

Reflective NanoNavigation

Current trends in Communicating Nanoethics

Interview with Prof. Dr. Lieve Goorden, TA Research Group, University of Antwerp, coordinator of NanoSoc project, Belgium

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Abstract

Professor Lieve Goorden coordinated the public dialogue on nanotechnology in Flanders held in the NanoSoc project. This project ran from 2006 until 2010 and resulted in a Roadmap for "Navigating in NanoSpace", intended to introduce reflectivity in the planning and conduct of research programmes in nanotechnology and other emerging technologies.

Under the header of Communicating Nanoethics, ObservatoryNano aims to highlight key findings and developments in current dialogues and public engagement activities at EU level and in Member States and other countries. This way, emerging issues not discussed sufficiently and best practices in communication on ethical and societal aspects of nanotechnology can be identified and brought to the attention of policy makers in the fourth annual report on communicating nanoethics to be published online in the spring of 2012.

Ineke Malsch: Who initiated the NanoSoc project?

Lieve Goorden: we proposed the NanoSoc project in response to a research programme organised by the Flemish agency for innovation by science and technology IWT in 2006. The project was funded for four years from 2006 until 2010. Different partners conducted the work. Our Technology Assessment division of the University of Antwerp (UA) coordinated it. It was set up as an interdisciplinary project including social scientists from our group, physicists from UA's physics department working on characterisation of nanomaterials, the leading nanotechnology research centre IMEC and the ethics department (CEWT) of the University of Leuven. IWT funded this project in the framework of their programme for strategic basic research. In the past this programme only funded natural science. When we applied, IWT had just launched strategic basic research for humanities for the first time. Our TA division took the initiative for the NanoSoc proposal.

For natural sciences, the Strategic Basic Research programme targeted research in between academic and applied research: theoretical and

empirical research with economic valorisation potential. For us, the potential for societal valorisation was important, addressing the needs of a variety of stakeholders in society.

In the department of applied economics I am teaching a course on technology and society to business engineers. Students follow technological and business courses. They end up in intermediary jobs in companies between R&D and marketing departments. In that year I taught a course on nanotechnology for the first time. For me it was a very new technology. Until then I had done research on biotechnologies. I asked students to make an inventory of studies on societal implications of nanotechnology. In the framework of that course we visited IMEC - a research centre in Leuven that is active in nanoelectronics and nanobiotechnology research. I asked them if they wanted to be partners and they immediately were enthusiastic and agreed to join the project. Our department mainly wrote the proposal, the nanotechnologists just agreed to be partner, but trusted us to write a good proposal. To draw lessons for the future: maybe it will be better to write the proposal together in an interdisciplinary way. It took a lot of time later on in the project to align the expectations of all partners in the same direction. The nanotechnologists expected that the social scientists should make an inventory of social and ethical impact and predict to the natural scientists the problems and concerns of people in the future and how attitudes will change. This should help natural scientists to take these issues into account when doing their studies. Our objective written down in the proposal was different: to search a new way to design research programmes, a new approach to set research agendas and roadmaps. The main question was how to introduce more reflective capacity by nanoscientists themselves when setting a research agenda. After one year, the nanoscientists were surprised that they were the subject of our research. It took some discussion to get on the same track. Four years were needed just to reach consensus on the objectives of such research proposals.

Ineke Malsch: Why was the NanoSoc project targeted to nanotechnology? Why was it organised in this way and in this stage of the development of nanotechnology?

Lieve Goorden: The choice of nanotechnology in 2006 was partly strategic: we knew that the Flemish government and IWT were interested in this type of technology. So we had a better chance to get funded. Another reason had to do with the history of the research in our department: in the early 2000s we specialised in Participatory Technology Assessment (PTA) of biotechnology as designers or evaluators of projects. These projects were commissioned by the Flemish or Belgian governments on genetic testing and GMO food and agriculture. Our experiences with these projects gave rise to some frustrations. Firstly, we did not see much impact of these interactive processes on technology policy making in Flanders. Secondly, despite the fact that many PTA projects were initiated,

the public debate was stuck in a deadlock. It was a good opportunity to change focus to nanotechnology which was then a newly emerging technology. It enabled us to reflect on earlier stages of technology development on a possible constructive and anticipatory approach. Another reason was that we could choose another target group. In the past we had focused on policy makers without much result. In NanoSoc we focused on the scientific world as target group and tried to build reflective capacity among scientists. Asking IMEC as partner - a leading research centre in nanoelectronics and nanobiotechnology also at European level - opened up a lot of opportunities. Furthermore, there were technology assessment projects on nanotechnology in other countries as well. We were interested in connections with experts in those other projects.

If we would have to start today, the focus could be on converging technologies. In 2006, IMEC started to focus on nanoelectronics, before they had concentrated mainly on microelectronics and ICT. Their research in nanoelectronics and nanobiotechnology has recently resulted in an interesting initiative. They are currently collaborating with the Flemish Institute for Biotechnology (VIB) and KU Leuven on converging technologies for brain research in NERF (Neuro-Electronics Research in Flanders). The Flemish government is investing €300 million in 3 years. Officially their mission is basic research, but in practice there is no clear separation between their research and possible applications. If I would have to start now I would focus on this project.

Ineke Malsch: A key result of the project is the integrated roadmap for navigating in nanospace. Has the government or the research community / key organisations adopted this roadmap? Will there be a follow-up?

The NanoSoc project is finished and we did not get funding for valorisation of the results. That is a pity. We have written down suggestions for applications of the roadmap, but it has so far not been discussed widely in the scientific community. We went to several authorities to present the roadmap approach. Minister Lieten (Innovation dept, Flemish government, Socialist party) was very interested but had no money for valorisation. She asked for advice to the Flemish Council for Science and Innovation on the following question: "Would you suggest to include the criterion of societal relevance in the list of criteria for funding basic research in universities and research centres?" This council is the most important advisory council to the ministry of innovation, consisting mainly of academic scientists and people from high tech companies. The introduction of the criterion societal relevance is important because if scientists apply for funding by the government they will have to give arguments for the societal relevance of the project, not just scientific objectives but also added value to societal expectations, concerns and problems arising today. The minister has asked this question beginning of

2011, but I have not received any feedback yet if the council has started examining it.

The second step we took to valorise the roadmap was to present it to the administrative staff of this council. This gave them the opportunity to judge the importance of this approach. They were enthusiastic but have no power to make decisions. They promised to discuss it with the members.

We also went back to IMEC. The staff responsible for writing project proposals to governments (15-20% of IMEC's budget) concluded that the roadmap was relevant as guidance for writing proposals and imagined that it would also be relevant while conducting research, but did not want to take the first step. "If the government is funding research, why not impose as a criterion that the research should be societal relevant? If it is obligatory, then we will do it." If the Flemish government is funding research by IMEC, the researchers should demonstrate ecological benefit, so why not refer also to social and ethical impacts of research? IMEC researchers find it difficult to apply the roadmap tool on their own; they lack resources and time. The government should support them with money to enable them to do it.

We have taken three steps towards valorisation. Now it is up to responsible policy makers to take the roadmap further.

Ineke Malsch: The Flemish Parliament adopted a resolution requesting a Flemish Action Plan Nanotechnology on 25 March 2009. What has happened with this initiative since then? Is there a relation to the NanoSoc project?

Lieve Goorden: The Flemish parliament's resolutions are adopted as an advice from the parliament to the government regarding particular policy issues. They are not binding. Resolutions are always adopted in plenary meetings which gives them political authority. We considered the resolution on nanotechnology to be important. The initiative came from the Green and Socialist parties, but was adopted by all parties. The discussion about the resolution took place in the second year of NanoSoc. The initiators invited us to present our intermediary results. As a response they broadened the scope of the resolution. Initially it had only covered economic benefits and risks, later they also stressed the importance to reflect on broader issues and communicate with the public on nanotechnology development. The resolution was adopted in March 2009, and in June there were elections. The new government entered in July. After an election, resolutions must be introduced again but so far nobody has taken the initiative for this. My colleague Marian Deblonde is currently working for IST, the institute for science and technology of the Flemish Parliament. An MP asked for a copy of the NanoSoc reports, so we hope that the resolution may be revitalised.

Ineke Malsch: Which societal groups do you expect to remain engaged in furthering your roadmap after the end of the NanoSoc project? Should other groups get involved? How can they be convinced to participate?

Lieve Goorden: I hope there will be more opportunities for valorisation of the roadmap in the parliament. IST and the ministry of innovation are the two main entrance points. During the project, some nanotechnology research group leaders from IMEC and the UA, were open in discussions. They have leading positions and are responsible for writing project proposals. I hope our ideas will keep influencing the decisions they take. It is difficult to monitor from a distance.

Lieve Goorden: I am reflecting on a way to get into the NERF project. I understand that so far there has not been discussion in the Flemish Parliament on this important research project with a lot of ethical, medical and social implications for society. The project is labelled basic research so it is considered to be too early to reflect on societal and economic implications. However, in the project neuroscientists from Leuven and IMEC's experts are working on brain implants for Parkinson and neurodegenerative diseases. In this field of converging technologies or technosciences, there is no clear distinction between basic and applied research. The European Union is funding the Human Brain project, a follow up of the Blue Brain project. This was an attempt to make a computer model mimicking an animal brain. The Human Brain project includes plans for participatory research reflecting on ethical and social implications. Since IMEC is partner in the Human Brain project, why not do this also in Flanders?

Ineke Malsch: What are the main outcomes of the NanoSoc project in your view? Why are these outcomes the most important?

Lieve Goorden: As you can read in the report "Navigating in Nanospace", we organised four different interactive phases in the project. The first was an exercise in opening up imagination and visions of possible futures. Nanotechnology researchers and interested citizens participated in this exercise. They imagined very divergent futures. The main objective of this phase is that participants become very critical of dominant visions in the public debate. Their eyes are opened: are these the only possibly imaginable visions? E.g. Kurzweil's vision on downloading the human brain in a computer, influences the research agenda of NERF. Why not open up the debate on possible futures?

In the second phase we organised three panels with scientists and three with citizens, who visited the imagined futures. They experienced an emotional response and examined how this could be translated in a critical view on prevailing values in society. These attempts to articulate values in public, will be important in the future. Values are currently not discussed

in public forums. Thinking about the good life and quality of life tends to be restricted to the private sphere, but should be discussed in public with scientists and citizens.

In the third phase we organised a stakeholder forum with science and technology promoters (academic research, government research and policy makers) and NGO's. Even though we had little time and resources, we managed to attract representatives from 30 different organisations including environmental, patient, social security and human rights groups. The stakeholders are eager to enter into discussion with the scientists. The objective is to bring social expectations and concerns on the research agendas of policy makers and research institutes. How can co-responsibility be organised? Who should do what? What could be the responsibility of other stakeholders? How can all these actors cooperate?

In the fourth phase we tested the roadmap approach: a new approach for programming research in nanotechnology and emerging technologies. This is the last step. Valorisation of the first three steps is mainly the task of the IST institute of the Parliament. In our department we should focus on valorisation of the roadmap approach. The main message of the stakeholder forum is that there is a need for a better match between the research agenda for nanotechnology and unresolved societal problems. How to guarantee that not only scientific excellence and economic potential but also societal relevance are taken into account?

It is my experience from working with the partners that scientists are confronted by many barriers to discuss research aspects with the public, stakeholders or policy makers. Firstly, the central research focus is on an experimental bottom up way. This is not easy to steer. How to do effective research with effective results is considered very important, but the why question remains in the background. There is no time to reflect with citizens or stakeholders. Secondly, researchers are involved in competitive development of ever more complex systems and have to find a balance with managing this complexity and risks. Thirdly, they don't know what society wants. Society reacts emotionally, and they don't know how to direct research towards expectations. They don't know the predominant values in society. Our roadmap approach can help them resolve these barriers as a guiding tool.

Currently, a common way of roadmap design (eg. at IMEC) is to fix on one particular technological future and give it an aura of objectivity, by extrapolating scientific and economic trends towards that future. By plotting only one course for the future, common roadmap designers disregard complexity and uncertainty of socio-technical changes. Roadmap designers at IMEC know that they should broaden their network. Currently they argue: to reach this future with our research, we need these partners we know from past collaborations. And a clear research path towards the

future, makes it easy to get all partners on the same track. But this type of roadmapping does not work any more for converging technologies.

Why not mobilise the dreams of stakeholders and match these step by step with the available research capacities in a particular department of IMEC or the physics department of UA? This will help research planners to see socio-technical alternatives and explore impacts of alternatives on quality of life already in the stage of planning a research proposal. Don't just involve trusted research networks but try to orchestrate early stage efforts of all involved players. If we know which issues will come up, we know who to invite in open innovation. IMEC is already experimenting with this. We suggest opening up this network with more expertise from society. Traditionally the network was restricted to academic researchers and companies. For bionanotechnology devices, medical experts are invited. Go one step further and invite patient organisations, medical doctors and health insurance companies. Our roadmap can help guide such open innovation.

Ineke Malsch: What can the European Commission or other governments interested in stimulating dialogue on nanotechnology or other emerging technologies learn from the Flemish experience?

The participants in the stakeholder forum don't expect much from new regulation or codes of conduct or ethical codes. They mainly discussed how to introduce a reflective research culture in science, which is currently fragmented and dominated by specialisation. How to counter-act organised irresponsibility for technological development? All parties involved consider other partners to be responsible for ethics: university researchers point to IMEC, IMEC to companies and companies to consumers. Our stakeholders suggested that governments must guarantee the responsibility of researchers themselves, when research is funded from the public budget. Currently, governments stimulate universities and institutes such as IMEC to cooperate with companies. As a result researchers focus on short time steps and can't place their research in a broader perspective and longer term vision. Stakeholders want more guarantees for independency of publicly funded research. Researchers should be enabled to target research towards more long term visions. Governments should take the lead in setting up research projects. Our stakeholders also favour platforms for science-society cooperation on all kinds of levels, including scientists and stakeholders and scientists and policy makers. Why not invest more in interactive platforms? Furthermore, the government should promote visionary people to head research institutes, not just managers. They should be selected on visionary capacities.

The European code of conduct for nanotechnology can help to stimulate reflectivity. Our roadmap approach could be guidance, more than just a

list of principles to follow. I doubt if that will work. The principles themselves are good, but researchers need guidance when implementing them in institutes and networks. The EC should invest more in guidance tools and processes for implementation. We carried out one experiment with our roadmap in IMEC and the physics department at UA. More experimenting with this approach would be good.

Ineke Malsch: What are the main issues currently in debate on nanotechnology or other emerging technologies in Flanders (Belgium)?

Lieve Goorden: There is no debate in public or parliament on the NERF project on Neuro-Electronics Research in Flanders I mentioned before. The most recent public debate is on a GMO potato test field that was recently partly destroyed by the "field liberation movement". The discussion on biotechnology has halted ten years ago. In the 1990s there was much discussion and the government organised consensus conferences and citizens focus groups. VIB (Flemish Institute for Biotechnology) had a research cell on public dialogue, but this was abolished. After ten years of no debate, the field liberation movement initiated a severe debate. The test had been approved by the Belgian Biosafety Council and was carried out by researchers from the University of Gent, VIB and BASF. The interesting thing is that the scientific community is participating in the debate. A group of scientists calling themselves "save our science" is radically opposed to the field liberation movement. On the other hand, some biotechnologists from VIB participate in the action of the field liberation movement. The debate on the pros and cons of biotechnology is now held within the scientific community. What is also new is a public debate in the media and among scientists on the autonomy of science as a result of the biotech controversy. How independent should scientists be from industrial funding? This is an interesting evolution in Flanders. How to design research programmes, who should discuss its societal relevance? In September and October, universities are planning public discussions on academic research in emerging technologies. It is a good start and may help open up the discussion on nanotechnology as well. In Flanders, there has not been a public debate on nanotechnology comparable to France or The Netherlands. In those debates, inventories of concerns and expectations have been made; we don't have to repeat that. It is more important to engage scientists themselves in the debate.

Ineke Malsch: Has a need for particular new regulation or voluntary measures to govern responsible development of nanotechnology / emerging technologies become apparent in the dialogue?

Lieve Goorden: Regulation is important, but currently most discussion in Flanders is on how to reorganise the research community.

Ineke Malsch: How do you see your own role in furthering your roadmap?

Lieve Goorden: I will continue my research and have already taken steps in valorisation of the roadmap. I have been invited to give presentations for a broader public on nanotechnology. I hope to be able to give advice how to promote the roadmap.

Identification

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Role in debate on nanotechnology, ethics and society: Lieve Goorden coordinated the public dialogue on nanotechnology in Flanders held in the NanoSoc project.

Relevant recent publications and projects

Several reports and publications and other outcomes of the dialogue in English and Dutch can be downloaded from the website of NanoSoc:

www.nanosoc.be

This includes the following publications:

- Goorden, Lieve & Deblonde, Marian, 2011, "Navigating in Nanospace, Presentation of an Integrated Roadmap," UA, Antwerp, March 2011
- Goorden, L., Van Oudheusden, M., Evers, J., & Deblonde, M., "Nanotechnologies for Tomorrow's Society: A Case for Reflective Action Research in Flanders, Belgium", in: Guston, D., Selin, C., Wetmore, J. & Fisher E. (Eds.), *Excavating Futures of Nanotechnology. Yearbook of Nanotechnology in Society*, Vol. 1, Arizona State University, July 2008.
- Van Oudheusden, M. & Evers, J. (2008), "Assessing citizens' moral argumentations on nanotechnologies: an incentive to rethink the participatory Technology Assessment approach to new and emerging technologies", Paper presented at the STGlobal Conference, April 5-6, 2008, Washington DC, USA.
- *Widening the Circle of Nano-Research: **A Case for Reflective Action Research in Flanders**, Belgium* (Working Paper presented at the International Congress of Nanotechnology, San Francisco, USA, November 2, 2006)
- ***Nanotechnologies for Tomorrow's Society*** (Working Paper presented at the International Congress of Nanotechnology, San Francisco, USA, November 2, 2006)
- Deblonde Marian, van Oudheusden Michiel, Evers Johan, Goorden Lieve.- Co-creating nano-imaginaries: report of a Delphi-exercise.-

In: Bulletin of science, technology & society, 28:5(2008), p. 372-389.

- Goorden Lieve, van Oudheusden Michiel, Evers Johan, Deblonde Marian.- Lose one another ... and find one another in nanospace: 'Nanotechnologies for Tomorrow's Society: a case for reflective action research in Flanders (NanoSoc)'.- In: Nanoethics, (2008), .- doi:10.1007/s11569-008-0043-x.
- Filmed portraits of key spokespersons in the Nanoblogs at <http://www.nanosoc.be/index.asp>
- L.Goorden, Nanotechnologies for Tomorrow's Society: Societal dialogue as a contribution to agenda setting?, Nano Conference University of South Carolina, Columbia, May 19-20, 2008.
- M. Deblonde, Lieve Goorden, 'Co-creating nano-imaginaries. Some lessons learnt from the first phase of a Flemish action research', Contribution to the panel session 'Nanotechnologies, foresight and the broader future-oriented debate', International conference *Managing the uncertainty of nanotechnologies. Challenges to law, ethics and policy making*, May 22-23, 2008, Rovigo, Italy.
- M. Deblonde, 'Co-Creating Nano-Imaginaries. Some Lessons Learnt', Invited contribution to the panel session 'Setting the Agenda: Interactive Research for the Governance of Science and Technology' at the international conference *Acting with Science, Technology and Medicine*, Society for Social Studies of Science (4S) & European Association for the Study of Science and Technology (EASST), August 20-23, 2008, Rotterdam, The Netherlands.
- M. Van Oudheusden (2008), "Public Engagement in Science and Technology: Negotiating the meaning of participation in a Flemish participatory Technology Assessment", Paper presented at the 4S-EASST Conference, Rotterdam, The Netherlands, August 20-23.
- L. Goorden, M. Deblonde, 'A tentative methodology for responsible planning of nano-research', contribution to the first international conference of the Society for the Study of Nanoscience and Emerging Technologies, September 8-11, 2009, Seattle, Washington (US)

About observatoryNano

The observatoryNANO project is funded under FP7 for four years from April 1st 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 analyze 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 standardization. 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 maximized. To date liaisons have been established with international organizations including the EPO, OECD, and ISO, and will continue to be established with other relevant organizations 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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