Organising Collective Responsibility: On Precaution, Code of Conduct and Understanding Public Debate

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Abstract.

This paper makes a case for organizing collective responsibility through instruments beyond the regulatory system, such as codes of conduct and various deliberative assessment mechanisms within and outside the policy context. The paper reviews the requirements for implementing an ethics of co-responsibility with a view on the challenges current and prospective developments in the nanoscience and nanotechnologies impose on the regulatory systems of modern societies.

Keywords. Deliberation, Precaution, Public debate, code of conduct, nanotechnology policy

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1. Organising collective responsibility

Individuals assume responsibility for the consequences of their actions if, and only if, they can intentionally direct those actions and reasonably assess the consequences, both intended and unintended. But the consequences of scientific discovery and engineering design often escape all common or natural means of assessment. Most often neither scientific discovery nor the consequences of technological innovation can be traced back to the intentions of individuals At the same time, the consequences and side-consequences of technological innovation are usually the result of collective action or effects of societal systems such as our market-based economy rather than resulting from the actions of individuals. These circumstances are a challenge both for the academic discipline of ethics and for actual practice.

Science and engineering exist, in the first instance, within the scientific and technological systems and, subsequently, by means of a complicated transformation and use, are transplanted into the system-specific logics of the economy, politics, and law. None of these system logics are traceable to the intentions of individuals, nor are the possible unintended consequences always assessable. Scientists who have knowledge that leads to applications which are then criticized by many in society, may rightly point out that they anticipated other applications. Engineers who design products, processes, or systems that wind up actually being used in a variety of ways (guns that kill people as well as protect them, for example) make the same argument. Scientists and engineers may even claim that the possible applications and/or uses are not part of their occupational role responsibilities as scientists or engineers. In another sense, the scope of the ethics of engineers is a different one, than the responsibility for simple applications as such. For instance, a responsibility for the specification of particular technical standards for product-safety and efficacy rather than for the complete implementation of all kinds of requirements for a particular end-product. What is clearly required is thus some transformed notion of responsibility beyond the simple multiplication of roles or the expansion of occupational role responsibility to encompass public safety, health, and welfare. Indeed, techno-scientific applications can remain ethically problematic even in cases where scientists and engineers have the best possible intentions and users have not conscious intention to misuse or abuse. This situation constitutes the major ethical challenge we face today.

In response to this problem, we would need an ethics of collective co-responsibility. The itemized inadequacies of occupational role point precisely in this direction. Such a collective ethics of co-responsibility arises from reflection on the social processes in which technological decision making is embedded. That is, any new ethics must deal with the same substance as the old role responsibility ethics, namely with values and norms that restrict or delimit human action and thus enable or guide traditional decision making; but in the new ethics these values and norms will arise not simply in relation to occupational roles and their allocation to particular individuals. Here it is appropriate to address at least four general features and requirements for the implementation of such an ethics, which I review here below shortly (see Von Schomberg 2007, for a full coverage of this topic).

1.1 Public debate

To be co-responsible includes being personally responsive. It is clear that the norms of specific technical professions are insufficient because they arise from restricted perspectives. A true ethics of co-responsibility must be both interdisciplinary and even inter-cultural, in order to provide a standard of justice for evaluating and balancing conflicting occupational role responsibilities. If we fail to provide such an ethics, we inevitably continue to aggravate the clash of cultures and unarticulated hostile responses to particular (globalized) technologies.

According to my view, an ethics of collective co-responsibility is expressed at the level of free (international) public debate in which all should participate. It is unethical and even unreasonable to make any one individual responsible for the consequences and/or (adverse) side effects of our collective (especially technological) actions. It is, however, ethical and reasonable to have the expectation that informed and concerned individuals engage in the participation in public debates (subject, of course, to the particular situation), or at least make this the default position for which persons must give reasons for being excused from such a duty. Upon everyone's shoulders rests a particular moral obligation to engage in the collective debate that shapes the context for collective decision making. It is not just engineers who do social experimentation; in some sense all human beings are engineers insofar as they are caught up in and committed to the modern project.

If we trace, for instance, the history of environmental challenges, we see that many issues which depend on the involvement of personally responsible professionals were first identified and articulated within the public sphere. Public deliberation does not primarily aim at creating of itself a reasonable consensus, but serves, among others, the function of presenting different relevant issues to the more or less autonomous systems and subsystems of society -- that is, to politics, law, science, etc. The typically independent discourses of politics, law, science, etc. are called upon to respond to issues raised in public debate. An appropriate response by the appropriate subsystem to publicly identified and articulated issues constitutes a successful socio-ethical response. Conversely, responsible representatives of the subsystems are drivers for new debates, when they publicize particular aspects of an issue that cannot be fruitfully resolved within the limits of some specialized discourse. The continuous interaction between the autonomous subsystem discourses and a critically aware public provides an antidote for frozen societal contradictions between opposing interests, stakeholders, or cultural prejudices. It articulates also a form of ethical reflexivity[1]

1.2 Technology assessment

To be collectively co-responsible involves developing transpersonal assessment mechanisms. Although the institution of the public realm and interactions with the professionalized subsystems makes it possible for individuals to be co-responsive, these deliberations are in many cases insufficiently specific for resolving the challenges with which technological development confront us -- that is, they do not always lead to the implementation of sufficiently robust national or international policies. Therefore all kinds of specific deliberative procedures -- for instance deliberative technology assessment procedures -- must be established to complement general public debate and to provide an interface between a particular subsystem and the political decision-making process. The widely discussed consensus-conferences are one example of an interface between science and politics.

The implementation of ethics codes by corporations also constitutes an interface between the economic sector, science, and stakeholder interest groups, while national ethics committees are often meant as intermediaries between the legal and political system. Experiments with such boundary activities or associations have been, depending on the case, more or less successful. They represent important experiments for enabling citizens to act as co-responsible agents in the context of technological decision making. Further below, I will unfold the argument why the European Commission's recommendation for a code of conduct for the responsible development of nanosciences and nanotechnologies research is an example how we could *organise* collective responsibility in this particular field.

1.3 Constitutional basis or change

Collective co-responsibility may either be based on fundamental constitutional principles or may even eventually entail constitutional change to incorporate relevant principles. The initiation of specifically new forms of public debate and the development of transpersonal science and technology assessment processes may eventually require constitutional adjustment. Indeed, the adaptation of specific deliberative principles in our constitutions must not be ruled out.

The implementation of the precautionary principle, which is inscribed in the European Treaty and now also guides important international environmental deliberations (Climate Change negations, the Biosafety Protocol, etc.). is an example of a relative recent constitutional change in the context of the European Treaty This principle lowers the threshold at which governments may take action and possibly intervene in the scientific or technological innovation process. The principle can be invoked if there is a reasonable concern for harm to human health and or the environment, in the light of persisting scientific uncertainty or lack of scientific consensus. The very implementation of such a principle requires new and badly needed intermediate deliberative science-policy structures (Von Schomberg 2006, p.35ff) It imposes an obligation to continue to seek scientific evidence and

1. [1] Vgl Arie Rip and Clare Shelley-Egan 'Positions and responsibilities in the 'real' world of nanotechnology' in Von Schomberg, Davies (2010).

enables also an ongoing interaction with the public on the acceptability of the plausible adverse effects and the chosen level of protection. The principle gives an incentive for companies to become more proactive and necessarily shapes their technoscientific research programs in specific ways. The principle is also reflected in the Commission's recommendation for a code of conduct and will have an impact on the organisation of research (see further below).

1.4 Foresight and Knowledge assessment

The issue of unintentional consequences can be traced back among others to the (principle) limited capacity of the scientific system to know in advance the consequences of scientific discoveries and technological actions. Virtually all complex technological innovations, from which our societies do benefit, are surrounded by scientific uncertainties and several degrees of ignorance. Instead of addressing the ethics of technology, it could therefore be more appropriate to address the "ethics" of knowledge transfer between our societal spheres such as the knowledge transfer between science and policy. As the "quality of the knowledge" will, by large, determine our relative successes in using this knowledge in the context of all kinds of possible applications. At the same time, we do constantly need a form of foresight (as predictions about our future have been shown to be enormously imperfect) in which we evaluate the quality of our knowledge base and try to early identify societal problems and new knowledge needs. (Von Schomberg 2005).

2. The responsible development of nanosciences and nanotechnologies: A historical perspective

The formation of public opinion on new technologies is not a historically or geographically isolated process; rather, it is inevitably linked to prior (national and international) debate on similar topics. Ideally, such debates should enable a learning process – one that allows for the fact that public opinion forms within particular cultures and political systems. It is therefore not surprising that, in the case of nanotechnologies, the nature of public debate and its role in the policy making process is articulated against a background of previous discussion of the introduction of new technologies (such as biotechnology), or that specific national experiences with those technologies become important. In particular, the introduction of genetically modified organisms (GMOs) into the environment is a frequent reference point within Europe (whereas more frequently absent in such debates in the USA).

This historical development of policy frameworks can be followed through the ways in which terms are used and defined: initially, definitions are often determined by the use of analogies which, in the initial stages of the policy process, serve to 'normalise' new phenomena. In a number of countries, for instance, GMOs were initially regulated through laws which deal with toxic substances. Subsequently such analogies tend to lose their force as scientific insights on the technology grows and distinct regulatory responses can be made. GMOs, for example, eventually became internationally defined as 'potentially hazardous', and, in the European Union, a case by case approach was adopted under new forms of precautionary regulation. This framework was developed over a period of decades, and thereby took into account the ever-widening realm in which GMOs could have effects (developing from an exclusive focus on direct effects to eventually include indirect and long-term effects). It is not, however, solely the scientific validity of analogies which determines definitions and policy: public interest also plays an important role. Carbon dioxide, for instance, has changed from being viewed as a gas essential to life on earth to being a 'pollutant'. (The latest iteration of this evolution came just prior to the Copenhagen summit on climate change in December 2009, when the American Environmental Protection Agency defined greenhouse gases as a "threat to *public health*" – a definition which has important implications for future policy measures.)

In the case of nanotechnology policy, then, it seems likely that we are still in the initial phases of development. There are not, so far, any internationally agreed definitions relating to the technology (despite repeated announcements of their imminence), and nanoparticles continue to be defined as "chemical substances" under the European regulatory framework REACH. (Analogies are also made with asbestos, as a way to grasp hold of possible environmental and human health effects, but these are contested. There is no certainty that they will become the definitive way to frame risk assessments.) To cite one topical example, nanotechnology in food will not start its public and policy life with a historically blank canvas but will be defined as a 'novel food' under a proposal for renewing the Novel Foods regulation.(The Novel Foods regulation came into existence in the 1990's with foods containing or consisting of GMO's in mind). Recent proposals for renewing regulation on food additives (after a first reading of the European Commission's proposal in the European Parliament in April 2009) have made this the first piece of regulation to include explicit reference to nanotechnology.

Public debate that articulates particular interests and scientific debate on the validity of analogical approaches to nanotechnologies will inevitably continue to shape the ways in which nanotechnologies are addressed in regulation and policy. But the governance of the technology, as well as debate around it, has to be seen within its historical context. How did stakeholders behave in previous cases, and what can we learn from these cases with regard to nanotechnology? One answer to this question might point to a learning process around the governance of new technologies, and the development of a consensus that early involvement of both stakeholders and the broader public is of the utmost importance. The European Commission has responded to this with its adoption of a European strategy and action plan on nanotechnologies, which addresses topics from research needs to regulatory responses and ethical issues to the need for international dialogue. This strategy above all emphasises the "safe, integrated and responsible" development of nanosciences and nanotechnologies – something which the DEEPEN[2] consortium has drawn upon in articulating how 'responsible development' might take its course within deliberative fora.

3. The Code of Conduct for the responsible development of nanosciences and nanotechnologies

Policy development treads a fine line: governments should not make the mistake of responding too early to a technology, and failing to adequately address its nature, or of acting too late, and thereby missing the opportunity to intervene. A good governance approach, then, might be one which allows flexibility in responding to new developments. After a regulatory review in 2008, the European Commission came to the conclusion that there is no immediate need for new legislation on nanotechnology, and that adequate responses can be developed – especially with regard to risk assessment – by adapting existing legislation[3].

While, in the absence of a clear consensus on definitions, the preparation of new nano-specific measures will be difficult, and although there continues to be significant scientific uncertainty on the nature of the risks involved, good governance will have to go beyond policy making focused on legislative action. The power of governments is arguably limited by their dependence on the insights and cooperation of societal actors when it comes to the governance of new technologies: the development of a code of conduct, then, is one of their few options for intervening in a timely and responsible manner. The Commission states in the second implementation report on the action plan for Nanotechnologies that "its effective implementation requires an efficient structure and coordination, and regular consultation with the Member States and all stakeholders" (CEC, 2009, page 10). Similarly, legislators are dependent on scientists' proactive involvement in communicating possible risks of nanomaterials, and must steer clear of any legislative actions which might restrict scientific communication and reporting on risk. The ideal is a situation in which all the actors involved communicate and collaborate. The philosophy behind the European Commission's code of conduct, then, is precisely to support and promote active and inclusive governance and communication. It assigns responsibilities to actors beyond governments, and promotes these actors' active involvement against the backdrop of a set of basic and widely shared principles of governance and ethics. Through codes of conduct, governments can allocate tasks and roles to all actors involved in technological development, thereby organising collective responsibility for the field.(CEC, 2008) Similarly, Mihail C. Roco has argued that rather than monitoring in detail the interactions among stakeholders:

> " it is more efficient to support various parties to play their roles in the overall system, encourage partnerships, and facilitate mechanisms for interactions and conflict solving" (Roco, 2008, page 25).

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[2] The DEEPEN (Deepening Ethical Engagement and Participation with Emerging Nanotechnologies) project was a three-year (2006-2009) research project funded by the European Commission's Framework Programme 6. The project was coordinated by Durham University, UK (Phil Macnaghten, Matthew Kearnes and Sarah Davies) and hosted by the Institute of Hazard and Risk Research (IHRR) in the Department of Geography. Project partners were researchers based at Darmstadt University of Technology, Germany (Alfred Nordmann and Arianna Ferrari), the Centre for Social Studies at the University of Coimbra, Portugal (João Nunes, Marisa Matias, Ângela Marques Filipe and Antonio Carvalho), and the University of Twente, Netherlands (Arie Rip and Clare Shelley-Egan). The project concluded in 2009. See: http://www.geography.dur.ac.uk/projects/deepen/Home

[3] However, the European Commission will give follow-up to the request of the European Parliament to review all relevant legislation within the next two years, to ensure safety over the whole life cycle of nanomaterials in products.

The FRAMINGNANO project[4] proposes a governance plan which both makes use of existing governance structures and suggests new ones, as well as proposing how they should relate to each other.

The EC Code of Conduct also views Member States of the European Union as responsible actors, and invites them to use the Code as an instrument to encourage dialogue amongst "policy makers, researchers, industry, ethics committees, civil society organisations and society at large"(CEC 2008, recommendation number 8 to Member States, page 6) , as well as to share experiences and to review the Code at the European level on a biannual basis.

4. Applying the precautionary principle

As argued above, the responsible development of new technologies must be viewed in its historical context. Some governance principles have been inherited from previous cases: this is particularly notable for the application of the precautionary principle to the field of nanosciences and nanotechnologies. This principle is firmly embedded in European policy, and is enshrined in the 1992 Maastricht Treaty as one of the three principles upon which all environmental policy is based. It has been progressively applied to other fields of policy, including food safety, trade and research.

The principle runs through legislation that is applied to nanotechnologies, for example in the 'No data, no market' principle of the REACH directive for chemical substances, or the pre-market reviews required by the Novel Foods regulation. More generally, within the context of the general principles and requirements of the European food law it is acknowledges that "scientific risk assessment alone cannot provide the full basis for risk management decisions"[5] – leaving open the possibility of risk management decision making partly based on ethical principles or particular consumer interests.

In the EC Code of Conduct, the principle appears in the call for risk assessment before any public funding of research (a strategy currently applied in the 7th Framework Programme for research). Rather than stifling research and innovation, the precautionary principle acts within the Code of Conduct as a focus for action, in that it calls for funding for the development of risk methodologies, the execution of risk research, and the active identification of knowledge gaps. Under the Framework Programme, for example, an observatory has been funded to create a network for the communication and monitoring of risk. The NANOCAP consortium – featuring deliberation among European NGO's and Trade Unions – similarly made a number of suggestions of further building blocks for a precautionary approach [6]

5. Outlook: Deliberative approaches to the policy making process

Deliberative approaches to nanotechnology should not be reduced to a public debate exercise. While such debate is important, the responsible development of nanosciences and technologies also requires deliberative approaches to the technology assessment mechanisms of the policy process (such as cost-benefit analysis, foresight exercises and risk assessments). Scientific and public controversies often remain inconclusive when there is a lack of consensus on the normative (ethical) basis of such assessment mechanisms. In the development of nanotechnologies, there is not

[4] FramingNano project was funded by the European Commission's Framework Programme 7 and coordinated by AIRI/Nanotec IT (project coordinator, Elvio Mantovani and Andrea Porcari, ,Italy). Project partners: The Innovation Society (Switzerland), The Institute of Nanotechnology (UK), National Institute for Public Health & the Environment – RIVM (The Netherlands), Fondation EurActiv (Belgium), Technology Centre (Czech Republic), see: www.framingnano.eu

[5] Regulation (EC) no 178/2002 of the European Parliament and of the Council of 28 January2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety states "(19) it is recognised that scientific risk assessment alone cannot, in some cases, provide all the information on which a risk management decision should be based, and that other factors relevant to the matter under consideration should legitimately be taken into account including societal, economic, traditional, ethical and environmental factors and the feasibility of controls".

[6] The NANOCAP, which concluded in 2009, was coordinated by Pieter van Broekhuizen based at IVAM of the University of Amsterdam in the Netherlands, Project website: www.nanocap.eu

yet a shared understanding of how we might define the acceptability of possible risks, or of how we would weigh them against possible benefits.
Moreover, in the context of scientific uncertainty and production of knowledge by a range of different actors, we need knowledge assessment mechanisms which will assess the quality of available knowledge for the policy process. We are currently forced to act upon developments while at the same time being uncertain about the quality and comprehensiveness of the available scientific knowledge and the status of public consensus. A deliberative approach to the policy-making process would complement and connect with deliberative mechanisms outside policy (on which, notably, the FRAMINGNANO consortium focused, see footnote 3). The outcomes of ongoing knowledge assessment[7] should feed into other assessment mechanisms and into deliberation on the acceptability of risk, the choice of regulatory frameworks or the measures taken under those frameworks. Knowledge assessment following the result of foresight exercises would then be important tools in setting out arguments for the necessity and nature of future legislative actions.

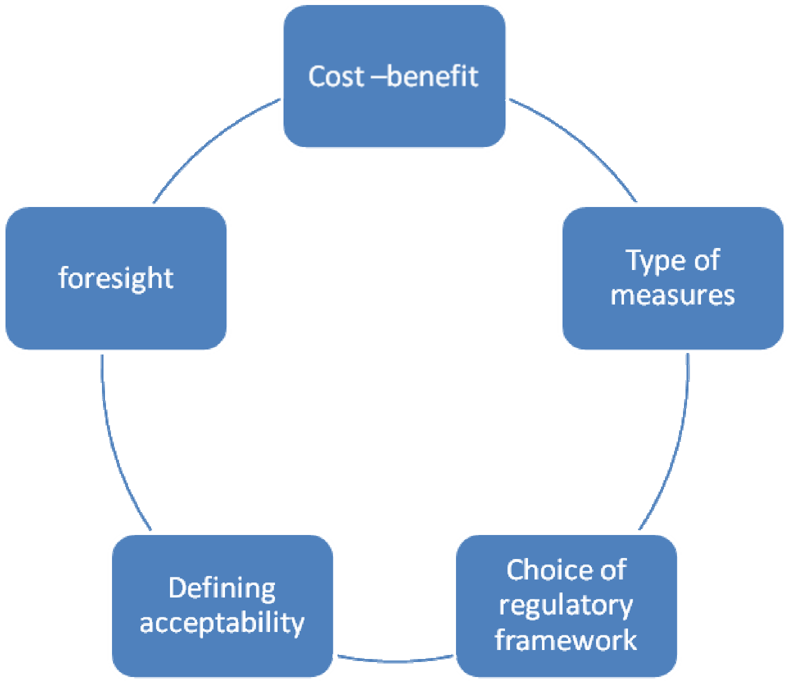

Figure 1: A non-directional cycle of assessment mechanisms within the policy making process fed by knowledge assessment processes.

It is important to note that the reason for this approach is not limited to the normative rationale of a more democratic and transparent decision making process. A deliberative approach to policy can also improve the quality of the decision making process and help to identify knowledge gaps for which we would need to go back to science. A part of this potential "quality" gain gets lost when we limit deliberation to stakeholder or public deliberation, although these constitute necessary components. An immediate normative deficiency of stakeholder deliberation is that the involved actors do not necessarily include the interest of non-included actors . That said, deliberative foresight exercises need to be progressively embedded in public policy in order to make a real qualitative step forward.

In policy, we cannot rely on stakeholder and or public deliberation as such, since epistemic dissent in science is immediately mirrored by stakeholder and public dissent in society. Policy makers are equally challenged by dissent in science as by dissent among stakeholders and the public. If we deal unreflexively with public debate (very often induced by a scientific debate), an improper politicising effect inevitably occurs and translates into an irrational struggle concerning the "right" data and the "most trustful and authoritative scientists" in the political arena. Interest groups can pick and choose the experts which share their political objectives. A functional deliberative approach,

[7] In accordance with the procedures developed in: Von Schomberg, Rene (2007) and Von Schomberg, Rene, Angela Guimaraes Pereira and Silvio Funtowicz (2005).

apart from public and stakeholder deliberation, includes a deliberative extension of the science-policy interface. Such an interface institutionalises particular deliberation based on normative filters such as notions of proportionality and precaution (or as we have in the EU, the requirement to implement the precautionary principle in policy frameworks), various forms of impact analysis, such as sustainability impacts, cost-benefit analysis, environmental policy impact analysis etc., the application of particular consensual norms or prioritisation of norms (for instance that health and environment takes precedence over economic considerations) and the application of normative standards for product acceptability. These normative filters are in themselves results of public and policy deliberation and enable consensual decision making at the public policy level. Although democratic societies have these deliberative filters in place, they need to be consciously applied and be subject of public monitoring. Currently I see a procedural gap, especially, when it comes to identification of knowledge gaps and the assessment of the quality of the available knowledge.

The NANOPLAT[8] project developed a case that a more permanent form of deliberation is necessary for enabling an ongoing process of collective responsibility. The consortium developed an online tool for the deliberation on consumer products, which might serve as a starting point for this ongoing process. The argument of the NANOPLAT consortium for the necessity for permanent forms of deliberation is also reflected in the recent Communication of the European Commission (CEC, 2009):

> "The existence of diverse forums indicates a need to monitor the debates at national, European and international levels, for instance with support from future FP7 activities, in order consistently to convey messages from public debates to policy makers"(CEC, 2009, page 6)
>
> and
>
> "Implementing a more direct, focused and continuous societal dialogue; and monitoring public opinion and issues related to consumer, environmental and worker protection" (cited from the conclusions of the Communication)

Any such discussions, however, also need to take into account the sheer scale of the numbers of nanomaterials expected to hit the market: J. Choi et al (2009, p 3030 ff) calculated that, merely for a 190 nanomaterials currently in production, the cost of risk assessment would amount to between $249 million(with optimistic assumptions about hazards) and $1,2 billion (in case of an approach consistent with the precautionary principle and this would take 34-53 years to fully implement). If a case for case approach consistent with the precautionary principle is taken, the capacity of regulatory bodies and the feasibility of control will soon become highly questionable given a likely flood of new nanomaterials. The question of the capability of regulatory systems plays both at the micro-level orf regulating identifiable risks and the meta level of governance systems. Especially Alfred Nordmann has been pointing out to the possible shortcomings and peculiarities of regulatory approaches to Nanotechnology [9]. The framing of public policy will, yet again, be dependent on the ways that public interests and scientific insights are articulated in the years to come (see for extensive further reflections on the role of public debate on nanotechnologies based on the here cited 4 projects: Von Schomberg, Davies, 2010).

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[8] This NANOPLAT project was funded by the European Commission's Framework Programme 7 and it was coordinated by coordinated by Eivind Stø, National Institute for Consumer Research, Norway. NANOPLAT proposed a new deliberative platform for consumers of nanotechnologically-enabled products and, in the course of doing this, evaluated a number of different approaches to deliberation. The project concluded in 2009. Projectwebsite: http://nanoplat.org

[9] See Alfred Nordmann's work and that of others in the interesting volume edited by S. Gammel *et al* 2009

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