The Governance of «Well-Ordered Science», from Ideal Conversation to Public Debate [*]

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ABSTRACT: In *Science, Truth and Democracy* (2001) and *Science in a Democratic Society* (2011a), Philip Kitcher proposed a model of "well-ordered science". Through the development of a philosophical ideal, Kitcher's well-ordered science aims to consolidate the requirements of both democracy and scientific practice. This paper is an attempt to follow this ideal model in a more empirical perspective: how far can we use such a theory in the realms of scientific policy and institutional frameworks? The focus is put on a case study of a public debate on nanotechnology which took place in France.

Keywords: science & society; well-ordered science; ideal conversation; nanotechnology; science policy; public participation.

RESUMEN: En *Science, Truth and Democracy* (2001) y *Science in a Democratic Society* (2011a), Philip Kitcher propuso un modelo de "ciencia bien ordenada". A través del desarrollo de un ideal filosófico, la ciencia bien ordenada de Kitcher tiene como objetivo consolidar los requisitos de la democracia, así como de la práctica científica. El presente artículo trata de seguir este modelo ideal desde una perspectiva más empírica: ¿Hasta qué punto podemos aplicar dicha teoría en el plano de la política científica y de los marcos institucionales? El enfoque se centra en un estudio de caso de un debate público sobre nanotecnología que tuvo lugar en Francia.

Palabras clave: ciencia y sociedad; ciencia bien ordenada; conversación ideal; nanotecnología; política científica; participación pública.

Use of the word "governance" is often controversial as it stems from administrative literature instead of philosophy or scientific policy, but it will allow us to catch here a reality which is not so easy to conceptualize. Governance of science generally means the decisions concerning research, referring thus to an intermediary zone including so-called political decisions and so-called scientific decisions as well. If there is indeed a point on which contemporary studies of science agree, it is on the lack of precise boundaries between the two domains. This governance has to take place at the level beyond the scientists themselves, since they are not the only ones affected by their research: potential recipients of therapeutic innovations, users or targets of a new military technology, laboratory animals, etc, are concerned as well. In a way we are all involved in scientific activity as its developments often have direct implications for our daily lives.

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Governing science requires a clear process of management of scientific activities.[1] Consequently the issue of good governance can be split in two:

- A descriptive aspect: how are scientific and technological choices really taken?
- A normative aspect: what are the best decision processes to implement as far as science is concerned?

In two books, *Science, Truth and Democracy* (Kitcher 2001, *STD*) and *Science in a Democratic Society* (Kitcher 2011a, *SDS*), Philip Kitcher deals with the question of the articulation of these two valuable concepts, science and democracy, and proposes a normative model of "well-ordered science". We will focus on the question of the ideal decision process for the conduct of future research, and especially the setting of the "research agenda". A proper attempt to engage some of the philosophical tools to help solving problems in science policy-making would require the consideration of no small amount of political and sociological experiments.[2] Such targeted processes could be citizen's panels, consensus conferences, technology assessment experiments, examining the role of parliamentary technology assessment offices, etc. In fact, Kitcher does not tell us what kind of decision-making procedure would be the closest to his ideal, and our point cannot be to criticize the Kitcherian philosophical ideal from an empirical standpoint or even from what is enabled by actual procedures. It is not obvious how an actual process of public deliberation could lead to a decision close to the best outcome of the ideal model, or even that a single procedure has to be preferred, according to political and cultural contexts. As Kitcher admits, the link between an ideal philosophical model and the institutional conditions of his "implementation" has to be mediated by social scientists. Starting here from a brief account of Kitcher's model, we will try to apply it to the description of a French experiment in scientific policy-making. Surprisingly enough the policy at stake here looks at first glance very much like the presentation of Kitcher's well-ordered science in *STD*. Instead of arguing that a lack of prospect and engineering from the social sciences is responsible for both the failure of the policy on the practical side and the limits of the philosophical model on the theoretical one, we will consider some features of both to look for the relevance of philosophical ideals in concrete cases. In a way, the policy presented could be taken as a good example of a too-naïve implementation of well-ordered science in actual democratic procedure.

Following Kitcher, there are two extreme views to avoid in the relationship between science and democracy. The first one would be to immediately place science outside of the field of politics and remove it from any democratic logic. According to a kind of "theological" conception of knowledge, it would be a separate domain to which laymen do not have access (*STD*, ch. XII). Science is here seen as an absolute

[1] We can quote here a definition from a European Union report: "Governance encompasses the multiple processes of control and management that take place within and between states, in public agencies and private firms, or in any other social organization. Governance involves directing or setting goals, selecting means, regulating their operation, and verifying results" (European Commission 2009).

[2] Such an attempt is alluded to by Kitcher at the end of his last book. He mentions for instance James Fishkin's deliberative experiments (*SDS*, 225).

and scientists are the only ones in charge of the truth. Within this framework all decisions about the conduct of science are to be delegated to scientists. The political aspect of this model has particularly been developed by Vannevar Bush (Bush 1945), but it has its roots in the centuries-old anchorage of authority on knowledge since centuries. A good instance of this attitude is the old-fashioned physician who says: "I'm your doctor and I know what is good for you and even if you don't agree with the cure I propose, you will take it". The extent of this mindset society and among scientists themselves today is not so clear. Some polls have tried to investigate the subject but the interpretation is subtle. A recent *Eurobarometer* writes "results show that Europeans feel that decisions about science are best left to the scientific community itself", although the total of the answers in favor of public involvement is greater than the sum of the answers against it.[3] Regardless of current opinion, it is precisely a major contemporary concern to build a model for our societies in which the ethical and political norms that should rule other fields of social life would also apply to science.

The opposite mistake is to believe that the problem of good governance of science is easily resolvable through democratic practices. Unfortunately there are no juries of civic mathematicians voting to decide which theorem is to be true. More reasonably we can vote on all decisions concerning science (whether we should engage in nuclear research for example or in stem cells…). Yet the trap of what Kitcher calls "vulgar democracy" must be avoided—this would put all kinds of decisions regardless of the nature of the choice to an immediate vote. This solution would deprive democracy of the benefits of knowledge and lead to the "tyranny of ignorance". A more subtle variant of this perspective occurs when one is too optimistic and believes that the democratization of science can only improve the quality of science. Points in favor of this include highlighting the best practices of successful cooperation between scientists and the lay public, or integrating professionals in observation, problematization and scientific experimentation. Many science studies report such successful experiments.[4] In *Taking European Knowledge Society Seriously*, Brian Wynne & Ulrike Felt tried to make a more general use of these too-specific experiments, however an integrated framework is still needed (see below) and further studies are required on this point (European Commission 2007a).

Between those two extreme points, Philip Kitcher describes what would be a well-ordered science, in a sense that science, in its main orientations and in its daily practices, should be subjected to certain moral and political norms. A choice affecting the collective cannot be the decision of a single person, even if this person is the most competent one from a technical point of view (an expert scientist) or the one in charge of public affairs (a legitimate politician). According to the definition of *SDS* science would be "well-ordered" if all scientific choices were the result of an "ideal conversation", requiring three conditions: that this conversation is *fully representative* ("embodying all humans points of view", *SDS*, 106), *well-informed*, and takes place under the conditions of *mutual engagement* ("remedying of altruism failures", *SDS*, 57). We

[3] 51% vs 43% (European Commission 2010).

[4] For a seminal study in sociology of science see (Callon 1986).

will meet these three requirements all along our analysis—however in this paper we will instead follow the steps of the ideal deliberation presented in the tenth chapter of *STD*. I will quickly sum up this normative ideal of a conversation as following.[5] First, all the information must be correctly transmitted and understood by all the participants. These participants are then able to conceive the correct epistemic and practical meaning of each proposed line of research. During this "educational" phase the participants can change their preferences, which consequently lead us to the confrontation of "tutored preferences". These tutored preferences are compared in the ideal discussion, in which these preferences are modified by what one learns of the preferences of others. Once the main orientations of research are set up in the ideal discussion, evaluation of scientific projects is then left to the experts,[6] and then the choice for the programs of scientific inquiry is left to an ideal judge. In the last phase, research conduct and applications are controlled by standards, so that scientific activity is not exempt from the norms of democratic life (respect for the human person during experiments for example).

Once we have the guiding principle of an ideal conversation for good decisions in mind, the question we are entitled to ask (even if Kitcher does not directly confront it) is of the best institutions—that is to say, the institutions that will allow us to approach the supposed outcomes of this ideal. Indeed, many official attempts to open dialogue with citizens as far as scientific and technological decisions are concerned preceded Kitcher's model. These attempts are not new—they are part of national and political cultures that make them difficult to compare, but they are usually referred to "science and society" initiatives. In Europe, these practices have their roots in the 1970's, at a time when scientific and technological progress was called into question.

The first reaction of the authorities was to improve the communication of scientific information and public scientific literacy: centers of scientific and technical culture were developed, science museums were opened. In this view, a well-educated public would willingly endorse any scientific and technological choice made by policy-makers and scientists. This theory is known as the "deficit model" in the sense that distrust in science would only be due to a lack of knowledge (Royal Society 1985). Protests would be due to misunderstandings based on a lack of expertise to be overcome with a better education in school and improved scientific communication. Several studies have since endeavored to establish the link between the level of education/science literacy and risk aversion or the rejection of science and technology, but there is no consensus on this correlation in the empirical studies.[7]

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[5] We will later name this process "Ideal Conversation model" or IC model.

[6] This is the case in *STD* and some changes appear in *SDS* for these last steps, and particularly in the "public certification of knowledge" (see for instance, *SDS*, ch. 6). Inasmuch as we are primarily focusing here on agenda setting we will not insist on this point but there are many interactions between the certification of knowledge and setting the agenda.

[7] See for instance (Boy 2007). According to some opinion polls, the chance of being against nuclear technology or GMOs is correlated positively with diploma/education level.

Since then, the demand has been growing for greater public participation in the governance of science. Since the 1990s some participative experiments have been set up, such as consensus conferences, citizen juries, public debates or the so-called "technology assessment" procedures. Nowadays these experiments are localized and focused on specific topics, restricted to certain areas of public research. Furthermore they are conducted at a regional or national level, at best at European level—while research has become more and more global and worldwide. As a European Commission report puts it: "Policymakers increasingly recognize that deliberation is a cornerstone of good governance. What global deliberative governance might look like nevertheless remains unclear" (European Commission 2009). Another document concludes: "The links from public engagement back to the choices, priorities and everyday practices of science remain fuzzy and unclear. Dialogue tends to be restricted to particular questions, posed at particular stages in the cycle of research, development and exploitation… There are questions about the science we need and the science we want; questions about uncertainty, evidence and burdens of proof; questions about ownership, access and control. We need to learn how to open up and debate these questions in public" (European Commission 2007b). New practices are emerging. They suffer however from the lack of a clear conceptual framework in scientific policy. Various social sciences are engaged in these experiments: to introduce and manage methodological innovations or to enhance the development and the evaluation of these policies. The role of philosophy and perhaps of a model like the one proposed by Kitcher could be to provide the theoretical horizon of a deliberative global governance of science.

Ideally this would imply looking for the institutional implementation of such models, for the social epistemology underlying it, and for some proposals in public policy. Kitcher describes the "Ethical Project" as having progressed for tens of thousands of years, from a "relatively crude initial phase" to a complex articulation of rules, and then to our even more complex contemporary institutions (Kitcher 2011b). Far beyond the scope of this paper, a systematic analysis should first classify (i) the spontaneous emergence of some topics on the public sphere (through protests, boycotts, scandals, sensationalist journalism…) and (ii) all the intentionally organized debates about science in society (social experiments); and then evaluate the match between each type of social experiment and the Kitcherian model. For the sake of clarity and coherency we will focus here on a single example: a public debate on nanotechnology in France held between 2009 and 2010.[8] As an example of (ii), this institutional attempt is interesting inasmuch as it tried to involve both stakeholders (those more involved but with different interests in the field) and laypeople, a procedure supposed to be more representative. A participative experiment can be launched at any institutional level; the nanotechnology debate was considered a major event as it stemmed from a political decision at a national level[9]. As one of the main members of the government

[8] For an overview and assessment, see (CNDP 2010).

[9] If the national level may not always be the more relevant to scientific decision making, it is still in France preeminent as far as political debates are concerned.

at the time put it: "Nanotechnology is a fundamental revolution to come, and I don't want this revolution be only a thing of experts. The debate aims to involve citizens in the basic orientations of the future of society."[10]

We will follow here the steps described by Kitcher for the ideal conversation and draw a parallel for each step with the features of this public debate on nanotechnology. The table summarizes the major steps of both ideal discussion and real debate. Our goal is to stress the obstacles that plagued the public debate and the subsequent improvements that may be inspired from the ideal model.

Ideal Conversation Model	Public Debate on Nanotechnology	
	Action	Authorities in charge
Setting up the debate (a)	Request made to the Commission	Government /Ministries
Ideal information to create tutored preferences (b)	Information file + participant contributions	CNDP[11] and stakeholders
Modification of tutored preferences through discussion (c)	Participant contributions + Public meetings	CNDP and participants during the meetings
Research program selection (d)	Call for projects	ANR[12], PIA[13], research centers, universities…
Conduct of research (e)	Ethical boundaries…	Legislation, ethic committees…

Setting up the debate (a)

The preliminary step is the identification of the problem at stake, and it is not only an empirical problem. How do we know that a debate is required on such fields as "nanotechnology" or say "synthetic biology"? There are two questions here, one of the delimitation of the domains in question, and another of the problematic definition of the identified domain. (i) Defining domains is a problem of individuation of scientific activities, specifically by the authorities in charge of scientific governance. Without going so far as radical nominalism, the arbitrary nature of borders thus delineated should be noted. Scientists themselves do not hesitate to play with it, integrating their research under different labels depending on calls for proposals and available funding (Klein et al. 2008). As Kitcher emphasizes, this point is too often left to serendipity in the history of our institutions, and we must add the effects of fashion when a new concept

[10] Speech held by Jean-Louis Borloo, French Minister of Ecology, Energy and Sustainable Development, on the occasion of the launch of the public debate on nanotechnology (Paris, Sept. 23rd 2009).

[11] *Commission nationale du débat public*: National Commission for Public Debates.

[12] *Agence nationale de la recherche*: National Research Agency.

[13] *Programme d'investissements d'avenir*: French applied research program.

emerges and flourishes. (ii) The second question concerns the decision to debate a particular scientific choice perceived as problematic. It is a burning issue in our context where some scientific issues are submitted to the deliberation of citizens, but not all. In other words, when a scientific domain becomes a public issue, this implies that the area identified is already recognized as problematic enough to deserve discussion. Here we face the risk of a conceptual infinite regress, since a discussion would ideally have already taken place to identify priorities to be discussed. A variant of this argument is known as the "Collingridge dilemma" (Collingridge 1980): for the sake of democracy the development of significantly new technology should be discussed as early as possible in the public sphere, but as long as this technology is not developed we cannot see what it means and implies.

Let us say that in well-ordered science, provided with efficient technical support, we must be able to discuss all the broad guidelines of research at the same time. One big difference between the IC model and organized debates to date is precisely this: social experiments always are linked to a particular field of research, as vast as that may be, while the ideal conversation model also weighs alternatives between research programs themselves.

Ideal information (b)

The first stage described by Kitcher, even before any "conversation" takes place, is a phase in which each participant receives maximum information. This step aims to ensure that "each deliberator becomes aware of the significance, epistemic and practical, attaching to potential lines of inquiry" (*STD*, 118). The initial preferences of the participants are then replaced by "tutored preferences". In most deliberative experiments, authorities, in the continuity of their action in favor of scientific and technological culture, included an attempt to educate the participants, with talks and presentations from scientists, combining diverse backgrounds and disciplinary or institutional points of view, in order to avoid biased information. As far as the public debate on nanotechnology is concerned, a large information dossier was compiled by the authority responsible for the debate (the Commission for Public Debate), introducing nanotechnology and the issues at stake. This document was created and tested with the collaboration of a panel of scientific experts and a focus group of 15 lay citizens. It was complemented by 51 contributions of participants, prepared by any party that wished to enter the debate. These contributions were both informative and stated the participant position. Research organizations, environmental organizations, trade unions, scientific societies, etc, produced many valuable documents on the subject, covering a broad range of opinions.

As an empirical conclusion the debate failed in a way to reach the general public, the impact of this debate on the whole French population was surely disappointing (the main objectives in terms of participation in public meetings and website visitors were not achieved). A key point was the lack of time to increase public awareness of this issue and to reach a larger public through scientific information. In fact this problem is difficult to overcome since the participants can never be in the same epistemic state. Too much emphasis on this point, may lead directly to the "deficit model", in

which the poor transmission of information is mainly responsible for the lack of consensus on scientific issues, a position already taken for obsolete in social science and public policy. Even if we do not intend to go so far as "the tyranny of the ignorant", the debate must be allowed to take place with distributed expertise, each participant providing both knowledge and preference at the same time.

In the end, the best reason to minimize the role of the "information" input in a public debate, is that this point can quickly be turned against the will to open the debate. If one holds that no debate should take place until citizens receive a proper education, one can postpone the debate forever. If a reasonable threshold of knowledge is reached, you should accept that the conversation is valuable and meaningful.

Discussion (c)

The discussion itself aims at modifying the preferences of the participants and if possible to find a balance between their positions.[14] This is one of the most interesting points in the case of our nanotechnology debate, and what made it so singular and famous: debates should have taken place all over France, in large meeting rooms open to the general public. Contrary to many deliberative experiments based on the careful choice of a panel of citizens, either randomly or in a representative way according to the diversity of social backgrounds, these debates were open to all. If the meetings indeed occurred in some cities, the debate was not held in many of them, individuals or organizations preventing them from happening by force. Some debates thus had to be cancelled due to these protests (with banners, shouting…). These dissenters were putting forward the following argument: joining the debate means recognizing the legitimacy of the debate and the authority, which in turns means accepting nanotechnology, the political outcome of the debate suspected in advance to be the endorsement of R&D in nanotechnology. In a sense the dissenters were more informed than many citizens not taking part in the debate (and there were even scientists among them). This debate has certainly changed the preferences of some participants, including scientists who became aware of the potential effects of their research on the public and the resulting ethical issues. In the perspective of a comparison between the ideal conditions of the model and reality, the main difference lies in the fact that the engagement of the stakeholders in the debate appears proportional to their interests in the field, so their point of view is either concerned or biased, whereas in the IC model its participants have to be "mutually engaged" (*SDS,* 51ff).[15]

If the philosophical preconceptions can evolve through discussion, it is not the case of economic interests, which are likely to remain unchanged during the debate.

[14] In a case where no consensus is to be found, some different ways of dealing with this situation are mentioned in *STD* (119) and in *The Ethical Project*. Dissent on the research priorities can for instance lead to vote or to protests, and those deliberative experiments are only a part of the more general institutional framework of representative democracy. See on this point (Brown 2009). Our case study does not make such sense in this issue, the debate being only advisory and not decisional (cf. infra).

[15] A psychological disposition to altruism could be required to justify this condition. More on this mutual engagement condition in (Kitcher 2011b).

Let us consider for instance the official positions of the organizations—notice that participants in the discussion are not only individuals but also collectives, or corporate bodies. For a research organization, it is much more difficult to reach a consensus on moral or philosophical positions than on a shared interest of members of the organization, like promoting the development of a new research field providing funds and jobs for its labs. Such an "interested" position would even be institutionally more stable than the position of the current president of the organization, of the director of the lab, or of an ethics committee composed of prominent personalities. Institutional or official stands would also very unlikely be amended by the debate. The policy of interests or the "stakeholder model" could roughly exemplify this kind of approach, taking into consideration the actors concerned directly by a decision. In order to be part of the discussion, every interest has to be represented by some institutional means. This model does not prevent the ruling out of many public issues (Bensaude-Vincent 2012). One of the challenges of social experimentations today is to find new methodologies in order to resolve this tension between the so-called broad "public" and the engaged actors (Pestre 2011).

Research program selection (d)

According to Kitcher the ideal discussion does not end with the broad guidelines of research. It must also be pursued until the research programs themselves have been selected. This model is in line with current public policies that aim to stimulate the engagement of research in directions which are not only epistemically significant but also socially relevant. In the U.S., the National Institute of Health and the National Science Foundation have held this position for a long time. More recently in Europe, the Framework Programmes and other national scientific project funding agencies are rising. Here is an interesting lesson we can draw from Kitcher's thought experiment. At the very same time that the public debate on nanotechnology was being set up in France, calls for proposals in research were already being launched in this field by research institutions or funding agencies. The stakeholders and participants of the debate therefore denounced a hollow debate, that was in no way intended to influence research and that could not control it. The authorities responsible for the debate (ministries/government) were supposed to announce their decisions concerning nanotechnology research immediately after the end of the procedure, once the debate was over and its conclusions were published. Instead, the authorities remained silent for two years, despite repeated requests from stakeholders to speak out. In the meantime, important decisions were made, call for projects were launched or even selected, some research was undertaken, and commercial products including nanotechnology were sold. Finally, in February 2012, almost three years later, a statement was published expressing "the government's commitments following the public debate on the development and regulation of nanotechnology" (CGDD 2012).[16]

[16] Noteworthy is that this document comes from the ministry in charge of environment, not from the authorities directly in charge of scientific research.

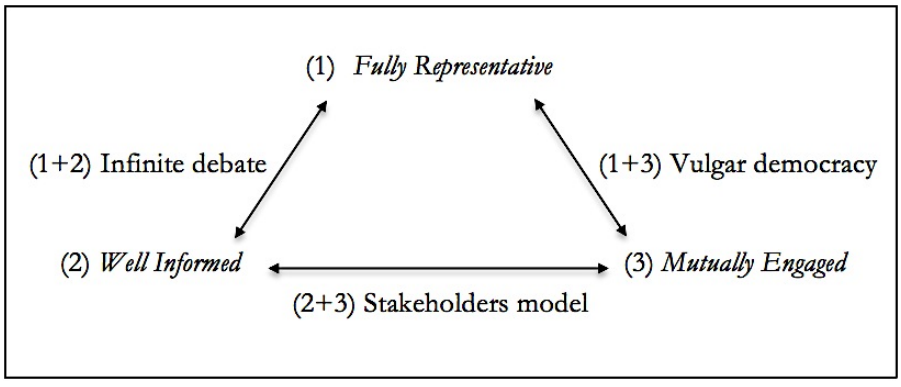
We face two different problems here:
(i) The first concerns the institutional consistency and the role of these debates in decision making. What we can learn from the IC model is that the debate should not be superficial or confined to a small part of the process. For now the debates of this kind are confined to an advisory role, as they are just a new procedure at an experimental stage. The credibility and the legitimacy of the debate, even of an advisory one, depend on the will of the decision maker to take into account the conclusions of the debate. In a similar way, the ideas circulating during the debate had for the main part already been previously put forward by many advisory bodies. However they had seldom been considered, and the assessment made by the chairman of the National Commission for the Public Debate raises concerns about the coordination and the impact of this expertise (CNDP 2010). The Kitcherian model tells us that fundamentally we are dealing here with one and the same discussion. Maybe we could make the following suggestion: that a single institutional structure clearly dedicated to scientific and technological questions should be made responsible for public discussion and the selection of research programs, based on this discussion. The plurality of institutional structures makes orientation and discussion very difficult today, especially for the lay citizen. Furthermore this plurality prevents the quality of the exchange of ideas and the impact of those ideas on research policy. There are already stakeholders within research organizations, such as patients' organizations in health institutes, but we can go still further, and involve them further upstream. Such an upstream engagement implies the development of research strategies in the most public way possible, so why not combine it with participative methodology? It would thus bring together what is currently institutionally separated (development of the research strategy at the political level, selection of projects in the hands of scientists, and discussion on broader issues with all the stakeholders, which is now restricted to advisory debates).
(ii) The second problem is a problem of temporality. This can also be considered as challenging the development of well-ordered science in our societies. When we say "challenge", it is not the relevance of the model *per se*, but its ability to provide a guide to action. Is it possible to reconcile the time for discussion and the research agenda or the rhythm of economic competition? This is the major obstacle that supporters of democracy have to overcome. Unlike an ideal conversation, any debate procedure as we have described takes time: time to inform, time to bring together deliberators, time to discuss, to exchange ideas, then to select projects—and these stages and their chronology must be respected. In *SDS*, Kitcher writes: "Except when something has to be done very quickly, it is worth taking time to explore what others know and what others want" (*SDS*, 114). In our democracies numerous important issues stay beyond debate, precisely in the name of the emergency. First, an economic urgency. For instance, the previously cited governmental document relative to nanotechnology (CGDD 2012) begins precisely with insisting on the overall estimated value of the nanotechnology worldwide market in 2015 ("from 500 to 3500 billion euros"). It shows that the true objective for the authorities is the role of France as a market leader in this field, which requires not wasting too much time arguing. This economic urgency is coupled with a scientific rush: in the domain of globalized science, innova-

tions and discoveries are the prizes of a team competition. Scientific prestige and economic gains may be reserved for the first over the line. Fear of delay, both from a scientific and an economic point of view, prevents us from taking the time to discuss issues of science and technology and ask the question of what is worth developing or not. Again, a proposal that comes to mind following the ideal model is to implement an automatic discussion process, which would be routinely set up and integrated in decision-making processes of our democracies. Indeed a much faster and efficient system for discussion is needed.

Conduct of research (e)

The last step leads us to the conduct of research and its applications. We do not focus on this because this is perhaps the most discussed issue and the most developed today. The democratic control on research and its application already exists through legislation and it has certainly to be developed further. The public debate on nanotechnology stressed these problems of control, of detection or of risk, at the expense of the strategic issues and the direction of research. It is precisely one of the major criticisms that have been made of the debate: it focused the discussion too much on regulation issues and did not point out the more fundamental choices for research.

To conclude, we will recall the three conditions for the success of the ideal conversation: *fully representative* (condition 1), *well informed* (condition 2), *mutually engaged* (condition 3). As far as the setting of an actual research agenda is concerned, we cannot literally have the three of them, but we can reasonably find a balance, prioritizing some conditions over others. In this case we might form an approximate characterization of some of the actual institutional procedures and of some of their flaws. For instance, if one wants to have a well-informed debate, one cannot be fully representative in a reasonable amount of time and organizational constraints. Or if one insists on having well informed people participating in the debate, they might not be mutually engaged, in the sense that most informed participants are also those who have deep interest in the field, and they are not likely to change their point of view or to be sincere (conditions 2&3, cf. the stakeholder model biases). Or if one wants to have well-informed and representative participants, then the debate is likely going to last forever (conditions 1&2).



As a two-fold general conclusion we can propose:
(i) As far as we are looking for a model of governance of science through public debate, philosophical conceptions should recognize that the expertise is necessarily distributed (there is no perfect epistemic agent). One of their main concerns should also be to avoid any assumption related to what has been called the "deficit model", if they do not want to be discarded before even being taken into consideration. Lastly, we have to find a balance (or at least to confront this problem head-on) between the three conditions of a successful discussion, which are Representation, Information and Engagement. Those three conditions have close relationships.
(ii) As far as we are looking for institutional reforms to come, one of the main concerns of the current governance of research reforms—which are taking place in almost all countries—should be an integration of true deliberation in the governance of research. The "panhuman conversation" is much more important than any one-way communication overselling the benefits of science. Institutions responsible for this task should be encouraged, although in the details the national contexts are very different from each other.

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