



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.

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

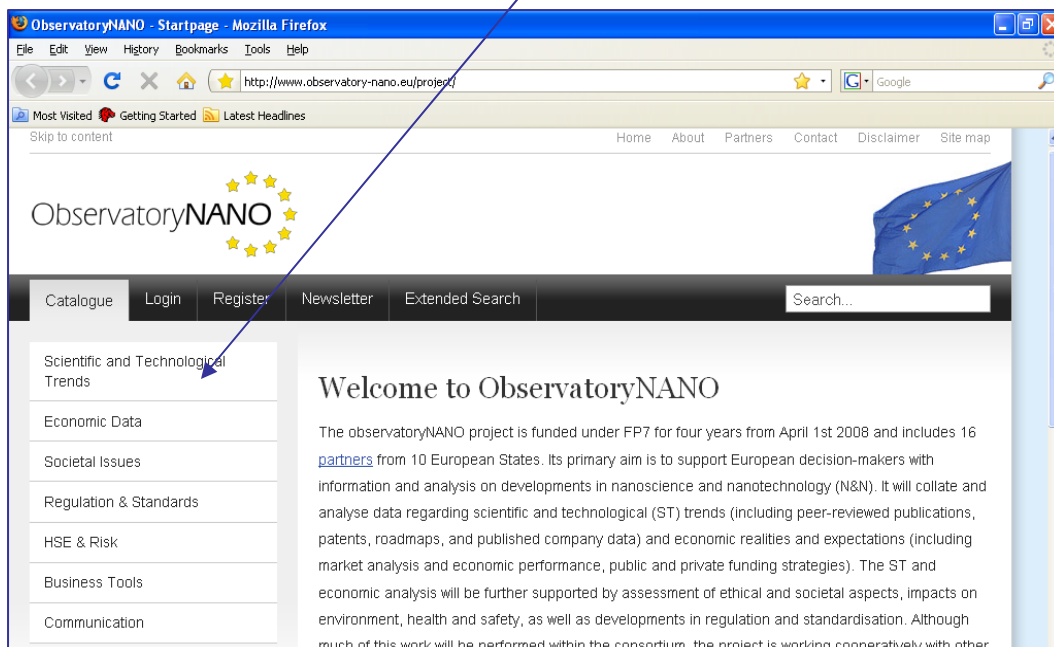
VDI Technologiezentrum (DE)
 Commissariat à l'énergie atomique (CEA) (FR)
 Institute of Occupational Medicine (IOM) (UK)
 Malsch TechnoValuation (MTV) (NL)
 triple innova (DE)
 Spinverse (FI)
 Bax and Willems Consulting Venturing (B&W) (ES)
 Dutch National Institute for Public Health and the Environment (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).

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)

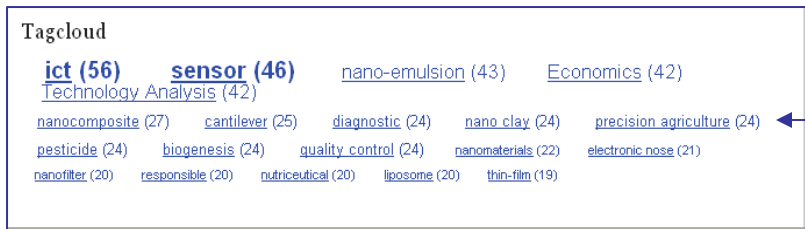
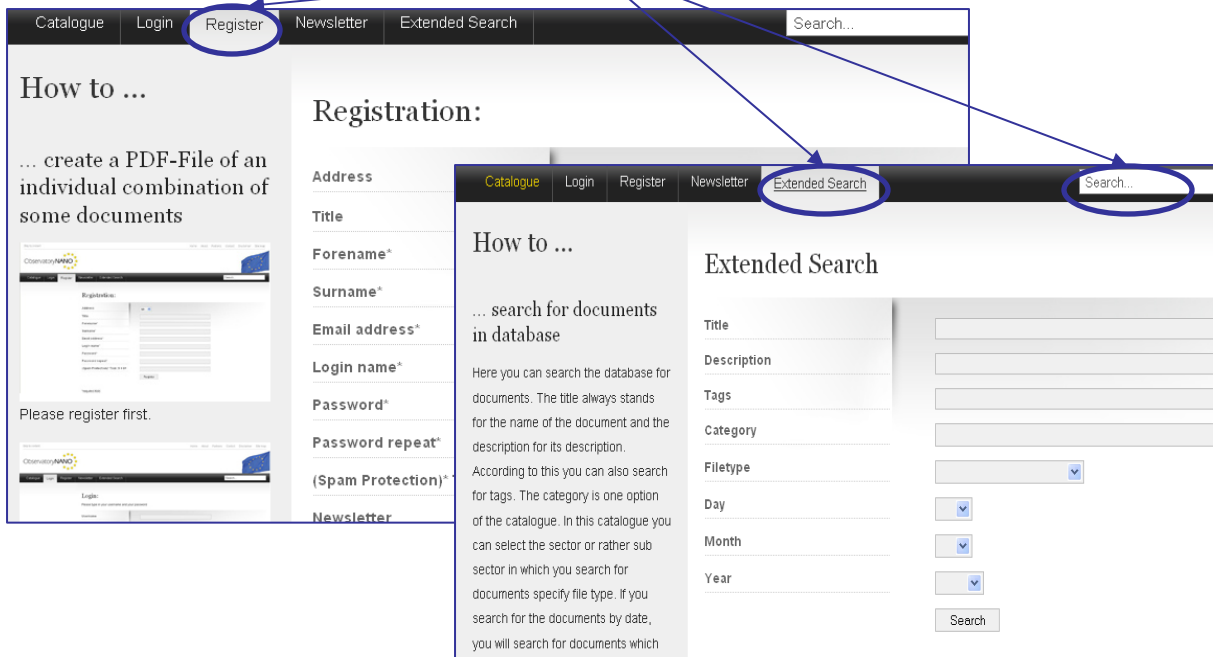
Newsletter Contents

p2	What's new at www.observatory-nano.eu
P3	Hot topics for 2 nd year reports
p4	ObservatoryNano events: Governing Board meeting, Workshops & Symposium
p5-9	Interview: <i>Be Prepared for Life with Enhanced Humans</i>

All first year reports are now available online; they can be accessed from the menu on the left hand side of the www.observatory-nano.eu homepage.



Users can search for specific topics or browse through the catalogue of reports and articles. Once registered users can select items in an online 'briefcase' to store for easier access later or to download/print as required.



The home page also features a 'Tagcloud' where popular keywords can be selected and the user will be directed to all relevant material.

ObservatoryNano 2nd Year Reports

This year the project partners have analysed the scientific, technological and market trends in each of the ten ObservatoryNANO technology sectors and have selected 24 'hot topics' as subjects of the second year reports. Of these 20 will combine scientific and technical data (WP2) with economic and market analysis (WP3); the remaining 4 reports (highlighted in *italics* below) will look at important technology developments which do not yet have a market. The final peer-reviewed reports will be available online in April 2010.



Aerospace, Automotive, & Transport

Tribological coatings
Toolings
Electric vehicles



Agrifood

Biodegradable/active packaging
Controlled delivery - crops & food



Chemistry & Materials

Coatings
Aerogels
CNT & nanodiamond



Construction

Adhesives & sealants
Restoration



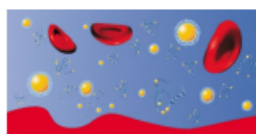
Energy

PV
Portable power



Environment

Nanoscale zero valent iron
Groundwater remediation



Health, Medicine, & Nanobio

Drug delivery
Regenerative medicine
Imaging



ICT

Nanophotonics
Graphene
Printed electronics



Security

Protective materials
Detection of CBRNE substances



Textiles

Sport/outdoor textiles
Medical textiles

The project consortium is also analysing wider issues associated with nanotechnology developments, through online discussion and at planned workshops. These analyses will integrate with the technical and economic reports and provide insight to ethical and societal implications, and environment, health and safety (EHS) issues. Further review of relevant regulation and standards issues is also underway and the ethical questions surrounding Nanobiomedicine will be discussed in the next societal issues annual report.

UPDATES

In addition the scientific/technological trends and economic data first year reports, freely available for download at www.observatory-nano.eu, will be updated with new relevant and available information.

Governing Board Meeting: Wednesday 30th September 2009, TU Berlin

The observatoryNANO is pleased to announce the formation of a Governing Board to assist the consortium in the ongoing development of the project, ensuring that it continues to fulfil its aims and objectives. 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 Board will (see table below).

Francoise Roure	National Advisory Board on Information Technologies	FR
Ottilia Saxl	TTC/IoN Publishing	UK
Prof. Paul H. Dembinski	Observatoire de la Finance	CH
Hans-Jörg Fecht	University Ulm	DE
Paul Borm	University Dusseldorf & Zuyd University	NL
Peter Hatto	IONBOND	UK
Arie Rip	Uni Twente	NL
Péter Krueger	Bayer Material Science	DE
Jan Kocka	Institute of Physics, Academy of Sciences of the Czech Republic	CZ
Louis Trépiéd	Ministry of Economy, Finance & Industry	FR
Frank Barry	AMICUS the union	IRL
Anne-Christine Ritschkoff	VTT Technical Research Centre of Finland	FI
Peter Venturini	Helios Domzale	SL
Alex Dommann	CSEM	CH
Fabio Beltram	CNR-INFM NEST	IT

Workshops

Workshops corresponding to each technology sector are currently in planning and details will be released shortly; these will be held alongside existing conferences and exhibitions.

Workshops have been confirmed for the following technology sectors at the events below;

Agrifood: Session at the British Crop Production Congress, 11th November 2009, Glasgow (*contact: douglas.robinson@nano.org.uk*).

Health, Medicine & Nanobio: Nanomedicine: Visions for the Future, 23rd-25th February 2010, Amsterdam (*contact: linsey.robertson@nano.org.uk*).

Security: Converging Technologies for the 21st Century, 26th-27th November 2009, London (*contact: kshitij.singh@nano.org.uk*).

2nd Annual Symposium

The second annual observatoryNANO Symposium will take place at the Minatec Cross Roads 2010 in Grenoble on the 22nd and 23rd June 2010. Further details will be released soon or can be obtained by contacting Stéphane Fontanell (fontanell@chartreuse.cea.fr).

ObservatoryNANO Interview with Dr Daniela Cerqui

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.

As human enhancement continues to feature on the policy makers agenda (c.f. the STOA-TAB-Rathenau Institute project on Human Enhancement and recent meeting at the European Parliament), the first interview this year is with anthropologist **Dr Daniela Cerqui** discussing how trends in nanotechnology, converging technologies and other human enhancement technologies may influence “what it means to be human”.



Ineke Malsch: What does it mean to be human?

Daniela Cerqui: If we have four hours maybe we can answer the question! As an anthropologist, I can say that there are some anthropological theories saying that a human being is something specific from a paleontological perspective. It seems to me that the social point of view is more important than the paleontological point of view. In my view, one main point is that human beings are flexible, because of or thanks to the brain that enables us to think about our future. If I could give one characteristic of a human being it is that we have a very developed brain, which enables us to make projects about our future. We are the only species which can make projects. I think it is the main criterion determining humankind.

Ineke Malsch: How do or could the neuro-implants Kevin Warwick experimented with change human self-consciousness?

Daniela Cerqui: It is more related to the first dimension I mentioned. Concerning what is a human being, you have anthropological and paleontological definitions, which are supposed to be scientific, but they are not interesting here. Each society has its own definition of what it means to be human. This is where it becomes interesting for us. In our society we think human beings are defined by their sensibility and rationality, so we come back to the brain. But this question comes back to the paleontological definition. A French anthropologist, André Leroi-Gourhan^[1] gave the following definition: “we have a mediated relationship with the environment. The first mediation is language and the second mediation is technology. Our nature as human beings is because we can be sensible and rational thanks to of this mediation. We can stand back because of this mediation.” Coming back to what Kevin Warwick is trying to do. This kind of direct relationship with our physical environment and other people, with the idea of brain-to-brain communication is trying to cancel the mediation. It could be something against humankind because if we don’t have this same possibility of standing back, our self-consciousness may be changed.

Ineke Malsch: Do you see other trends in nanotechnology or its applications which are already or might be used for human enhancement or other problematic applications from your perspective? Which trends and what are their problematic aspects?

Daniela Cerqui: When you talk about converging technologies there is something wrong. We are talking about it as if all these technologies are the same, but they are not. If we think about Information Technologies, Biotechnology and Cognitive Sciences, we talk about technologies defined by the object they work upon. When we think about nanotechnology, we think about the scale the technology is working on. We can apply nanotechnology to all the other technologies. In my view it is unnecessary to talk about trends in nanotechnology.

[1] See wikipedia: http://en.wikipedia.org/wiki/Andr%C3%A9_Leroi-Gourhan

We can talk about all fields, implants, genetics, drugs, surgery, all fields concerning human enhancement and think about how they could be better applied with the use of nanotechnology. When they work on the nanoscale it is easier as there is no difference between living and non-living elements at the nanoscale. All fields of human enhancement can go further thanks to nanotechnology. All problematic aspects of all fields can go further thanks to nanotechnology.

Ineke Malsch: What is the current debate on human enhancement essentially about? What are the issues and interests at stake? Who is involved or should be involved?

Daniela Cerqui: The reply is in the question. When we talk about “human enhancement”, there is “human” in the enhancement. The current debate is focused on what human enhancement can bring or not in terms of risks of benefits to the human beings. In my view we should stand back and think that in essence the notion of “human” can be at stake. Usually it is not taken into consideration. In Switzerland there is a centre for Technology Assessment which has published a call for a research project on Human Enhancement. What they want to be studied is the risks and benefits, in terms of humans. If we don’t stand back and realise that in the end the aim is something else than humankind, we are too close to the problem to see it in the right way. The issue which is really at stake is not just the benefits and risks for humans right now, but tomorrow and the day after tomorrow, will we remain humans. There are two levels.

First the social level: The question is what kind of social rights will we have tomorrow when there are enhanced humans? In terms of employment, pension funds and social structure in general. We should think about a society which is the right one for enhanced people to live in. I am not sure we are doing it. We are just starting a little bit to discuss it with the human enhancement project in Switzerland I mentioned for instance. It is completely at a social level considering that we still have human beings in this society. It is important to think about this society. But in my view we should also involve more philosophers and anthropologists (of course I am selling my job!). We should think in terms of long term issues. It seems the stakes discussed now are just about short term issues.

Ineke Malsch: But there are a lot of people thinking about long term issues, like transhumanists.

Daniela Cerqui: Yes, but people like transhumanists are involved in the process. Usually when you talk to people with a good position in policy making in Switzerland, they say it is not important, there are just a few transhumanists. These kinds of people should be taken very seriously and we don’t do that. It is what I was talking about philosophers and anthropologists. In the middle you have people who are involved in empirical and practical decisions. I can perfectly understand them. They have to have very practical skills. They are interested in the society we will have tomorrow. When I talk to them about transhumanism they say: *“Transhumanists are not serious people so we don’t need to listen to them.”* Or they say: *“They might be right, but it is long term and we are not interested in long term issues.”*

In my view, in order to understand the short term issues we have to start by trying to understand the long term issues. Afterwards we can come back to the short term issues. This is why we need anthropologists and philosophers able to think about scenarios which may happen in the future, without saying what the transhumanists say: *“It is a bright future.”*

People who can say: If we keep going the same way we are going now, this is where we will arrive. So after, we will have to take the right decision just now to say whether we want or don’t want to go in this direction.

Ineke Malsch: So you want people who are not involved in creating Human Enhancement to think about it?

Daniela Cerqui: If you talk to someone like Kevin Warwick, he says: *“Yes, we will be enhanced, we will be another species and it will be a bright future for everyone.”* He might be right, but

he might also be wrong. We need someone to say, this scenario is plausible, but there may also be more catastrophic scenarios which are also plausible. If we want to choose the right direction, we will have to make the right decision now. Because it is too easy when you have transhumanists saying the future will be bright, we are very happy to be lazy. It is easier for the transhumanists than for people who have a more critical view like I have. To summarise: the current debate is too much focused on humans. We should also think about the post-humans that could appear.

Ineke Malsch: *Is there a limit in the application of these technologies which should not be crossed according to you? What would be that limit and with which arguments do you want to convince Kevin Warwick or others who want to go further that you are right?*

Daniela Cerqui: I think it is very personal. I think there is no formal limit. Again, if we talk about the social level, there is clearly a limit after which we will have people who are enhanced and people who are not. The current social gaps will become even bigger. It is very difficult to say where exactly the boundary is. It is less a question of clear and formal limits than a question of degrees. It seems to me that we are already in a society... You see it in systems of care. We have the haves and have-nots in terms of health. At least in European countries we had very good national healthcare systems. Suddenly it is becoming a catastrophe. Everything is getting very expensive and you have money or not. It is obvious that with human enhancement it will get worse. We could even say that the limit is already behind us, if we consider the social level. It is a question of degree and we are just going further in a situation we are already involved in. We can also consider the human level. I come back to transhumanism. If you are a transhumanist you are very happy about the idea of a limit and want it to be passed. But there might be a limit, but I am not sure. As I said, human beings are flexible. My question is another one: How far are we flexible? Are we flexible to such an extent that we can enhance ourselves and stay human? But I am not sure. My fear is that one day we realise that we have crossed the boundary afterwards and it is too late. I am unable to say if there is a limit and where it is. It is necessary to be aware that there might be a limit and we don't know exactly where it is.

Ineke Malsch: *Do you think there are enhancements which should be allowed or would be desirable? What could they be? With which arguments would you convince people opposing any enhancements that you are right?*

Daniela Cerqui: We have to consider that there are two different levels. If we consider the individual level, we are in a society where all enhancements are desirable. Since two or three centuries at least, we can see very well that we want to improve ourselves. Now we have the technological abilities to enable us to do it. Enhancement applies to a very old will in humankind. When I say two or three centuries, it is because it was clearly said two or three centuries ago, but I think it is much older. I don't know if I can say that it is natural to humans. Coming back to André Leroi-Gourhan, we could even say that human beings have always used technology to improve themselves. We could say that all enhancements are desirable on an individual level.

Coming back to the social level, it is very different. If you think about one person being enhanced, it can be very nice if you are this person. But you have to wonder what it means for society if everybody can be enhanced. It means you need more employment, more social pension funds. We are not working to build the right society for enhanced people to live in. These are my arguments.

Ineke Malsch: *Is there a need for particular regulation or voluntary measures to govern responsible development of the nanotechnologies and related technologies with problematic aspects you identified in response to question 2? At which level should such measures be taken (national, EU, global)?*

Daniela Cerqui: I don't have clear reply, because we don't know where the limit is. Until we

know, it is very difficult to regulate. The first step is to work at the national level, but we should also work at global and European levels. If we don't work at all the levels, people will not be aware of the issues. When I started working on human enhancement, it was 15 years ago. I remember very well when I was in Brussels with the European Commission and said this; they looked at me very strangely and asked: "*So you are working on science fiction?*" I said: No, I am not working on science fiction. I am working on what is going on now in the lab. Maybe we don't talk about it a lot, but it is a movement, it is being done just now. People couldn't believe it. Now we start talking about it. The Swiss call and the report by STOA on Human Enhancement are examples. Suddenly it seems that is finally taken into consideration. But I am afraid it is starting a bit too late. It is the same as the debate on the environment. Now, people are concerned about the environment, but scientists were warning about environmental problems 50 years ago. Nobody was listening. Now citizens are realising that things are getting expensive for them, we start thinking there is a problem. In general it is a problem with big stakes for humankind. We don't want to realise that we are involved in a big movement as long as we don't have a problem with it. Maybe it is too late once we have problems with it. Maybe this is starting to be the case with human enhancement. We should act at all levels, because being aware that it is going on is the best way to prevent undesirable effects.

Ineke Malsch: How do you see your own role in the developments and discussions?

Daniela Cerqui: It is related to what I said. I think it is my task to help people become aware of what is going on. If you think about the man or woman in the street, who read newspapers, they don't have a clear idea what is going on. If they go to the doctor who says: "*Now it is possible to do that, do you want it?*" They just see their own individual case. It is my role to stand back and put all individual cases together, and to assess what kind of society and what kind of humankind we are building.

Ineke Malsch: So it is anthropological research and participation in the public debate?

Daniela Cerqui: Yes. I think there is not enough of that. I get sometimes invited in Brussels or to give presentations at technological schools. I think the public debate is not developed enough and anthropologists and philosophers should be much more involved. It is already better than 10 years ago.

Ineke Malsch: What do you think is the bottleneck? Is there not enough funding for anthropological and philosophical research on these issues?

Daniela Cerqui: No, it is not a question of funding. It is a question of culture. People who are involved in technology usually don't see very clearly what anthropology is. Even if they see what it is, they don't see what it can bring to the reflection. There is the idea that technology is like science: something very neutral. If you are convinced that technology is neutral, you don't see what an anthropologist can bring. If you know that an anthropologist studies cultural values, and think that technology is neutral, you can't understand their cultural values behind it. If we want anthropologists to be invited to discussions, we first have to get them to understand what anthropology can bring. It is kind of a never-ending problem. It is not a question of funding, but of understanding what the reflection can bring. I think it is normal, because if you study any technology, you are told that technology is neutral. You are told that what you are doing is good if it is used for good purposes; it can be bad but only if there is a bad use. If you are told that during all your studies and suddenly get explained that there are cultural values involved, it is not easy to realise that.

Ineke Malsch: So it is more the education of the natural scientists?

Daniela Cerqui: Exactly. I think one solution would be to introduce more anthropological courses in the curricula for people working in technology. It should start at the university.

Dr Daniela Cerqui

Junior Assistant Professor in Anthropology,
University of Lausanne (Switzerland) & University of Reading (UK)

<http://www.people.unil.ch/daniela.cerquiducet/>

Dr Daniela Cerqui has been working closely with Prof Kevin Warwick of the University of Reading, UK, on anthropological issues related to cyborgs and converging technologies for improving human potential. Kevin Warwick has experimented with implanting microchips in his nervous system for communicating wirelessly with computers and exchanging nerve signals with his wife.

Daniela has published and contributed to the public debate about what it means to be human given the implications of nanotechnologies, converging technologies and other enhancement technologies for human self-perception.

Relevant recent publications of and about Daniela Cerqui

Balavoine, M, Casselyn, M, Kiefer, B, “Daniela Cerqui, anthropologue aux frontières du réel,” in RevMed 3186, 2009 <http://titan.medhyg.ch/mh/formation/print.php3?sid=33839>

Cerqui, Daniela, “Understanding Converging Technologies; An Anthropological Approach,” presentation during EthicSchool on Ethics of Converging Technologies, 21-26 September 2008, Romrod / Alsfeld, www.ethicschool.eu

Cerqui, Daniela and K. Warwick « Technoethics: an anthropological approach », in Luppicini Rocci and Rebeca Adell (eds) *Handbook of Research in Technoethics*, IGI Global, 2008, pp.32-43.

Cerqui, Daniela and K. Warwick « Prospects for Thought Communication (brain to brain and brain to machine) », in Penny Duquenoy (ed), *Ethical, Legal and Social Issues in Medical Informatics*, IGI Global, 2008

Cerqui, Daniela and K. Warwick « Re-designing humankind. The rise of cyborgs: a desirable goal? », in Peter Kroes, Andrew Light, Steven Moore, and Pieter Vermaas (eds), *Designing: From philosophy to ethics, From engineering to architecture*, Springer, 2008 pp. 185-195.

Cerqui, Daniela & Warwick, Kevin, “The Rise of Cyborgs: Matter does not Matter!” in Papilloud, Kristian & Hahn, Kornelia, “Cultural Technologies within a Technological Culture,” LIT Verlag 2007

Cerqui, Daniela & Warwick, Kevin, “Can (and why should?) converging technologies bridge the gap?” in Brey, Philip, Grodzinsky, Frances & Introna, Lucas, “Ethics of New Information Technologies, Proceedings CEPE 2005, University of Twente

Cerqui, Daniela, «L’ambivalence du développement technique: entre extériorisation et intériorisation», in *Sciences et techniques dans la société, Revue européenne des sciences sociales*, XXXV, No 108, 1997, pp. 77-91.

The next ObservatoryNano newsletter
will be available in October 2009

Previous newsletters can be downloaded from the
‘Communication’ section of www.observatory-nano.eu