called *Horizon 2020* defining the European plans for funding research projects, target priority domains of public investments, and thereby transform the objective of European integration that was present in the Lisbon strategy (EC, 2010; Lundvall and Lorenz, 2011). Rather than attempting to harmonize the level of public investment in research across the entire Union, *Europe 2020* proposes to guide the development of technologies in selected areas. Thereby, this new European strategy expects to meet the expectations and concerns of European publics while also reserving limited public funding in the post-financial crisis era to a small number of domains considered crucial (EC, 2011b). Thus, European science policy is defined in *Europe 2020* as contributions to major "societal challenges" which are expected to represent the concerns of the European public. Among these challenges are "health and well-being", "safe, clean and efficient energy", and "smart, green and integrated transportation". *Horizon 2020* uses these "challenges" to define the expected topics of the research projects that apply for European funding.

The integration that RRI proposes is inscribed within the general re-phrasing of European research policy, whereby targeted domains of intervention are chosen in order to ensure both technological results and democratic legitimacy. Used as a vague objective based on the integration of public values and needs in European research, RRI can encompass a variety of meaning, which might even verge on the contradictory, as some expect the European public to have a direct say on technological development and others conceive "responsibility" mainly as a way of ensuring public support for innovation (de Saille, 2013). But it is this very

characteristic that makes RRI a useful concept for European science policy, as it captures both the expected democratic progress of the European polity and the targeted use of funding for the sake of economic growth. RRI is an instrument through which the anticipation of promising scientific domains is joined to political anticipation of the expectations and concerns of European publics. This is precisely the role of the "challenges" around which the European science policy is being redefined. This version of "integration" is not to be taken for granted – and the difference with the Lisbon strategy is a telling indicator of that. Consistent with the notion of "excellence", it proposes to target limited amounts of resources to selected (geographical and thematic) areas of public intervention. It grounds democratic legitimacy not on the game of electoral politics but on the monitoring of a European public opinion in need of technical solutions for collective problems.

Conclusion

In January 2013, the European Commission announced that the Human Brain Project (HBP) had been selected as a "flagship project", and would be supported with 1.9 billion euros. Expected to publicly display the "excellence" of European research, the HBP proposed no less than the development of a computer simulated human brain. This project attracted the praise of transhumanist movements, and was criticized in the media for its transhumanist undertones[12]. After the skeptical position of the nanotechnology-related European reports had construed transhumanism as an extra-European philosophy, this later initiative seems to be a clear contrast. Yet it shared with the examples discussed in this chapter a will to make science a problem of both technological and political progress. For the problematization of science within the HBP is not a matter of engendering innovation for the sake of perfecting a particular technological future. Rather, the HBP itself reflects the project of perfecting European research, and so too the progress of the Union: it is a technoscientific instrument for ensuring the integration of European society through the development of solutions for common problems.

As the HBP example shows, there may yet be many other sites where science is problematized in Europe as an issue of joint technological and political progress. This paper has not attempted to be exhaustive, but has instead demonstrated that emerging

[12] For instance, the "All about transhumanism" website, a "congregation of news, events, websites, and popular culture involving transhumanism" prominently displayed the promotional video of the HGP. A paper in a French newspaper devoted to the Human Brain Project was entitled "Transhumanistes sans gêne" (*transhumanists with no self-restrain*).

technologies proposing to intervene in "life itself" are entangled with crucial political questions pertaining to the identity of Europe. While these technologies offer the ways and means to perfect human life, European institutions situate them in a problematization of progress that extends far beyond the individual. As the examples discussed in this chapter have shown, European initiatives make them simultaneously matters of identifying desirable technological trajectories and perfecting European democracy. Through operations such as the experimental interventions in the European government of nanotechnology, the production of narrative of failure about past technologies, and the integration of "public values and needs" into European research policy, the problem of perfecting the technological future appears as that of producing of a politically perfected European collective, a collective within which a European polity would at last be supportive of science, and technology would in turn be responsive to public expectations. Problematizing science and technology as such is far from neutral. The three operations I have described propose to legitimate certain technological trajectories and certain forms of democratic organization at the expense of others. Within the later *Europe 2020* strategy, they privilege a few technoscientific challenges that are imagined to respond to the needs of a general European public, a public whose political representation thereby ceases to be a problem of (perfecting) electoral politics.

The three operations identified in this chapter probably do not cover the entire range of mechanisms crafting the European concern for joint technological and democratic progress. But they do offer insights for an analysis of technological development that do not take the expected direction of change as granted. Problematizing in the terms of progress has effects on individuals and collectives, and the interest of the European case is precisely that it illustrates processes whereby European construction goes hand in hand with the crafting of narratives of technological and democratic progress. Studying progress in the making, then, appears as a way of accounting for the gradual shaping of large-scale political entities.

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