ObservatoryNANO Newsletter October 2009

ObservatoryNANO

www.observatory-nano.eu

SEVENTH FRAMEWORK PROGRAMME

**The mission of the ObservatoryNano is to create a European Observatory on Nanotechnologies to present reliable, complete and responsible science-based and economic expert analysis, across different technology sectors, establish dialogue with decision makers and others regarding the benefits and opportunities, balanced against barriers and risks, and allow them to take action to ensure that scientific and technological developments are realised as socio-economic benefits.**

The ObservatoryNANO project is funded under FP7 for four years from 1st April 2008. It is collating and analysing 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 is 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 is 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 are continuing to be established with other relevant organisations such as European Technology Platforms (ETPs), ERA NETs, and other EU-funded projects.

If you would like to find out more about the ObservatoryNANO project, participate in the engagement process or establish a liaison with the project, please contact the coordinator: Dr Mark Morrison (mark.morrison@nano.org.uk)

## Newsletter contents

Nanotech Europe 2009

## ObservatoryNano 1st Governing Board Meeting

The first meeting of the newly established Governing Board of the ObservatoryNano took place on Wednesday 30th September at Technische Universität Berlin (TU Berlin) during the Nanotech Europe 2009 event. The Governing Board (GB) consists of a non-executive External Advisory Board (EAB) in addition to the project consortium. The EAB members are internationally recognised, knowledgeable and experienced individuals drawn from industry, academia, finance, regulatory authorities, legislation, civil society organisations, and government decision-makers from research, enterprise, economics or industry departments.

The role of the Governing Board is to critically review the scope of activities and methodologies employed by the observatoryNANO and advise the consortium of relevant new developments and opportunities.

## Annual Symposium: Grenoble, 22rd & 23rd June 2010

MINATEC® Crossroads '10 June 21–25, 2010 MINATEC – Grenoble

The 2nd Annual Symposium of the ObservatoryNANO will take place on the 22nd and 23rd June 2010 during MINATEC Crossroads '10 at the MINATEC centre www.minatec.com in Grenoble.

The MINATEC Crossroads '10 event is expected to attract up to 1000 delegates and will be made up of 10 events related to research, education and industry in the field of nanotechnologies, including the Leti annual review.

## Liaisons with European Technology Platforms

Liaisons have been established with the following European Technology Platforms (ETPs):

European Construction Technology Platform

www.ectp.org/

Advanced Research & Technology for EMbedded Intelligence and Systems

www.artemisia-association.org/

EuMaT

European Technology Platform on Advanced Engineering Materials and Technologies

ETP on Advanced Engineering Materials and Technologies

www.eumat.org/

## Expert engagement: Workshops, surveys and interviews

Over the period November 2009 to April 2010, and beyond, WP2 and WP3 partners will be engaging in a number of expert engagement activities including workshops focusing on some of the 'hot topics' chosen for analysis during the second year of the ObservatoryNano Surveys, telephone interviews and expert review of draft reports will also be utilised during the expert engagement period.

| Sector | Workshop | Location/Date | Contact |
|---|---|---|---|
| Aerospace, Automotive & Transport | **Electric vehicles**<br>Session at Advance Automotive Battery Conference | Mainz<br>2nd-5th February 2010 | Yanki Keles<br>y.keles@bwcv.es |
| Agrifood | **Controlled Delivery for Crops**<br>Session at British Crop Production Congress | Glasgow<br>11th November 2009 | Douglas Robinson<br>Douglas.robinson@nano.org.uk |
| Chemistry & Materials | **Carbon based materials**<br>Session at Nanofair 2010 | Dresden<br>July 2010 | Dr Matthias Werner<br>werner@nmtc.de |
| Environment | **Nano zero valent iron**<br>Workshop on soil and groundwater remediation<br>**Nanofiltration and nano-adsorbents** | Zurich<br>24th November 2009<br>Zurich<br>November 2010 | Nicole Müller<br>Nicole.mueller@empa.ch |
| Health, Medicine & Nanobio | **Drug Delivery Systems**<br>Session at Nanomedicine: Visions for the Future | Amsterdam<br>25th February 2010 | Richard Moore<br>Richard.moore@nano.org.uk |
| Security | **Protective materials**<br>Workshop at Converging Technologies for 21st Century Security | London<br>26th November 2009 | Eleanor O'Rourke<br>Eleanor.orourke@nano.org.uk |
| Textiles | **Application of nanotechnologies in the textile sectors: the medical and sport-outdoor cases**<br>Session at Nanitec 2010 | Venice<br>26th March 2010 | Elvio Mantavani<br>mantovani@nanotec.it |

## November 2009


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For further information see www.nano.org.uk/events/ionevents.htm or contact carrie.smith@nano.org.uk

## December 2009

cea

### Workshop on Ethical Issues for Nanosciences

***Orsay University – 8th December 2009***

With an audience of 8 French experts in bioinspired nanosciences & nanotechnologies the Ethical Toolkit of the Observatory Nano will be tested at this workshop organise by CEA in partnership with OMNT. For further information please contact marc.pavlopoulous@cea.fr

## February 2010

### Albert Franks Memorial Lecture

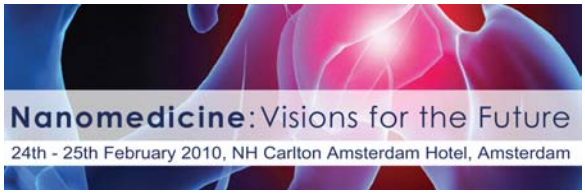
***11th February 2010, London***

Pietro Perlo (FIAT) will present

**Clean Mobility: Enabling Technologies**

INSTITUTE OF nanoTECHNOLOGY

For further information see www.nano.org.uk/events/ionevents.htm or contact carrie.smith@nano.org.uk

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For further information see www.nano.org.uk/events/ionevents.htm or contact carrie.smith@nano.org.uk

## June 2010

**Nanotoxicology 2010**
**EDINBURGH**
**June 2nd - 4th 2010**

The Nanotoxicology 2010 conference is to be held from the 2nd-4th June 2010, at Edinburgh Napier University in Scotland. It is one of the seminal conferences for the nanotechnology EHS community calendar each year, and will feature talks on exposure assessment, characterisation, human toxicology, ecotoxicology and risk assessment for nanotechnologies.

Further information is available from http://www.nanotoxicology2010.org/.

The first announcement flyer for the conference is available at http://www.nanotoxicology2010.org/downloads/Nanotoxicology2010_FirstAnnouncementFlyer.pdf

# NEW REPORT

## Nanotechnology in perspective. Risks for man and the environment

RIVM report **601785003** and **601785004** (summary report), available at www.rivm.nl

**Key words:**
*nanotechnology, risks, health, environment, consumer products, medical applications, food, worker safety*

The Risks of Nanotechnology Knowledge and Information Centre (KIR nano), a Dutch government-supported observation organisation based at the National Institute for Public Health and the Environment (RIVM), has provided an overview of the potential risks to both man and the environment of exposure to nanoparticles. The focus is on free, non-degradable and insoluble nanoparticles found in medical applications, food, consumer products and the environment

.

Scientific data compiled to date demonstrate that adverse effects due to exposure to nanoparticles cannot be ruled out. However, much more information is required to be able to estimate the risks of nanoparticles equally as well as those of other non-nano chemicals. Nevertheless, hundreds of products containing nanomaterials are currently available commercially, a situation which clearly necessitates investigation of the exposure and toxicity of these materials in the near future. Unfortunately, the research questions to be answered are so numerous that it will take years to compile the relevant data.

KIR nano recommends that research be focused primarily on those questions that provide information critical to the assessment of risks to man and the environment. Depending on the perspective – worker, consumer, patient, or the environment – the starting points can then be defined for controlling or limiting the risks. Information generated in the strictly regulated world of medical applications (e.g., on methodology) could constitute a valuable asset in other areas of research and application, where the data and dossier requirements are not as exacting.


Key concepts in the coming years include expanding our knowledge of nanoparticles and making this knowledge readily available to avoid duplication of research; identifying and where necessary taking appropriate risk management measures, deciding on which areas of research the Netherlands wishes to contribute to this field, supporting research & development and promoting cooperation between government bodies and agencies, the scientific community and trade and industry.

## SAFENANO publishes comprehensive listing of its nanotechnology health & safety related project work.

The SAFENANO initiative, the UK's premier resource on Nanotechnology Health & Safety, has recently completed a comprehensive resource on its nanotechnology health & safety related project work.

The SAFENANO Projects catalogue falls into three main categories: EC Framework supported work; Consultancy and Reviews; and Research Council Projects. The catalogue not only provides information on the contribution the SAFENANO team has made to each project, but also gives a useful outline of the remit for each of the projects – some of which do not yet have publically available presence on the internet. To access the catalogue and learn more please visit http://www.safenano.org/SAFENANOprojects.aspx

## ObservatoryNANO Interview with Dr Klaus-Michael Weltring

Under the header of Nanobioethics, the observatoryNANO aims to highlight technological and economic trends in nanotechnology for health, medical, biotechnological and agrifood applications with potential ethical and social implications. Simultaneously, current debates on relevant issues in nanobioethics among ethicists and social scientists, policy making circles and stakeholders are analysed and confronted with the issues emerging from the technical and economic trends. This way, emerging issues not discussed sufficiently can be identified and brought to the attention of policy makers in the second annual report on nanobio ethics to be published online in the spring of 2010. The series of interviews with opinion leaders is intended to be a compilation of different views on the relevant issues currently in debate from the perspective of a social scientist or ethicist, a natural scientist, and stakeholders from industry and civil society.

Klaus-Michael Weltring has been managing several activities on ethical, legal and social aspects (ELSA) of nanobiotechnology, including the ELSA board of the European Network of Excellence Nano2Life, the working group on Ethics and Societal Issues of the European Technology Platform Nanomedicine and the NanoMed Roundtable. As managing director of the innovation network Bioanalytik Münster, he has a pragmatic approach to nanobioethical issues from a business perspective.

**Ineke Malsch: From your perspective, what are the main issues in nanobioethics currently in debate?**

**Klaus-Michael Weltring**: That is not easy to answer, because in the area of medicine diagnostics, regenerative medicine and neuronanotechnology are very different areas. From the discussions I had, I think that one of the major problems is that there is in general a separation of science and ethics. In the EU Commission Directorate General for Research, previously, social science and ethics was part of Directorate for Industrial Technologies, but now it is separated into a Directorate for Science, Economy and Society. This contributes to the problem that you have to integrate these two areas again in roundtables, for example. Someone said once that Humboldt and his generation had ethics and social thinking integrated into scientific thinking, but this way of thinking is not there anymore.

Specific issues come in by applying nanotechnology to diagnostics or to regenerative medicine. They are very different ethical issues. For diagnostics, the ethical issues are related to the question when you call a person ill due to the fact that you try to diagnose a disease earlier and earlier. Are you ill when you have a genetic predisposition, or when cancerous cells are in your blood or when you have developed a tumour? That is also interesting from a social and insurance point of view. Making diagnostics more and more sensitive means you run into those questions. This is only partly due to nanotechnology. A lot is related to molecular biology and biomarkers and that kind of thing. Nanotechnology just adds to it. It is the same with regenerative medicine. The ethical issues are mainly related to the use of stem cells. Nanotechnology adds to development of organs, tissues etc. of stem cells by providing scaffolds and functionalised surfaces to bring stem cells to do what they are supposed to do. It is not a question of nanotechnology ethics, but a question of stem cell or medical ethics where nanotechnology plays a role. The same applies for neuronanotechnology. Even without any nanotechnology deep brain stimulation is already possible. If you then add nanotechnology either to increase biocompatibility of needles or by making needles smaller to target the area better, this is just an improvement of the technology, but it does not change the ethical question: that suddenly you might convert a depressed person into a cheerful person or vice versa. This is why I think nanotechnology contributes to the ethical issues in these different areas but does not cause them.

**Ineke Malsch: So there are no specific nanoethical issues?**

**Klaus-Michael Weltring**: Nano is always only part of the story. It enables the formation of new materials by making them more biocompatible, for example. Sometimes nanotechnology contributes to the improvement of a product, sometimes it makes it feasible. You always have to consider the degree of nanotechnology involved in a product. That is what most people seem to forget. I always say there is no nanomedicine; there is only nano for medicine or nano in medicine.

**Ineke Malsch: So why do nanoethics, then?**

**Klaus-Michael Weltring**: I think scientists do not have the time and are not credited for thinking about ethical issues. The system calls for papers, publications and career management and these kinds of things, in which ethics play no role. In addition, science has become more complicated, and gets further and further away from ethical and social issues. You have to reunite ethical thinking with scientific and technological development and credit people for actually doing this. As we discussed in Seeheim at the Nanomed Roundtable discussion on nanomedical ethics, a potential solution is the example of the university Darmstadt or Münster where you have a social science or ethical department together with an engineering department which organises shared courses introducing ethics and social thinking to life science or engineering students and make these students aware that there is some social and ethical responsibility related to what they are doing.

**Ineke Malsch: Is the solution that ethicists and social scientists should collaborate more with natural scientists?**

**Klaus-Michael Weltring**: Yes, they should have common projects, and not just monitor projects. I can give you the example of Nano2Life, where we tried out different formats to get communication going between philosophers and lawyers on one side and the researchers in the network on the other side. Donald Bruce gave a wonderful talk - at first everybody was sort of stunned and said: "Wow, these are very interesting questions!" But at the next meetings people lost interest, because it is not part of their daily life and work routine. So we invited natural scientists to meetings of the ethics board and discussed areas they were working on. That was very interesting not only for the scientists, but also for the ethicists to understand both sides. It was basically a mutual learning exercise. This is something we have to continue doing. Questionnaires are not helpful, like you have to fill out with each European Union project proposal to declare if there are ethical issues or not. It is more useful to include ethical and social scientists into the projects as soon as they deal with some kind of application. This way, the scientists involved understand that they do some research that affects ethical and social questions. Mutual learning and understanding each other is better than controlling.

**Ineke Malsch: Is this mutual learning limited to social scientists and humanities experts or is there also a need for more communication with the general public or civil society?**

**Klaus-Michael Weltring**: Of course it is also a matter of civil society. How to interact with society and different members of the public is an important question. You have to interact differently with politicians than with lay people on the streets. It is a difficult problem to solve. There have been different projects called "Dialogue", "Citizen´s Jury" etc. These have worked only to a limited extent. They only helped clarify what people think, but they do not serve the purpose of informing the public, because only a limited number of people were involved. The next step will be to get access to TV shows, radio programmes, comics, etc. to raise awareness. But the question is also whether people are really interested in the exact details of a technology. They probably do not want to know if it is micro or nano as long as it works for them and brings advances to their everyday life.

**Ineke Malsch: What is then the purpose of informing the general public?**

**Klaus-Michael Weltring**: I think it is very necessary to allow the interested public to get information to make the development as transparent as possible. First of all this helps scientists and of course industry to get a response from the public, to learn if there is a market or if there is no market. If you produce something with nano inside, but the market does not want the product, then you have wasted a lot of money. It is the same with doing research. If the government funds a lot of research that is not wanted by the public, then it is a waste of money. I think with every new technology you should make the development as transparent as possible so that people can make a choice. The problem is that you have to explain it in a way that people can really understand. If you label a product with "nano", this will not provide much information to a lay person. It does not have a meaning in itself. Some people might even think it will be dangerous. The question to me is how you inform the public in a way that will allow them to make an educated choice, and will not

frighten them or make them enthusiastic. This is a delicate question. In Münster we had a science exhibit in a shopping arcade in the city centre. Hundreds of people were very enthusiastic and played with it. But I do not know how much they can really understand from such exhibits and if it helped them make an informed decision.

**Ineke Malsch: It could be aimed at a different audience. What is aimed at children is not the same as what is aimed at adults.**

**Klaus-Michael Weltring**: It has to be honest and responsible and aimed at the target audience, without selling or tampering something. A lot of trust has been lost in the GMO debate. The question is can you regain trust and can you keep trust in nanotechnology? The problem is that nanotechnology is even more diverse than biotechnology. You can have nanoparticles in cars and in medicine. You can have the same nanoparticle for different purposes. How do you explain that to the general public? This is the real challenge.

**Ineke Malsch: There are several projects looking into that.**

**Klaus-Michael Weltring**: There is a call for proposals to find ways to get information from all these public relations projects on what kind of issues you can communicate to the public, what kinds of tools you can use and for which issue. If you take regulation, you can not explain it to the public, but you have to explain it to politicians and to researchers. You do not necessarily need TV shows, but articles etc. But if you want to explain nanoparticles in sunscreens, you have to inform the public. You may do this through advertisements, TV shows or videos. There are different ways for informing different target groups on different issues. We have learned a lot in the different projects. The question now is to bring together results from Nanomed roundtable issues on patient needs, ethical issues etc., rank them, prioritise them and indicate to which target group and with which tools they can be communicated.

**Ineke Malsch: Do you think the European Commission code of conduct for nanotechnology can play a role in governing nanobiotechnology[1]?**

**Klaus-Michael Weltring**: I am not very enthusiastic about this code of conduct, for several reasons. Some of the points inside this draft code, like accountability, are not realistic. It is also not sensible to ask the public what kind of directions research should take. Furthermore, there are many codes of conducts out there. But people are not really convinced that these codes are actually applied and not just used as a disguise. I am not in favour of this. Especially because such soft laws sometimes become hard law. For me, this is a grey area.

**Ineke Malsch: What would be a better approach, legislation?**

**Klaus-Michael Weltring**: I don't think so. In all discussions, regulators and experts say that current regulation is sufficient, but that we have to adapt it in a case by case approach. Even the European Group on Ethics says so. The principle of risk-benefit assessment within these regulations is robust enough to cope with everything. It just has to be applied and adapted to individual cases. For free manufactured nanoparticles, the question is how to do the toxicology, how to measure exposure? There is regulation which says you have to measure exposure, we just have to develop methods to measure especially long term toxicology of nanoparticles. It is a question of how to enforce and adapt the procedures and how to apply those regulations. The problem comes in through politics. Politics likes to have legislation and calls for new regulations, which in turn means that industry will have a very uncertain situation. Industry will not invest until exact regulation is set, whether it is strict or not. Industry wants valid regulations which they can deal with, and not changing regulations or political regulations, which puts them into an uncertain legal position. A precautionary approach is needed, not the precautionary principle. Industry, regulators and experts should come together and discuss how to adapt the regulations, how to make products as safe as possible. The slogan of the European Parliament "No data, no market," is misleading and not helpful, as no product will go on the market without data anyway. The question is whether the data are sufficient.

[1] http://ec.europa.eu/nanotechnology/pdf/nanocode-rec_pe0894c_en.pdf

**Ineke Malsch: So political debate on the precautionary principle is not giving good guidelines to industry?**

**Klaus-Michael Weltring**: Currently, a lot of uncertainty is created. To get a new regulation in place takes a lot of time because the agencies responsible for regulation will not easily agree on the exact wording. In the meantime industry will not be able to invest, because the legal framework is not clear. In a way, this debate is very unethical because it delays for example new treatment for patients, who have to wait until these new regulations are in place, while the experts agree that it is only a matter of adapting existing legislation. The politicians should pay more attention to the experts.

**Ineke Malsch: The European Commission code of conduct is not only relevant to nanoparticles, but also addresses human enhancement and nanomedical ethics issues. Can the code of conduct play a role in those areas?**

**Klaus-Michael Weltring**: If it is meant to make people think about these issues, and human enhancement is certainly a very interesting issue, not only related to nano but more to stem cells, it might help. A code of conduct is a soft law which might become hard law. It is not really a legislative process, but slow adaptation of soft law into hard law by jurisdiction. A code of conduct can highlight some of the issues you can think of. Whenever I talk to industry I hear they want clear rules. If they know the rules they can cope with it. If they do not know the rules, but if there is a soft law of which they do not know if it will be applied and how, then it creates an uncertain situation, which prevents investment and innovation.

**Ineke Malsch: The problem is that nanotechnology is still being developed, and a lot of the risks are still uncertain.**

**Klaus-Michael Weltring**: That is why a very early approach is necessary involving regulators, scientists and industry. This is what we have to support and enforce much more. Sometimes industry does not want to talk openly about their research and development but this is a mistake because regulators do not have the expertise. Safety officers in companies often do not know how to handle nanomaterials. As with the ethicists, we need mutual learning. We have to support communication schemes where industry learns that it is important to talk to regulators openly. To some extent it is important to talk to the public too. Although it is difficult in the end it pays off. It is a communication barrier. Nanotechnology enables so many products and application areas, that you may lose track of who needs to talk with whom. One of my favourite examples is telemedicine. You need a sensor on or inside your body which might have nanotechnology. You need a data transmission module, which might include nanotechnology. Along the whole data sending chain you might have all kinds of nanotechnology, so who has to talk to whom? If nanotechnology is included in mobile phones people do not care, but if the same material may be used in making someone's hip joint more biocompatible it can raise apprehensiveness if there is no understanding the technology. One of the problems is that more public involvement creates more politics, and more politics creates new legislation and makes things more complicated, more expensive and time consuming. How to find the right balance? If ever stakeholder takes his responsibility in development - scientists, industry and politics- there is a mutual trust and you can apply current legislation and be sure that everybody does his best to measure toxicology and exposure. The major problem is mistrust. We should reintegrate the social science and ethics directorate in DG Research back into the directorate for industry, so they are forced to cooperate. That is a message to the new European Commission.

**Ineke Malsch: If you look at nanobiotechnology, do you see any potential applications that should not be allowed, or for which the current regulations are not adequate?**

**Klaus-Michael Weltring**: I do not foresee such problems, because all research projects have to go through ethics committees who will decide whether it is ethical or not. Nothing unethical, whether it is nanotechnology or not, will be allowed anyway. You can not do any trials with patients or animals without going through ethics committees first.

**Ineke Malsch: Is the current situation hampering progress in areas which you think should be stimulated more?**

**Klaus-Michael Weltring**: That is coming back to what I already said about politics. I recently had a panel discussion with industry and scientists and they were openly discussing many different issues. Difficulties occur when politicians come in and impose legislation or emphasise potential negative developments for political reasons. Politicians should trust that experts will do their best. I again quote the European Group on Ethics on Nanomedicine: we have to adapt legislation but do not need new legislation.

**Ineke Malsch: How do you see your own role? You are obviously a spider in the web.**

**Klaus-Michael Weltring**: I am involved in the ETP Nanomedicine, the NanoMed Roundtable and the EuroNanoBio project. The first project is meant to develop a roadmap for nanomedicine, the second is analysing the environment in which nanomedicine is developing and the third is trying to identify the infrastructure needed for the development. With a group of people I try to bring these together and come up with suggestions for developing nanomedicine in an efficient and safe way, supporting ethical and social dimensions or requirements. We try to merge the data and come up with suggestions what should be done next.

**Dr Klaus-Michael Weltring**
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Klaus-Michael Weltring has been managing several activities on ethical, legal and social aspects (ELSA) of nanobiotechnology, including the ELSA board of the European Network of Excellence Nano2Life, the working group on Ethics and Societal Issues of the European Technology Platform Nanomedicine and the NanoMed Roundtable. As managing director of the innovation network Bioanalytik Münster, he has a pragmatic approach to nanobioethical issues from a business perspective.

## Relevant recent publications of Dr Klaus-Michael Weltring

Francois Berger, Sjef Gevers, Ludwig Siep and Klaus-Michael Weltring, '*Ethical, Legal and Social Aspects of Brain-Implants Using Nano-Scale Materials and Techniques*," in Nanoethics, Vol 2, Nr 3, December 2008, 241-249, http://www.springerlink.com/content/r687534t64334n83
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European Technology Platform on Nanomedicine, "*Nanomedicine; Nanotechnology for Health; Strategic Research Agenda*," European Commission, Brussels, November 2006, ftp://ftp.cordis.europa.eu/pub/nanotechnology/docs/nanomedicine_bat_en.pdf
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Bruce, D. (2006) Nano2Life Ethics - *A scoping paper on ethical and social issues in nanobiotechnologies*. Ach JS, & Siep L (eds.), Nano-Bio-Ethics. Ethical Dimensions of Nanobiotechnology. Münsteraner Bioethik-Studien Bd 6, Münster LIT Verlag, 2006, p 63.
Bruce, D. (2006) Ethical and social issues in nanobiotechnologies. EMBO Reports 7, 754-758.
Ach JS & Lüttmann B (eds) Nanobiotechnology, Nanomedicine and Human Enhancement. Münsteraner Bioethik-Studien Bd 9, Münster LIT Verlag, 2008

The ObservatoryNANO project is coordinated by the Institute of Nanotechnology (IoN) (UK), and includes:

- VDI Technologiezentrum (DE) www.vditz.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).