

## **A conversation on governance of nanotechnology**

### ***Individual and collective responsibility for nanotechnology***

#### ***Interview with Arie Rip, University of Twente***

Ineke Malsch, 16 October 2008, corrected 5 December 2008,  
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#### **Ineke Malsch: What do you consider individual and collective responsibility for nanotechnology?**

Arie Rip: This question is not easy to answer. The first part: "What is individual and collective responsibility?" is about what the concept means. "For nanotechnology" implies you want to know how responsibilities are attributed concretely.

The concept of individual responsibility includes two elements: retrospective and proactive responsibility. Both have very different implications for who is held responsible for what. Retrospective responsibility can be rather diffuse, but nevertheless deals with issues like accountability and blamability or in some cases praiseworthiness. If you ask industry what they think about responsibility they will have in mind blamability for accidents or risks or in some cases praiseworthiness if they have done something good regarding corporate social responsibility. Blamability is problematic in the case of collective responsibility. How can you blame a collective for something?

If you look prospectively, you can consider what you can hold people responsible for. This can be both individual and collective. Scientific integrity is such a prospective issue, for which a collective spokesperson like the Royal Dutch Academy of Sciences plays a role. They have published an ethical code on their website. Ministries of Education and Sciences or of Economic Affairs act as collective representatives of public interest. In such prospective discussions on what must be done, collectives have responsibility in our societal order; either because they take responsibility, or because it is attributed to them. E.g. "the scientists" are blamed or praised for what we know or for a problem. Then collective responsibility is assumed.

As soon as you start filling in responsibility **for nanotechnology**, you quickly assume a consequentialist view on responsible development. The committee evaluating the US National Nanotechnology Initiative is an example; they want to stimulate nice things of nanotechnology and try to minimize problematic aspects. This results in a division of labour between government agencies who can emphasise one or the other side of the responsibility.

But an important issue is how you fill in responsibility in terms of "the good life", the third kind of ethics between consequentialism and deontology/rule based ethics. One interpretation is to contribute to progress of humanity. This can then lead to debates on what different groups consider "the good life". It gets rather diffuse if you try to fill in individual and collective responsibility for "the good life". It leads to organised irresponsibility and vagueness. In nanotechnology you have broad claims of progress of humanity, but in practice nobody is responsible.

**Ineke Malsch: But broad claims are taken as starting point for projects like nanotechnology for sustainable energy or water purification.**

Arie Rip: Yes, but such actions are ambivalent: We want to be active, so we have to legitimise our activities. If we make broad promises, this imposes no specific demands on us to really do something. But as soon as a project is really done, the connection with "the good life" is no longer made. It remains the justification in the background without real assessment whether the action in fact contributes to progress of humanity. It remains broad, diffuse and not very operational. Still, it is possible that some shifts occur. I heard about a university which has decided that all research they support must be aimed at sustainability. That is nice. But it is not clear if they will really monitor it.

Retrospective responsibility is operationalised faster. The codes of conduct companies place on their website often include both a retrospective and a prospective side. They are concerned with blamability but also with the beautiful things they want to realise. On the side of blamability they set targets for transparency. This leads to operationalisation in dialogue. They claim: "We are transparent because we publish everything on the website." A critical NGO responds "But you don't say what your new product developments are." "No," says the company, "because then we play in the hands of the competition." Then the NGO answers: "But then you are not transparent." In this way the question what is transparency for which a company can be held responsible in practice is operationalised. In this respect responsibility can be concrete, but other aspects related to prospective responsibility remain very diffuse.

**Ineke Malsch: So that is why you stress the need for better future scenarios for nanotechnology?**

Arie Rip: Yes, because that would be a way to make this responsibility somewhat operational. The concepts of "good life" or "balance between positive and negative impacts" must be filled in, even if it is only speculatively. People are then confronted by thoughts like "What may happen in that case?" and "Do we want that?" "If we don't want that, what should be done?"

*My PhD student Douglas Robinson has organised a workshop last December on responsible innovation with people from governments, companies, researchers, NGOs. He showed them a scheme of different actors and asked them to indicate "Who should do what?" They were rather hesitant. He had made scenarios until 2015 of what could happen if governments choose soft regulation of nanotechnology. In one scenario, Finland had stimulated nanotechnology for paper production so much that Environment, Health and Safety protection was not much more than maintaining existing rules. After several years in 2012 or 2013, a researcher's lungs were examined and an effect was identified which could only be caused by nanoparticles. This led to overreaction: Let's stop all nanotechnology activity. After that, slowly some things were allowed again.*

This illustrates that such scenarios can be used to demonstrate how responsibilities are distributed and how actions and reactions occur.

**Ineke Malsch: Currently, trade unions are getting involved and asking for 15 or even 30% of nanotechnology research funding to be dedicated to risk assessment.**

Arie Rip: I don't think this is a particularly sensible position (claim). But the fact that they are getting involved and contributing to the exchange (and to some extent confrontation) is good; it may lead to a better compromise eventually. Concrete outcomes (compromises) are possible because the issues are now concrete and potentially blamable.

**Ineke Malsch: Is it again retrospective responsibility?**

Arie Rip: Not in the sense that there is guilt, that something has already gone wrong. It is a mixed type of responsibility: "If something goes wrong, who can be blamed?" Once this is settled legally or by soft law, companies will have to take it into account in the here and now. This form of attributing responsibility is a more focused, less diffuse type of prospective responsibility. It can be filled in when at some point one says: "This should be the rules for blamability and praiseworthiness," and actors start behaving accordingly. There may well be such rules already, but they become subject to criticism and investigation when something goes wrong at some point and rules for blamability are codified in general rules. This is how laws with sanctions emerge.

**Ineke Malsch: The idea with prospective responsibility was that you would do it differently with nanotechnology than in the past. Not just learning from mistakes.**

Arie Rip: Yes, but these processes remain diffuse. With scenarios you can try to overcome this. The step to general rules is not easy if there is no sense of urgency; so one may need exceptional circumstances. The other diffuseness effect is that when a general rule is articulated and codified into law it may not be taken up. In 1959, in the new law on higher education, an article was accepted in Dutch parliament which required universities to advance a sense of societal responsibility even if there no concrete instances where universities had done something wrong. Actually, it was because of the experience in the Second World War. The process took 15 years, which resulted in debate in 1960. It is an example of regulation that is not implemented in practice, because it has a symbolic function.

A similar thing might be happening with nanotechnology. More rules will emerge than occurred with earlier technologies, but the difference will not be large.

**Ineke Malsch: Are you sceptical about responsible development of nanotechnology?**

Arie Rip: No, the other way around. I am rather sceptical about how things go in society, without blaming any particular actors. I am not a classical critic of society. I think things will always go sloppy, nothing and nobody is perfect. And you can't organise something centrally and just expect it will be implemented. Besides, who says it will be the right policy, or intended social order more generally? If you say I am a sceptic, I respond: I think it is great that with nanotechnology all sorts of attempts at doing better are happening. All littler bits help in our miserable world.

**Ineke Malsch: How do different stakeholder groups see each other's responsibility?**

Arie Rip: Responsibility for scientific development can take the form of retrospective responsibility, and then be part of struggles about praise and blame (cf. Ravetz's aphorism: Science takes credit for penicillin, while Society takes the blame for the Bomb). Different attributions are always possible, because effects/impacts are co-produced. There is also a prospective aspect, in that retrospective attribution may lead to action to do better (cf. the atomic scientists after World War II).

Attribution of prospective responsibility (for future actions and commitments) can be informal and diffuse, through expectations, roles. And it can be formal, up to legal requirements. The latter is almost absent for concrete scientific and technological developments (e.g. because there is no liability involved). There are grey zones, though (expert advice, professional service).

For the general question about scientific development, the commonly assumed division of moral labour is an important item: scientists are expected to do good science (and thus contribute to advancement of knowledge, one aspect of progress) while others are to be concerned about applications and impacts. This division of moral labour is embedded in practices and views of scientists, but is now criticized and attempts are made to modify this division of labour (already in the earlier (1970s) call for relevance, now also responsible innovation, codes of conduct). What will remain is the lack of responsibility considerations in the “protected spaces” in which science is being done, particularly by junior researchers. We already discussed responsibility for products.

**Ineke Malsch: In general, responsibility can be attributed by regulation, by voluntary codes of conduct and...**

Arie Rip: ... by the combination of credibility pressure and emergent visions in society. In environmental problems you have all three: regulation in the 1970s; voluntary codes in industry since the responsible care programme started in the chemical industry, end of the 1980s; and credibility pressure in society. This is apparent in complaints of chemical industry about their negative image. On the one hand, they try to improve their image, but on the other hand they also change their behaviour, working on sustainability.

**Ineke Malsch: Naming and shaming?**

Arie Rip: Yes. In itself it is explicit tactics used by societal actors, but it also works diffusely in building agendas, without any actor who consciously names and shames. In the case of climate change, when I book a flight, someone else in my office may not so much look angry, but surprised. They may say: “You fly a lot, don’t you? Shouldn’t you reduce that a bit?” It is not their strong opinion, but a remark in conversation, which is possible because of the public views on climate change and how we should be more careful. So it can be taken up in simple office talk.

**Ineke Malsch: How can distributed responsibility be made to work, avoiding “organised irresponsibility”?**

Arie Rip: The trouble with policy and instruments is that they never work in a linear manner. The Dutch regulation on societal responsibility of universities was never implemented in the 1960s. In the 1970s, several student groups wanted change, and were looking for instruments. They discovered this article in the law and started discussing societal responsibility. They were not necessarily convinced themselves, but it was written in a law. They could use it as a hammer. But there, their discussion stopped. Discourse of societal responsibility has to do with community-type ideas (Christian democrats) or with collective responsibility (social democrats), both leading to a corporatist

organisation of society. Most of those students were Marxists. Filling in the concept of societal responsibility went against their basic principles. But that did not really matter for them; they had just found an opening to start debating with other parties.

My answer to the question of implementation is: You can of course start implementing, and there are some (e.g. environmental) measures which include consideration of implementation from the start. Such measures may include monitoring and sanctions from the start. Other regulation or soft law may attempt implementation, but it can remain empty, because you don't know if it will work or whether other processes at work will dominate.

Another strategy is modulating ongoing developments in parallel to or instead of regulation. Implementation is interfering, whereas modulating means you don't completely change what happens because there are too many powers and parties involved. But you can influence developments in a certain direction. Some parts of legislation have such a character. In Dutch civil law sometimes a duty to care is included, "as behoves a good family father." It is an open concept. There are societal tendencies to interpret this concept. The legislation and interpretation of judges can help fill in this concept in practice. This way you can try to modulate trends in society. Implementation is not always successful. Modulation is almost by definition not completely successful, but can contribute to change. I am happy if I can change something.

**Ineke Malsch: So that is the idea behind "upstream engagement", where you bring decision makers on technology in contact with outsiders who can give their views on it in an early stage of development?**

Arie Rip: Yes. In our workshops we don't draw conclusions the way it is done in some citizens' conferences. After our workshops people go home, having seen more than before.

**Ineke Malsch: Then it is hard to measure the effect.**

Arie Rip: We do measure, but it is more in terms of learning than in terms of what is done differently.

**Ineke Malsch: Do you ask them what they have done after one or five years?**

Arie Rip: It is difficult to measure if you wait a long time. There is an intervention (a workshop), but after a year so much has happened, that it is seldom possible to trace a particular activity back to a workshop. We phone or visit them directly after the event, and ask again 3-6 months later. In this period it is still possible to trace back what happened, and there has been enough time to really take initiative. We have published one evaluation in the PhD thesis of Rutger van Merkerk. The longer time

evaluation has only been done ad hoc. Douglas Robinson is now doing it, but he has problems to get response. Still he can conclude that there are some effects, though not overall. In his case, the workshops were organised in the framework of the European network of Excellence Frontiers. Since there is this framework; it is not a separate activity of the University of Twente, it helps achieve results. People feel a responsibility to the network they are part of. It is a form of citizenship which has a moral dimension, how a good citizen should behave. For example, in the scientific community you have rights, but also duties, like the moral obligation to peer review even though you don't get paid for it. It is typical for that particular community. A similar sense of citizenship is related to being part of a network like Frontiers. For example, you have to participate in events organised by the network partners. This view is like my general point about implementation: if implementation comes from outside it will not bring so much, unless there are elements in the ongoing development which help the process. So I turn it around: start by the ongoing developments and try to modulate them. This is what we do in our workshops; we take advantage of the growing culture of citizenship in the network.

**Ineke Malsch: How do you position yourself in the opposition between precautionary and proactionary approaches? There are two ways to deal with the uncertain future of nanotechnology. Precaution implies applying the precautionary principle. The present situation is in principle good, but future developments should be distrusted. Proaction implies the present situation is not perfect, and there are chances to influence future developments positively.**

Arie Rip: I see precaution and pro-action as attitudes and measures, not as roles. My own role is linked to the different roles social scientists play: on the one hand being analytical, write for your colleagues and leave it to other actors to take action. On the other hand a proactive role in that researchers themselves can also take action in society. I am keen to observe, analyse and write articles, but I am also to some extent proactive. In nanotechnology my role is modestly pro-active by moving about, addressing various audiences. I position my contribution as one of pointing out issues that may be overlooked, diagnose problems, and offer suggestions. I rarely make strong claims. Together with colleagues and PhD students I organize meetings (workshops etc) where stakeholders in nano come together and 'probe each other's worlds'. I contribute to thinking of policy makers and industrial actors, often without having an official role. There are other roles. Joachim Schummer by contrast has strong opinions on what happens, but he does not act on them. He sticks to an analytical role.

Precaution is sometimes necessary, not always. Proaction can be interpreted as: "we try all sorts of things and see what goes wrong and

what goes right." Neither characterises my role. I have a strong conviction that there is a third position between precaution and proaction possible, which can help shift the fruitless debate between the positions. If people say: "We expect many beautiful things from nanotechnology which may be beneficial and we should not be too precautionary," they overlook the issue of opportunity costs. If you invest in nanotechnology for a good cause, you will also have to take into account what you could have done with the same investment of money, intelligence and people in another domain or for another aim. It is not just that nanotechnology could be beautiful, but that there could be other priorities which are overlooked. I don't have a strong preference for precaution or proaction, but I am more in favour of the good life ethics. What kind of goals can you reach with certain resources? I have written about this in my chapter on "Governance of New and Emerging Sciences and Technologies," in the book edited by Peter Healey. The book is based on a conference discussing human enhancement. The promises like genetic solutions for improving human learning processes can be argued against by saying: with current learning techniques there is still so much improvement to be achieved in learning processes, that you don't need to modify genes. Also, when modifying genes you still have to wait and see if it really leads to improvements. I prefer improving learning processes here and now. That is why I am against human enhancement research, not because I find it scary, but because there are other more useful things which can be done. The result is the same as with a moratorium, but the motivation differs. In any particular question in discussion, I try to draw attention to these other aspects which are at stake.

**Ineke Malsch: So the solution is to make several improved parallel scenarios?**

Arie Rip: That is one way to make opportunity costs visible, but in the case of human enhancement it is so obvious, you don't need detailed scenarios. You can cite people: If we are allowed to modify genes, we will all be smarter. This gives me the chance to ask: what else must be done to achieve that? Maybe our appreciation of human beauty and of learning processes must be adapted. Then it is better to do that rather than modify genes. It is not that it is not allowed, but it does not serve much purpose.

**Ineke Malsch: Do you want to add anything?**

Arie Rip: A number of your questions are more related to governance than to responsibility. Responsibility has an ethical and a governance side. Our conversation was more a conversation on governance and policy. This is as it should be because we then include aims as well as means to achieve them. You can start by ethics, how to justify positions and norms, but governance is also relevant. Responsibility is located in between both.

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Role in debate on nanotechnology, ethics and society:	Arie Rip is an expert in Constructive Technology Assessment of nanotechnology and other technologies. He is flagship captain of the Technology Assessment component in the Netherlands NanoNed research consortium and occasional member of advisory committees and expert groups of the Dutch government and European Commission among others. He has published about dynamics of science and technology development including nanotechnology.

### Relevant recent publications of Arie Rip

Pierre-Benoît Joly & Arie Rip: A timely harvest, *Nature* Vol 450 8 November 2007, p. 308: decision making on nanotechnology development should be made more robust by timely midstream public engagement.

Presentation EthicSchool, August 2008, [www.ethicschool.eu](http://www.ethicschool.eu): ethical aspects include: justification of division of moral labour, ethics of promising, ethics of early warning, role of NGOs.

Arie Rip, Folk Theories of Nanotechnologists, *Science as Culture* 15(4) (December 2006) 349-365

Tsjalling Swierstra and Arie Rip, Nano-ethics as NEST-ethics: patterns of moral argumentation about new and emerging science and technology, *NanoEthics* 1 (2007) 3-20

Arie Rip, 'Research Choices and Directions – in Changing Contexts', in Marion Deblonde et al., *Nano Researchers Facing Choices*, Universitair Centrum Sint-Ignatius Antwerpen, June 2007, pp. 33-48. The Dialogue Series # 10

Claire Marris, Arie Rip, and Pierre-Benoît Joly, 'Interactive Technology Assessment in the Real World: dual dynamics in an iTA exercise on genetically modified vines', *Science, Technology & Human Values* 33(1) (2008) 77-100

Arie Rip, Governance of new and emerging science and technology, chapter in Peter Healey (ed.), *Tomorrow's People: Challenges of Radical Life Extension and Enhancement*, London and Sterling, VA: Earthscan Publishers, 2009, pp. 209-214

### About ObservatoryNano

The observatoryNANO project is funded under FP7 for four years from April 1<sup>st</sup> 2008. Its primary aim is to support European decision-makers

with information and analysis on developments in nanoscience and nanotechnology (N&N). It will collate and analyse data regarding scientific and technological (ST) trends (including peer-reviewed publications, patents, roadmaps, and published company data) and economic realities and expectations (including market analysis and economic performance, public and private funding strategies). The ST and economic analysis will be further supported by assessment of ethical and societal aspects, impacts on environment, health and safety, as well as developments in regulation and standardisation. Although much of this work will be performed within the consortium, the project is working cooperatively with other initiatives to ensure that effort is not duplicated and that resource sharing and output are maximised. To date liaisons have been established with international organisations including the EPO, OECD, and ISO, and will continue to be established with other relevant organisations such as European Technology Platforms (ETPs), ERA NETs, and other EU-funded projects.

The observatoryNANO project is led by the Institute of Nanotechnology (IoN) (UK), and includes: VDI Technologiezentrum (DE), Commissariat à l'énergie atomique (CEA) (FR), Institute of Occupational Medicine (IOM) (UK), Malsch TechnoValuation (MTV) (NL), triple innova (DE), Spinverse (FI), Bax and Willems Consulting Venturing (B&W) (ES), Dutch National Institute for Public Health and the Environment (RIVM) (NL), Technical University of Darmstadt (TUD) (DE), Associazione Italiana per la Ricerca Industriale (AIRI) (IT), Nano and Micro Technology Consulting (NMTC) (DE), Swiss Federal Laboratories for Materials Testing and Research (EMPA) (CH), University of Aarhus (DK), MERIT - Universiteit Maastricht (NL), Technology Centre AS CR (CR).

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