

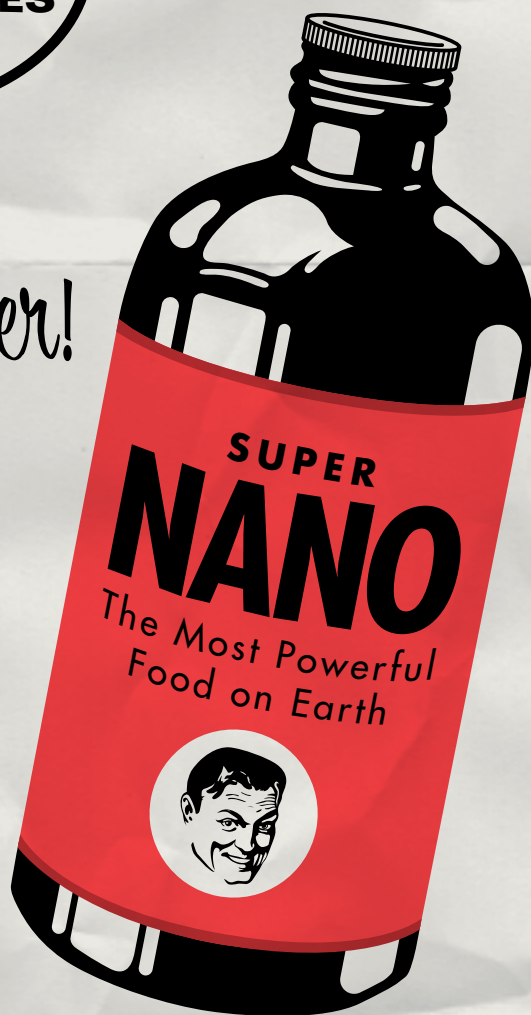
November 2012



**I EAT  
SUPER NANO  
EVERY DAY.  
IT REALLY DOES  
WORK!**

*Look Great, Live Longer!*

Energy. Attention. Alertness. Lose Weight. Become Smart. Cut Fat. Slim Down. Miracle Pill. The New Secret. Boosts Energy. Helps in Sexual Weakness. Melt off the Pounds. Fight Fatigue. Advanced Weight Management. Slimmer and Happier. Look Great. No Hunger! Removes Impotency. Increase Metabolism. Kill Free Radicals. Powerful Antioxidant. Real Solution to Rapid Weight Loss. A Very Strong Blood Flow Stimulator. Belly Fat Targeter. All Natural. Herbal Wonder. Curb the Hunger. Chemical Free. Muscle Energy and Endurance. Power Punch. Increase Sperm Count. Plant Insulin. Supports Muscle Glycogen Storage. Beats Lack of Desire for Sex. Helps You take the Distance. Free Bottle. Act Now While Supplies Last. Free Offer, Learn More.



**SPECIAL REPORT ON NANOTECHNOLOGY AND FOOD**

Page 04

**Coming up** | News

Practitioner workshops  
and signposts in cyberspace

Page 06

**Nanotechnology and food** | Special Report  
Finding Nano

Page 14

**Only Connect** | Library  
TA portals and citizen science

Page 15

**Scenario based analysis** | The Method  
Predicting the future without  
a crystal ball

Page 16

**Human enhancement** | Interview  
Gregor Wolbring  
on human enhancement

Page 19

**TA for an ageing society** | Masterclass  
Senior Moments:  
TA and the challenges of longevity

Page 20

**Biorhythms** | Highlight  
Rafael Lozano-Hemmer  
and *Pulse Index*

Page 21

**Pacita Summer School 2012** | Feature  
Doing TA in Liège

Page 24

**Nuclear testing** | Speaker's Corner  
Euro views on nuclear testing

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# Editorial

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Volta - Volume 2012 – no 3

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18 pictures, iStockphoto, Planethunters.org, Gregor Wolbring, Ellen Lande Gosner, www.lozano-hemmer.com, Pascal Messer, gettyimages.

## Cover

Petit Comitè (Catalonia)

## Cover idea

pd productions (The Netherlands)

## Printing

Industrias Gráficas Galileo, S.A. (Catalonia)

## Website

<http://volta.pacitaproject.eu/>

## Legal deposit

B-40368-2011

Volta was made possible by



Volta is an initiative of fifteen technology assessment organisations that work together in the European Pacita project - a four-year EU financed project aimed at increasing the capacity and enhancing the institutional foundation for knowledge-based policy-making on issues involving science, technology and innovation. [www.pacitaproject.eu](http://www.pacitaproject.eu)

Danish Board of Technology Foundation (Denmark); Karlsruhe Institute of Technology (Germany); The Rathenau Institute (Netherlands); Norwegian Board of Technology (Norway); The Institute of Technology Assessment (Austria); Applied Research and Communications Fund (Bulgaria); Institute of Technology of Biology and Chemistry (Portugal); Institute Society and Technology (Flanders, Belgium); Catalan Foundation for Research and Innovation (Catalonia, Spain); Swiss Centre for Technology Assessment (Switzerland); Knowledge Economy Forum (Lithuania); Technology Centre ASCR (Czech Republic); University of Liège, SPIRAL Research Centre (Wallonia, Belgium); University College Cork (Ireland); Hungarian Academy of Sciences (Hungary).

Dear reader,

Welcome to the third issue of Volta, a magazine on Science, Technology and Society in Europe.

VolTA is an initiative of fifteen Technology Assessment institutes that work together in the European PACITA project. Their aim is to contribute to responsible innovation. New technology makes our lives easier and helps us to explore problems but it also confronts society with questions and dilemmas. It is these questions that European Technology Assessment institutes address.

Nanotechnology is an example par excellence of an innovative technology that seems to offer great opportunities but at the same time raises questions and concerns. Is it safe? Well there's no simple 'yes' or 'no' answer. When it comes to food using nanotechnology, consumers are particularly suspicious and cautious. The food industry's secretive approach to product development does not allay these fears.

TA-institutes in Europe have performed several studies on the public acceptance of nanotechnology. Unsurprisingly, transparency is the key. Consumers need to be informed about the benefits and risks of technology and involving people in the decision making process is critical.

The simple truth is that when consumers know what's going on, when they understand the motives behind new developments - when their concerns are acknowledged - they are more likely to accept new products on the market.

Only when governments and food companies take that into account will nanotechnology fulfil its promise.

Antoinette Thijssen, on behalf of the Editorial Team  
[a.thijssen@rathenau.nl](mailto:a.thijssen@rathenau.nl)

## PACITA Practitioner workshops:

Approaches and Methodologies Sofia, Bulgaria, April 2013 (see *Coming Up*); Customers, Participants and Managers Vilnius, Lithuania, October 2013; Communication and Impact Strategies Prague, Czech Republic, October 2014 (organized by TC ASCR).

[www.pacitaproject.eu](http://www.pacitaproject.eu)

Photo:  
PACITA Lisbon  
workshop



## Framing TA: Selecting the issue

The first of four TA training workshops designed to insure a high and uniform standard of P(TA) in Europe took place in Lisbon in September 2012 organised by PACITA partners from the Institute of Technology of Biology and Chemistry (ITQB) and Centre for Technology Assessment (TA-SWISS). The workshops are aimed at practitioners of PTA and non-PTA institutions and deal with the guiding questions of a TA project (what, why, when, how and who). The first one dealt with selecting and framing TA studies and projects and was attended by decision-makers, experts from research institutions, universities, NGOs, media and industry. Some participants had already been involved in TA activities; others had an ambition to do so in the near future.

Group discussions on how to frame TA studies and project themes took place during the three days of the workshop and resulted in a variety of criteria (internal, external, according to political relevance, availability of input data, human or financial resources, etc.). At the final plenary session, participants discussed how to apply the selected criteria when deciding on a specific TA project theme in their home institution. Further details on this workshop, and information about how to apply for future events can be seen on the website.



The TA Portal is live. Articles, institutes, experts, publications and other TA resources.

[www.technology-assessment.info](http://www.technology-assessment.info)

## Coming up

### PACITA conference Prague

The first PACITA conference will take place in Prague with the theme Technology assessment and policy areas of great transitions covering sectors such as health care and medicine, energy supply, climate change, and the use of computer technology in all areas of society. It is being organized by the Technology Centre of the Academy of Sciences of the Czech Republic (TC ASCR) in cooperation with the Karlsruhe Institute of Technology Assessment and Systems Analysis (KIT-ITAS).

<http://pacita.strast.cz/en/conference/general-info>

**Technology assessment and policy areas of great transitions** Prague, Czech Republic, 13-15 March 2013.  
Contact: Lenka Hebáková a Iva Vancúřová [vancurova@tc.cz](mailto:vancurova@tc.cz)

### Science Slam in Spain

Encouraging dialogue between academics and practitioners to improve innovation design, implementation and evaluation is the aim of the conference organized by The UAM-Accenture Chair in Economics and Management of Innovation and INGENIO (CSIC-UPV). Featuring keynote speeches, parallel thematic sessions and roundtable discussions it is also encouraging 'early career' researchers with a 'Science Slam'. After a seven minute pitch for a publically useful research idea, the audience (at the dinner on the first evening) will vote for the best.

[www.euspri-madrid2013.org](http://www.euspri-madrid2013.org)

**Eu-SPRI Forum Madrid conference**  
Madrid, Spain 10-12 April 2013.  
Conference registration from 1st December 2012.

### Approaches and Methodologies Workshop

The second PACITA practitioners' workshop will present an overview of different approaches and methods in (P)TA with special emphasis on adapting techniques to suit national political cultures and organisational issues. It will also enable project managers to explore three PACITA case studies using different approaches: WP5 European Future Panel on Public Health Genomics: expert-oriented; WP6 EU stakeholder involvement on Ageing Society: stakeholder workshops; WP7 Citizen consultations on Sustainable Consumption: citizen consultations.

**2nd PACITA Practitioners' Workshop:**  
Approaches and Methodologies, Sofia (Bulgaria), April 2013 (exact date to be announced on website).

## Signposts in cyberspace

Laptops and smartphones allow us to be networked to the world from anywhere in the world but whenever we log on (and sometimes, even when we don't), we leave traces. It's a risk, according to the authors of *Geographical Signposts in Cyberspace*, a new report from the Swiss Centre for Technology Assessment: "Someone who divulges location-related information too openly gives others an insight into their everyday life and habits."

The study from TA-SWISS gives an overview of currently available localisation technologies and services and puts forward recommendations to policy makers for handling location-related data. These include the certification of reliable and transparent software products guaranteeing a minimum standard of data protection, the implementation of data protection measures on an international level and the improvement of general digital media competence to sensitise users to the implications of putting their movement profiles and whereabouts online.

It's not all bad news: "Localisation data are increasingly becoming a basis for innovative business models and services," state the authors, citing use in traffic planning and rescue services as positive examples. More concerning is data passed on from social networks to third parties without its owners being aware of it: "Contrary to wealthy companies, private individuals have much harder time obtaining information about all the data collected about themselves."

*Lokalisiert und identifiziert. Wie Ortungstechnologien unser Leben verändern* Lorenz Hilty, Britta Oertel, Michaela Wölk, Kurt Pärli. TA-SWISS, Centre for technology assessment (ed.). vdf Hochschulverlag AG der ETH Zürich, Swiss Federal Institut of Technology, 2012.



[www.vdf.ethz.ch/info/showDetails.asp?isbnNr=3460](http://www.vdf.ethz.ch/info/showDetails.asp?isbnNr=3460)  
English summary available from:  
[www.ta-swiss.ch/publikationen/berichte/](http://www.ta-swiss.ch/publikationen/berichte/)

## TA in Europe: current practices report

The PACITA report TA practices in Europe describes and compares policy-oriented TA practices in Austria, Catalonia (Spain), Denmark, Flanders (Belgium), Germany, The Netherlands, Norway and Switzerland. The reporting is based on interviews, institutional archives, websites, research and expert judgement. In the concluding chapter the comparative analysis is extended to organisations in Finland, France, Greece, the European Union, Italy, the United Kingdom and the United States.

The most important conclusion is that TA institutional structures do not emerge out of the blue. Carrying out pilot projects in new European Union member states to foster an interest in TA is essential to build credibility in the dynamic interplay between parliament, government, science and society.

[www.pacitaproject.eu](http://www.pacitaproject.eu)

## Knowledge-based policy making

In the first Parliamentary TA debate held in Copenhagen, policy makers from all over Europe addressed the challenge of how to ensure a stream of high-quality knowledge reaches the political decision making process. What is the role of knowledge brokers, such as TA institutes? Is there a special need for knowledge in science and technology policy making? What are the expectations of politicians? This new report from TA-SWISS who organised the event in association with the Danish Board of Technology, covers the debate. The need for timely and easy-to-understand reports and the global dimension of science and technology came under discussion, but also how TA could play a critical role in new European countries. "TA-inspired initiatives represent enlightenment values," noted Lithuanian parliamentarian Mantas Adomnas, "and are very important if we want to reinstate rational debate at the heart of democracy."

Report of the First Parliamentary TA Debate held in Copenhagen on June 18, 2012. Edited: TA-SWISS, author Danielle Bütschi.

More about the meeting with keynote presentations and interviews can be seen at [www.pacitaproject.eu/?page\\_id=1049](http://www.pacitaproject.eu/?page_id=1049)

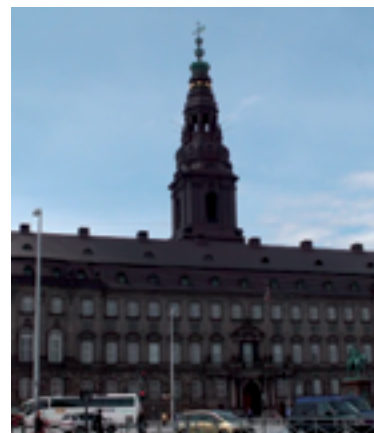


Photo:  
Danish Parliament

# Finding Nano

## Can public cynicism about food technology be overcome?

Text:  
Marianne Barland

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The trillion-euro food industry is keeping quiet about its nanotechnology research but, regulated or not, products will be coming to a fridge near you. Is that steak trying to tell you something?

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*‘I think the more information they give us the more we’ll trust them.’*

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Longer shelf life, intelligent packaging, and healthier or ‘functional’ food carrying medicines or supplements are among the possibilities offered by nanotechnology in the food sector. But the food industry itself remains secretive about how nanotechnology is being used which is raising the fears of EU citizens. Recent European TA studies stress the importance of transparent and credible information on nanoproducts. The need for information with regard to individual concerns and perceived risks should be taken seriously.

This spring, the FDA (U.S. Food and Drug administration) issued new draft guidance on the use of nanotechnology in food and food related products. The uncertainties related to nanotechnology in food are many and the FDA wants manufacturers to consult them before putting a product on the market. It was a move welcomed by health and environment campaigners: “The agency is no longer ignoring the scientific consensus that these nanomaterials have the capacity to be fundamentally different, and can create new and novel risks, necessitating new testing,” stated George Kimbrell of the Campaign for Food Safety. By identifying nanotechnology as one of their main priorities, the FDA has sent strong signals that this is something they see as highly relevant in the years to come and taken the discussion on the use of





nanotechnology in food in the US to another level. We know that nanotechnology is already used in some food related products. Is it time to speed up the discussion in Europe?

Nanotechnology in food and food related products has only recently taken its first few steps into the consumer world. While new products are being released every day, it's not yet the world of Willy Wonka and a three-course-meal on a stick of chewing gum. The food and beverage category in the Nanotechproject's Consumer Products Inventory returns over a hundred items. These include antibacterial kitchenware and storage products and utensils, but also edible products and food supplements. There's Slim Shake Chocolate from Nanoceuticals, for example, described as 'a technology advanced form of cocoa that offers enhanced flavor without the need for excess sugar'. Or Chinese NanoTea, which: 'can release effectively all the excellent essences of the annihilation of viruses through penetration so that a good supplement of selenium can be achieved and the selenium supplement function can be increased by 10 times.'

### Nano benefits?

In fact there are many proposed ways that nanotechnology could improve our food. Fighting obesity by reducing the amount of fat and sugar in our food is one. Personalized food that could adapt to the dietary needs of people with allergies or taste preferences is another. The technology can also be used in packaging and wrapping to improve the shelf life of food. These are positive outcomes that

one could hardly disagree with. But there are also certain risks related to the use of nanotechnology. When materials and particles are manipulated on a very small scale and take on new properties, it is difficult to know for certain how the body or the environment will react. Because of these uncertainties, the introduction of nanotechnology in consumer products has been cautious, and the precautionary principle has been a guiding principle in implementation of nanotechnology. This states that if an action or policy has a suspected risk of causing harm to humans or the environment, the proof that it is not harmful falls on those taking the action.

### What is nanotechnology?

Nanotechnology is technology that operates on the nanoscale (one billionth of a meter). Particles at this scale exist in nature (for example salt particles from sea spray or protein particles in milk), but the development of nanotechnology enables scientists to manipulate matter at the nanoscale; so small that it cannot be seen with a regular microscope. We can use nanotechnology to reveal new properties in different materials, also in the area of food.

Photo:  
iStockphoto

As one of the biggest industries in the world, the food sector is technologically advanced. From early 2000 until 2005, nanotechnology became a buzzword; it communicated innovation and forward thinking. But after some time of ‘buzzing’, the media started digging a bit deeper and wrote more and more about the proposed risks that could be related to the technology. This made the public more sceptical, and products with the word nano in their name disappeared from the shelves.

This can be illustrated by the case of Kraft Foods. In 2000, as one of the biggest food companies in the world, Kraft Foods proudly announced their very own project on nanotechnology - the Nanotek Consortium. It involved 15 universities all over the world and several national research laboratories. Presenting themselves as frontrunners in the development of nanotechnology in the food sector, Kraft Foods researched the use of nanotechnology both in packaging and in food itself.

After some years of activity, the consortium was renamed ‘The Interdisciplinary Network of Emerging Science and Technologies’, and passed over to Phillip Morris. Mondelez International (which now owns the brands of Kraft Foods) no longer fronts the development of nanotechnology in the food industry, but has a short text on their website:

“Currently we’re not using nanotechnology. But as a leading food company, we need to understand the potential this technology may hold for us in terms of food safety, product quality, nutrition and sustainability. That is why our research and development teams always keep their eyes on the scientific research, as well as consider potential applications where nanotechnology may be used in packaging material.” (Source: *Mondelezinternational.com*.)

### Nano and TA

The huge promises from the research and food industry combined with the fears communicated by NGOs makes nanotechnology a prime topic for technology assessment, says Adrian Rügsegger, project manager at TA-SWISS, the Swiss centre for technology assessment. The prominent role of the food industry and food research in Switzerland was one of the reasons they commissioned a study on nanotechnology and food in 2009. “In this specific case more insight was needed, since many studies focused more on nanotechnology at large and less on the particular use in the food sector. By taking an interdisciplinary approach, technology assessment looks at both opportunities and risks, taking into account not only the technological challenges, but also the societal, ethical and regulatory aspects” comments Rügsegger.

### Wrapped in nano

The industry is currently keeping quiet, and no longer communicates its actions when it comes to nanotechnology, but it does not mean it is not active in development terms.

“We can already find nano products in stores within the area of packaging and wrapping”, says Frans Kampers, coordinator of Wageningen



Bionanotechnology Centre (BioNT), a research centre active in the fundamental science and technology of micro- and nanosystems and their applications in food and health. “Providing better and safer food for the consumer is the overall goal of these developments”, he continues. “A basic use of nanotechnology in this area could be to change the barriers of packaging; the food will be less affected by, for example, sunlight or the leak of gases through the wrapping.”

One example of this is the American brewery Miller Brewing. Some years ago they wanted to change from glass to plastic bottles. Because of their weight, plastic bottles would be much cheaper to transport. But, it turned out the new plastic bottles were not able to keep the beer fresh as gas leaked through the bottles. Using clay nano particles in the plastic, the barriers of the bottle strengthened and the beer now has a shelf life of up to six months.

Kampers is positive about the general possibilities nanotechnology offers: “Nanotechnology is an enabling technology with many applications. It is a toolbox with a very high precision level and can be applied in many areas, also in the food industry.”

Nanotechnology could also introduce us to the concept of “intelligent packaging”. Small nano sensors could be embedded in the food packaging to inform consumers when food is starting to degrade, for example through a system of colors. The label will be green when you buy the product and turn to yellow when it only has a few days left before going bad. A red label shows that the food is not safe for consumption.

Implementing nanosilver in packaging to keep food free from bacteria is a technology that is already in use today. Kampers refers to research that shows there is little migration between the food and the packaging: “It seems that this application of nanosilver could be a good solution. If the silver particles stay in the packaging and don’t migrate into the food, the person eating the food will not measurably be exposed to the silver.”



And this is what it comes down to: exposure.

### Negative focus?

Andy Booth, a researcher at Scandinavian research institute SINTEF, is a specialist in engineered nanoparticles. “Wearing a silver ring on your finger is not seen as risky,” says Booth, “however, eating products that have been in contact with nano silver particles is perceived as something else.” Though he agrees there are certain risks connected to the use of nanotechnology, he feels the media has been biased in their writing. “We don’t have a balanced picture of nanotechnology. The focus is more or less always on the negative. Sure, there is a risk, but this is always related to exposure. The technology has so many possibilities that we should not kill it before we have assessed both the risks and the benefits.”

The TA-SWISS study *Nanotechnology in the Food Sector* (2009) found that food packaging modified by nanotechnology promised real ecological value – provided appropriate recycling systems can be set up. The effects of nanoparticles over the whole life cycle of a product must be taken into account, which means during the manufacturing process, in contact with the food, and in the case of packaging, when it is disposed of or recycled.

### Healthy eating

One of the most positive prospects for nanotechnology in food is the potential benefits this could mean to our health. Being able to reduce the amount of salt and fat in food without affecting the taste or texture certainly appears enticing and could help in overcoming issues such as obesity. In the UK, Leatherhead Food Research – whose working group NanoWatch has been running since 2007 – have shown that the size of salt particles can affect

taste. By using salt particles at the nano level, it would be possible to reduce the amount of salt and still get the same taste. Another ‘healthier version’ example would be making a low-fat mayonnaise by manipulating the texture at the nano level, so that the product still tastes and feels as creamy as the full-fat alternative.

An application of nanotechnology that could be useful for special groups of consumers is varying the quantity of nutrients or vitamins in food. Some groups of people have dietary conditions that make it difficult to have a sufficient uptake of vitamins which are caused by allergies, diets or other conditions. Nanotechnology could help these groups to get the nutrition they need. These functional ingredients can also be designed into a delivery system, so that the ingredients reach the place in the body where they will be most effective, without degrading on the way. This kind of delivery system has also been introduced in the field of medicine to get the most effective use of certain drugs.

*‘The technology has so many possibilities that we should not kill it before we have assessed both the risks and the benefits.’*

### Nano ‘meat’

Frans Kampers believes that nanotechnology could also make our meat consumption more sustainable. “In the future, meat and animal protein will be scarce. It will be impossible to produce enough meat if large populations, who until now have eaten less meat, start adopting the western lifestyle. The

## Read More?

### TA projects on nanotechnology

Several TA institutions have done or are doing projects concerning nanotechnology, within the food industry and also a wider context.

### Governance of Nanotechnology in the Netherlands - Informing and engaging in different social spheres. Rathenau Instituut (2012)

Describes the wide range of activities that were organised in the Netherlands to bring a public perspective into the development of nanotechnology. Will be published in a special issue on public engagement in the International Journal of Emerging Technologies and Society (IJETS) later this year.

Ten lessons for a nanodialogue. Rathenau Instituut (2008). [www.rathenau.nl](http://www.rathenau.nl)

### NANOMATERIALS: Effects on Environment and Health. TA-SWISS (2009)

An overview of commercial products which contain nanomaterials and an analysis of future trends. [www.ta-swiss.ch](http://www.ta-swiss.ch)

### Nanotechnology in the food sector. European Parliament (2009)

Commissioned by TA-SWISS and conducted by the Institute of Applied Ecology (Freiburg, Germany), a STOA

(Science and Technology Options Assessments of the EU parliament) study which assesses products in respect of environmental issues and sustainability, showing the direction that future developments might take and where there is a need for caution. [www.europarl.europa.eu/stoa](http://www.europarl.europa.eu/stoa)

### Nanotechnology in the EU

Policy, research and actions on nanotechnology from the EU <http://ec.europa.eu/health/nanotechnology>

Photo:  
iStockphoto

current way of producing meat using animals is simply too inefficient. In some cases only ten percent of the plant protein is converted to meat. It would be an interesting opportunity to use nanotechnology to make a meat replacement directly from plant protein. If it tastes and feels sufficiently meat-like, consumers will probably like it. Using a source of plant protein, scientist could manipulate the proteins already in the plant to make the taste and texture like the meat we know today.”



## Regulation

Scientists agree that there are a number of opportunities in the field of nanotechnology that could be beneficial for consumers and the society as a whole. Nano products, mostly related to wrapping and packaging, are on the shelves, but many more are on-going projects based in labs around the world. Regulating the use of nanotechnology and dealing with certain risks related to exposure will be of importance in the years to come. It will give the industry important guidelines and will also help educate and inform consumers.

In Europe it is the European Commission that regulates the use of nanotechnology and it is mindful of the importance of a solid framework:

“The EU has invested a great deal of money in research and development for nanotechnologies. It must now create the right conditions for realizing their full potential. The EU has decided to take an “integrated, safe and responsible approach” to the development of nanotechnologies. This includes: reviewing and adapting EU laws; monitoring safety issues; engaging in dialogue

with national authorities, stakeholders and citizens.

There are already laws regulating food safety, food packaging and novel food. How nanotechnology fits into these different regulations is more difficult. There isn't one clear definition of nanotechnology or nanomaterials that everyone agrees on. This creates problems formulating laws and regulations, which again makes it difficult to label and register products. So even though we know there are products out there containing nanotechnology, it could be difficult to identify them by simply looking at the product labels. There's no requirement for 'nanotechnology' to appear on the label. It could be stated but 'hidden' in a chemical description which makes it difficult for the average citizen to recognize.

Frans Kampers sees this definition debate as a dead end, especially for food products. “If you look at the current definition proposed by the European Commission and apply that to food, all food products will need to be labelled as nano,” he believes. It would

## Nanowatching

### SINTEF

SINTEF is the largest independent research organization in Scandinavia. SINTEF creates value through knowledge generation, research and innovation, and develops technological solutions that are brought into practical use.

[www.sintef.no](http://www.sintef.no)

### Institute of Nanotechnology

The Institute works closely with governments, universities, researchers, companies and the general public to educate and inform on all aspects of nanotechnology. It also organises various international scientific events, conferences and educational courses that examine the implications of nanotechnology across a wide variety of themes and sectors.

[www.nano.org.uk](http://www.nano.org.uk)

### The Project on Emerging Nanotechnologies

The Project on Emerging Nanotechnologies was established in April 2005 as a partnership between the Woodrow Wilson International Center for Scholars and the Pew Charitable Trusts. The Project is dedicated to helping ensure that as nanotechnologies advance, possible risks are minimized, public and consumer engagement remains strong, and the potential benefits of these new technologies are realized.

<http://www.nanotechproject.org>

### nano&me

nano&me is a website for anyone interested in nanotechnologies. The site aims to bring a balanced and thoughtful perspective to discussion about nano. Through these discussions a wide range of views can then be brought to the

attention of government policy makers and any business and science using nanotechnologies. The website is made by The Responsible Nano Forum and the Together Agency of Nottingham. [www.nanoandme.org](http://www.nanoandme.org)

### Wageningen Bionanotechnology Centre

Wageningen Bionanotechnology centre (BioNT) is active in the fundamental science and technology of micro- and nanosystems and their applications in food and health. The centre wants to help companies utilize the opportunities of these new technologies to innovate their products and processes and to improve our food and prevent health problems.

[www.biont.wur.nl/UK](http://www.biont.wur.nl/UK)

More information on <http://volta.pacitaproject.eu>



But what will our future meat look like? Professor Mark Post and his team in Maastricht University in the Netherlands revealed they were growing a hamburger in February 2012. Take some bovine stem cells and serum from an equine foetus and grow a few thousand strands of muscle. Hungry yet?

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*‘People associate food with emotion and don’t want it to appear as something artificial. Knowing that something ‘secret’ is going on will create a negative attitude towards nanotechnology.’*

therefore be much simpler to focus on those types of engineered nanomaterials that could be deemed hazardous. These are the persistent non-dissolving, non-biodegradable nanoparticles which can be defined and regulation can be based on such a definition.

Moreover, these materials can be detected, even in complex matrices like food, which is a prerequisite for enforcement of regulation. This is the same line taken in a recent report from STOA (Science and Technology Options Assessments of the EU Parliament). Nano Safety - Risk Governance of Manufactured Nanoparticles (July 2012) argues that regulation should be limited to human activities; a legal definition of nanomaterials should therefore focus on manufactured nanomaterials.

### **Accepting the tiny technology**

As nanotechnology becomes more widely distributed in a variety of consumer products, an increasing number of people are seeking information and expressing concerns about the safety of products containing or using nanotechnologies. In 2011, the Food Standards Agency in the UK researched citizens’ opinions on nanotechnology and food through citizens Forums.

Although nanotechnology is a complex area, and citizens find it difficult to assess because of its risks, in certain areas citizens were clear.

Photo:  
iStockphoto

*Medicines (and vitamin supplements) using nanotechnology can be delivered more quickly to the bloodstream and have been used for decades.*

---

*‘Citizens want governments to act on behalf of the public interest’*

First of all, they want information about research and developments, potential risks and uncertainties, and the motivations of those involved in its development, to be made publically available. This request for greater transparency clearly contradicts the more introverted attitude we have seen from the food industry itself.

This matches the findings of STOA and TA-SWISS and the debate concerning genetically modified crops; citizens are more cautious about products if they suspect that the manufacturers are not transparent about the constituents of their products. A proactive information policy and specific labeling could help prevent mistrust, says Adrian Rügsegger of TA-SWISS. The fear of citizens that the ratio of potential benefits to potential risks is unfavorable was one of the reasons TA-SWISS wanted to do a study specifically on the food sector.

Frans Kampers concurs: “People associate food with emotion and don’t want it to appear as something artificial. Knowing that something ‘secret’ is going on will create a negative attitude towards nanotechnology.” People need to be educated on both the benefits and the risks, he says.

Another conclusion from the Food Standards Agency’s citizens forums was that they want governments to act on behalf of the public interest. Seeing the food industry as self-interested, they wanted governments to take a stronger position. However, they also wanted more citizen involvement when making decisions about whether certain products were ‘worth the risk’ when it came to consumption.

During the workshops, participants developed their views as their knowledge about the issues grew. This shows the importance of educating consumers and having a transparent dialogue between the food industry, manufacturers and the government. When



consumers know what's going on and the motives behind scientific developments, they are more likely to accept new products.

This method of involving citizens is well known from the area of technology assessment and was also included in the study made by TA-SWISS. Their 'Publifocus' on nanotechnology, health and environment in 2006 aimed at finding out how lay people perceived the debate on nanotechnology and where citizens saw opportunities for themselves, their health and the environment. One of their findings was that, in general, people expect more opportunities than risks with nanotechnology – their hope outweighs their reservations, says TA-SWISS project manager Emiliano Feresin. But even when participants had a positive attitude they wanted more information and labelling of food containing synthetic nanoparticles.

Andy Booth knows that it is difficult for the average citizen to understand the complexities of nanotechnology, and consider (or make their mind up) about the risks and the benefits. "Nanotechnology is a huge field and it is difficult to discuss it as a whole" he confirms. "To say that nanotechnology is dangerous is the same as saying that all chemicals are toxic. Some products with nanotechnology are perfectly fine, but when we actually consume the product the exposure is completely different."

#### **Product safety is paramount**

The STOA study concludes that information about the ingredients, functions and effects of nanomaterials in consumer products is required by citizens and consumer organizations. Product safety is paramount and the industry is expected to provide this information in a clear and understandable way, in order to enable the public to make an informed decision.

It may be needed sooner rather than later. An expert group from FAO and WHO identified 183 published patents containing the keywords 'nano' and 'food' in the period 2009–2011 indicating that there is a lot

of research activity and probably several 'near-ready' products.

Nanotechnology can be revolutionary in many areas of consumption, but is of no use if it is not accepted by the public. If, in the future, we want the meat in our fridge to communicate with us, we will have to rely on the soundness of the science, industry and the governments that regulate the developments.



# 14 Only Connect

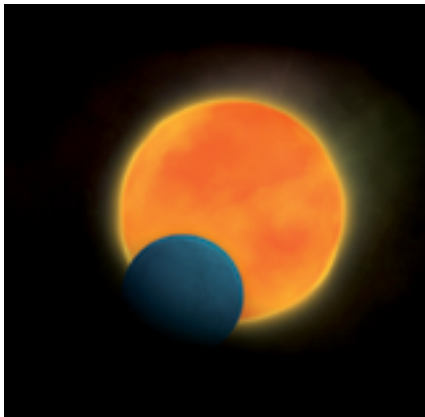
Knowledge-based decision making requires intelligently organised data sources but it's not only professionals that create value. Volta magazine highlights two useful additions to the TA library and explores the Zooniverse where citizen science rules.

Text: Ann Maher,  
Michael Nentwich

Photo:  
Planethunters.org

## Is there anything odd about this image?

Peering into their computer screens around the world, 704,991 (and counting) citizen scientists of all ages are busy in The Zooniverse



classifying galaxies, hunting for planets, identifying objects on the ocean floor or categorising whale dialects. Projects like these, which have been developed by the Citizen Science Alliance together with academic institutions and other partners, enable volunteers to engage with scientists and researchers in dealing with the deluge of data confronting them. It's a major shift between science and society, according to open science advocate Michael Nielsen, a former theoretical physicist and author of *Reinventing Discovery: The New Era of Networked Sciences*. And there have been major discoveries - such as the new four-sun planet PH1 announced in October 2012.

It started with just one project, Galaxy Zoo, which celebrated its fifth birthday this year and is now in its fourth incarnation: Galaxy Hubble. So: Smooth or rounded? Star or artifact? Would you like to discuss this object?

[www.zooniverse.org](http://www.zooniverse.org)  
[www.galaxyzoo.org](http://www.galaxyzoo.org)  
[www.planethunters.org](http://www.planethunters.org)  
[www.citizensciencealliance.org](http://www.citizensciencealliance.org)

## Dutch science site

When navigating the world of technology assessment, it's not always easy to find essential and detailed information about a country's scientific policy making process and the intersections between various institutions all in one place. But in the Rathenau Instituut's new website, developed in conjunction with The Royal Netherlands Academy of Arts and Sciences (KNAW), such information is now available. The new website provides extensive information on Dutch science and innovation policy organisations, advisory bodies, research funds, research programs and research performing institutions (and their budgets, where possible). Special topics include evaluation practices, exploratory studies, and internationalism.

[www.dutchscience.info](http://www.dutchscience.info)



## TA Portal goes live

The Technology Assessment Portal providing instant access to European TA activities was officially launched at a meeting of the European Parliamentary Technology Assessment Network (EPTA) in October 2012. The core of the Portal is a searchable database containing the metadata of TA-related publications and projects as well as basics on TA institutions and experts around Europe. So if you want to know who is working on synthetic biology, for example, the portal will provide a list of past and current projects (with project leader contact details) together with relevant publications, many with full text links. The data are harvested and updated regularly from partners' websites and currently cover organisations in the PACITA project, but it is intended to include additional TA institutions within EPTA and beyond. While the main feature of the TA Portal is currently the growing database, PACITA is intending to add further useful services for the TA community including a full text server providing access to open access publications in the field and also a forum for discussion of TA related matters.

**TA Portal:** <http://technology-assessment.info>.

# Fast Forward

‘Prediction is very difficult especially if it involves the future,’ quipped famous physicist Niels Bohr. Yet technology assessment professionals are regularly asked to do just that. No crystal ball available? Scenario based analysis might be the answer.

*‘Scenario based analysis can strengthen communication with stakeholders.’*

While working on a military project for the RAND Corporation in the 1950s, American physicist Herman Kahn came up with a radical new method for analysing events before they happened. Using clues from the current situation as his starting point, he created reality-based story lines —much like a writer in the film industry would— by playing around with developments and influences which resulted in different scenarios. Kahn’s Cold War scenarios dealt with nuclear warfare; not only how it was possible but more controversially, winnable.

This scenario based analysis technique is still used by policy-makers, scholars and large corporations like Shell. And it can also be useful for technology assessment specialists. According to Lars Klüver, Director of The Danish Board of Technology Foundation, scenario based analysis is very good when exploring technology transition —from mineral oil to biofuel for instance. A good analysis can illuminate the constraints, the needed scale of change, and the policies that will favour a transition.

“Scenarios are built by identifying current factors that could have a strong influence in the (near) future,” explains Klüver. “A TA-professional will examine which outcomes could be the result of these influences. Usually, we produce a limited number of scenarios, for instance a negative, neutral and positive scenario.”

A recent example is the study *Future Perspectives of 2nd Generation Biofuels* published by TA Swiss in 2010. In this study, three very different biofuel scenarios for Switzerland for the years 2015–2030 were developed and analysed. The scenarios brought up many interesting developments. For example, in certain scenarios biofuels resulted in less greenhouse gas reduction than hoped for. It helped law-makers reach decisions.

But it is important to remember a scenario is a forecast, not a prophecy. As Klüver says, “It is a description of one out of many possible futures. Because of that, the process of making the scenario is like a negotiation process with stakeholders, politicians, and different experts making the decisions that define the scenario.”

As a bonus, scenario based analysis can also increase the ownership among those involved in a decision and strengthen communication with stakeholders. Using this strategy correctly might enable a level of consensus to be created round a scenario thereby smoothing the policy-making process.

Text: Philip Dröge  
Photo: gettyimages



So when is scenario based analysis not a good method? When ‘large transitions are unrealistic,’ according to Klüver. Situations where cautious incremental small step change is dominant or where more or less deterministic factors such as an ageing society or a depletion of resources are at play.

“There needs to be a high degree of freedom for change for scenario based analysis to make sense.”

Gregor Wolbring  
on human enhancement  
Species typical and beyond



*‘An acceptance of diversity and different abilities is the only answer. Without it, human enhancement will always be attractive and we’ll never get to a point where we can say no.’*



Chances are someone close to you has had a hip replaced. This is restorative technology at its best, giving a new lease of good quality life to an otherwise healthy body. But what if the replacement joint is fitted out with sensors plugged into the nervous system, enabling its new owner to walk faster and more steadily than they have done in years? Even if they are unlikely to outrun an athlete (though the ‘cheetah’ prosthetic legs worn by the South African Paralympic athlete Oscar Pistorius are an instructive example of such a therapeutic’ device with enhancement potential), this (fictitious) intervention undeniably goes beyond simply restoration. What we’re looking at here is human enhancement.

### And it’s not just hips

Dr Gregor Wolbring believes that many a technology designed to make up for lost faculties may eventually move beyond what he calls the ‘species–typical level’. As Associate Professor at the Community Rehabilitation and Disability Studies (CRDS) program in Calgary, one of the first such programs to be established in North America in 1979, he studies the social implications and governance of ableism, health ethics, and disability.

As for those enhancements - sharper senses, stronger muscles, a consistently happier mood or entirely new brainpower, it’s not just about the technology, according to Wolbring: “I myself use a wheelchair so why should I have a problem with someone else using tools? If we tell people without legs that they should have legs, why should they stop at the species–typical level when technology can take them beyond that?” But should they be obliged to use that technology, it becomes a whole different story.

### Transhumanist agenda

According to Wolbring, the risk looms large. “It is the transhumanist agenda”, he states. “Transhumanists like John Harris and Julian Savulescu are pushing for these things to become compulsory. The backdoor, so to speak, for the initial acceptance of enhancement, is always therapeutic enhancement; what they call restoration. That’s hard to fight.”

“Of course, I could say, ‘We shouldn’t do brain–machine interfaces’. But then someone will roll on to the stage a person with locked-in syndrome, and ask me, “So, you really don’t want that technology developed?” Obviously, it would be a PR disaster to say no. Besides, I do not want to deny useful therapeutics to people who need them.”

Is a high–tech device that releases people from their locked–in syndrome really bad news for the rest of us? “It isn’t”, Wolbring agrees. “As long as a technology is invasive, it will remain a health thing and the social impact will be tiny. But in many cases, the next step is towards non-invasiveness. For instance, brain–machine interfaces that you can just put on your head like a helmet. As soon as this allows you to do things like thought-control game characters or social robots it’s become a cool gadget that people will want to have. From that moment on, it is the new level of what is called ability expectation.”

But obviously, not everybody can afford an expensive device to thought-control their social robot, or even the robot in the first place.

### More than healthy

This is particularly relevant in the European context, believes Wolbring, because health insurance pays for all sorts of things provided you’re ill. There is a medicalisation process going on. “We’ve seen it with Viagra and erectile dysfunction”, he says: “The industry made men feel bad about themselves so that they would buy the stuff —though finally, in most countries people must pay for Viagra themselves. In a slightly different way, we’ve also seen it with sex change operations. The healthcare system will only pay for them if people define themselves in medical terms as having a gender identity disorder— even though many of them do not at all feel this way about themselves. If ever more technologies get medicalised this way, the healthcare system will run into trouble, because we have only so many healthcare euros to spend.”

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*‘I do not want to deny useful therapeutics to people who need them.’*

In the United States, where health insurance is more limited, it is likely that enhancement technologies will be consumer goods right from the start. But what happens to the majority of society when only the wealthy can afford to become more–than–healthy. Will unenhanced become the new disabled?

Given that many disabled people have low (or no) incomes, Wolbring believes they will lose out in the end, “Yet ostensibly these technologies are developed for their sakes”. When you take the global view, the inequity gets even worse.

In places where people can’t afford clean water or sanitation, “how can they have access to these new shiny gadgets?”

But what’s new? Don’t we already accept that some people have elite educations, seven-figure incomes and fridges full of champagne, whereas others can’t read, live as rubbish pickers and are dying for a glass of clean water? “That’s how the transhumanists argue”, Wolbring counters. “They say, ‘We accept inequity already, so what’s different with the technology inequity?’ But I, of course, fight inequity, full stop. If people’s livelihood came to depend on having access to a machine-brain interface, the device would have become a de facto obligation.”

**Dr. Gregor Wolbring** is a prominent academic, biochemist, bioethicist, health policy researcher, ability scholar and associate professor in the University of Calgary Faculty of Medicine. In addition to many academic articles on his specialist areas he blogs on the implications of scientific and technology advances at [www.bioethicsanddisability.org/articles.html](http://www.bioethicsanddisability.org/articles.html); and on ableism and ability ethics at [www.ableism.wordpress.com](http://www.ableism.wordpress.com).

Such a situation clashes with Wolbring's concept of 'ability security', that goes along with the series of 'human securities' as defined by the World Health Organisation. "Ability security is about being able to have a good life with the set of abilities that you happen to have", he explains. "If enhancement technologies become an obligation —if I can't say no— life will be modelled around this new technology. It will be required for employment or even education, and if you don't want it or don't have access to it, you will get less income, and so on."

Not behaving in a 'species-typical manner' can affect employment, education, social life, political participation, asserts Wolbring. It is exactly what disabled people have been fighting for a long time. "Even today, disabled people in the United States are only protected by the Americans with Disabilities Act if their condition is not 'fixable'. If it is, they have the obligation to obtain the fix. If they don't, why should society have the obligation to do XYZ for you? —so the reasoning goes."

### Regulation

Prohibiting enhancement technologies is not the answer: If they fulfil an ability expectation of a powerful social group, the technology will be developed somewhere. "If Europe bans it, it will move to, say, China. And when it comes pouring out of China, suddenly all regulations will be cut in the US, in an attempt to remain the military and economic number one."

So what can regulators do, if anything? "From an equity point of view, there are only two ways to respond to human enhancement", according to Wolbring. "One, you make sure everybody has access - which is unlikely to be feasible. That leaves you with option number two: make sure people don't want to acquire it to start with. What we need, therefore, is a retooling of what we think important in life. We have to realise that everyone has their worth, and that an individual's contribution to society is not equal to their contribution to GDP."

If such a change of culture is the only feasible option, then surely that's up to society – governments, after all, are supposed to respect their citizens' choices. "Oh no, I do think that governments have a role to play. Science governance should ask the hard question of which ability expectation is tenable and what will be the consequences if health consumers' expectations rise beyond that. I've long been critical of the health technology assessment field, because they only consider the efficacy and safety of products and largely overlook the social dynamic, including the rise of ability expectations."

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*'Of course people will say that competitiveness is part of human nature, but I don't buy it.'*

Another thing governments can do is fight rather than spread the message of competitiveness and productivity. "Now it is often claimed that without competitiveness, we will stagnate. This makes people want any new technology that enables them to compete more effectively with others. Of course people will say that competitiveness is part of human nature, but I don't buy it. An acceptance of diversity and different abilities is the only answer. Without it, human enhancement will always be attractive and we'll never get to a point where we'll say: no, we don't want this or that technology."

# Senior Moments

Do dementia patients need GPS tracking? Are smart houses safe? Our increasing longevity raises many challenges in society that technology assessment can help to address. The Norwegian Board of Technology brought together stakeholders (who rarely meet) to encourage and influence debate.

Norway, Europe and China are all facing the same issue. By 2035, there will be twice as many people as there are now above the age of 80. The ageing population will cause an increase in the need for care services, while the availability of caregivers will be increasingly scarce. It's a double challenge which exposes a huge gap between the technological possibilities that might help and the lack of awareness in politics and the health sector itself.

With this in mind, The Norwegian Board of Technology (NBT) started their project The Future of Ageing in 2008.



At the time, the competence in care technology was low and the need for innovative care sector policies high. Despite the projected future growth of the older population, it did not seem to be a political priority. Technology, often seen as something cold and alien, was frowned upon; surely what the aging population needed was traditional care and 'warm hands'.

To get an overview of the available technology and the needs of the different interest groups, the NBT put together a diverse expert group. Among its members were an alderman, an occupational therapist, the leader of the senior council and several technologists.

With the expert group in place, the NBT invited different stakeholders to three scenario workshops. The workshops had three different personas as the starting point, and the participants discussed their options in different future scenarios. The questions discussed were: How can the health services transform with new technology? Can smart houses create the required safety in the home so that seniors can live there

*'I have reached an age when, if someone tells me to wear socks, I don't have to.'* Albert Einstein

Text:  
Adele Flakke  
Johannessen and  
Marianne Barland  
Photo:  
Ellen Lande Gosner

longer? When is GPS tracking of dementia patients necessary? Can body sensors in daily use provide better treatment and monitoring for those who live at home?

The workshops were designed for three different types of actors: in Oslo, seniors, relatives and people with a minority background met. In Tromsø, the hometown of the Centre for Integrated Care and Telemedicine, the participants were mostly researchers and technologists. In Lyngør, an area characterized by many small municipalities, there were participants from local politics and the health care system.

Combining two TA methods —the expert group and scenario workshop— was successful in several ways. While there are many actors in the field, they rarely meet. Creating an area for them to meet and discuss the challenges ahead can help in closing the gap, both for themselves and the NBT.

These meetings also gave a good overview of the field and identified the issues stakeholders find important. The work in the expert group led to a final report that was presented at an open meeting at Parliament. This report, and presentations of the project all over Norway, has had an impact on work in the standing committees, white papers and governmental policy. The work contributed to raising the issue and framing the policy field.

## Read More?

Value Ageing ITA Institute  
of Technology Austria  
[www.oeaw.ac.at](http://www.oeaw.ac.at)

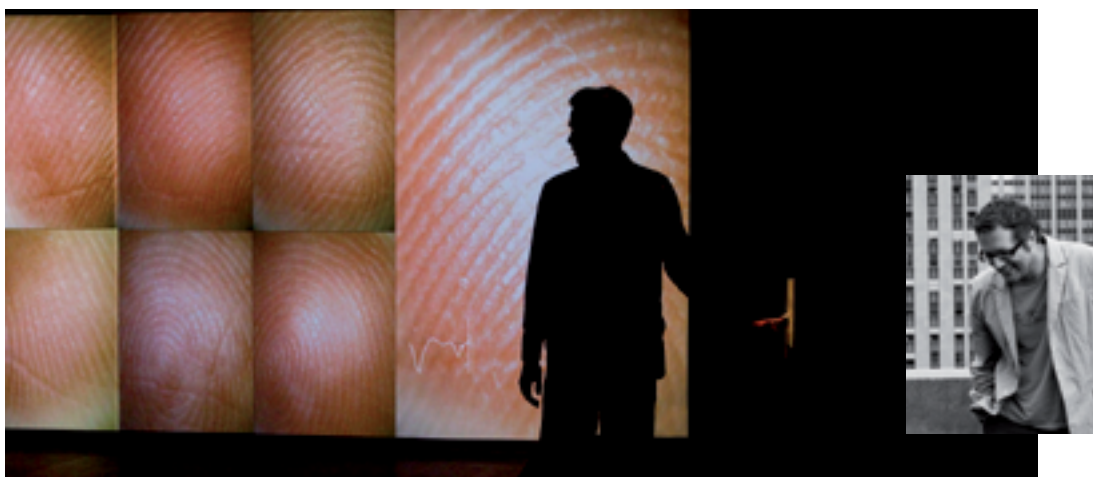
The Nordic Innovation  
Network for Welfare  
Technology  
[www.welfareinnovation.net](http://www.welfareinnovation.net)

MATCH Mobilising  
advanced technologies  
for Care at Home  
[www.match-project.org.uk](http://www.match-project.org.uk)

# Biorhythms

Text:  
Adele Flakke  
Johannessen  
Photos:  
www.  
lozano-hemmer.com

Chemist turned electronic artist Rafael Lozano-Hemmer creates platforms for public participation using robotics, computerized surveillance and telematic networks. In *Pulse Index*, individuals place their finger in a sensor that records their fingerprint and heart beat and displays them alongside hundreds of others to create a pulsating horizon line of skin.



### Present state of mind?

Concerned. There is deep trouble in 'my' three countries. In Mexico, documented electoral fraud is about to bring the PRI party back to power. In Canada, the Harper government is converting a nation that was proudly environmentally and socially concerned into an international embarrassment. In Spain, the Rajoy government is destroying the livelihood of low and middle class families instead of going after the bankers and speculators responsible for the melt-down.

### Biggest success?

The project *Voz Alta* [loud voice] is an interactive installation to remember the Tlatelolco student massacre in Mexico City (1968). The audience can speak into a megaphone that automatically controls the brightness of four searchlights that relay their voice over Mexico City as quiet light

flashes; tuning into 96.1FM radio allows people anywhere in the city to listen in live to what the lights are saying.

### How did you get here?

Perseverance, intuition, enthusiasm, luck.

### Heroes?

Chuck D, Agnes Martin, Alan Turing, Alejandro Jodorowski. There are many more, these examples come to my head as people whose passion and talent I admire.

### Biggest failure?

My career as DJ Taco Stand. I'm a bad DJ but I love doing it!

### Fear?

Right now it is Mitt Romney, not him, but the world view he represents.

### Inspiration?

In science, in night-clubs,

swimming, psychotherapy and with my family.

### Plans for the future?

To become a better father to my three kids, to go back to school, to pay my studio assistants a better salary, to start a foundation in Mexico, to be mindful that all plans for the future change.

### What would you change?

Like everyone, I'd love to come up with an alternative economic model that is not based on unsustainable growth, that values the environment and culture, and that can support an open society.

Until June 1, 2013, you can see *Pulse Index* in the *Focal Points* group show (curator: Tim Wilcox), Manchester Art Gallery, Manchester.

For more projects and information:  
[www.lozano-hemmer.com](http://www.lozano-hemmer.com)



# Doing TA in Liège

What does a Lithuanian combustion engineer have in common with an Australian social scientist working for a mining company or an Irish ex-senator? Well, in Liège (Belgium), they all want to find out how technology assessment can help solve the big science and technology related problems our society faces.

Text & Photos:  
Pascal Messer

Did you know that the name Liège stems from the Latin form Leodicum or Leodium, which has the Germanic word leod, meaning ‘people’, as its origin? And did you know it was a symbol for a city that in the early Middle Ages had the most democratic governing system of the Low Countries? I didn’t. But it seems a nicely fitting décor to a summer school on Parliamentary Technology Assessment and Renewable Energies, I ponder, as I climb over the bags brimming with rubble and construction debris that are blocking the entrance to our hotel. Liège has all the elements TA claims as its kicking ground: messy energy technology related problems, a democratic history and an ambition to become a better place with better technologies.

## Balanced and unbiased

So, what is Technology Assessment? And how can it help solve the big science and technology related problems our society faces? These are the questions 34 international participants - ranging from combustion engineers, research analysts, social scientists, physicists, EU project managers, several members of parliament, and even a ‘muse

by vocation’ - have gathered to find an answer to. “Today, technology is the strongest force of change in society,” says Pierre Delvenne, head of Spiral’s Science and Technology studies Research Unit and co-organizer of the summer school in his opening speech. “We’re facing geo-engineering, nanotechnology, biotechnology and renewables. The complexity and intensity of these emerging technologies will challenge not only individuals but societies too. They will have an even more profound effect upon us than IT, the internet and the mobile phone have had in the past thirty years. So we need responsible and innovative policies which stem from an understanding of how science, technology and society interact. And as the number of lobbyists and interest groups grow, European policy makers urgently need the right knowledge; balanced, unbiased and objective information. That’s what TA is about.”

On Tuesday we get to work in the Chateau de Colonster, a secluded little castle outside Liège. The morning is devoted to TA theory, the afternoon for workshops on TA and renewable energy. Johan Evers of the Belgian Institute Society & Technology hands down an often used definition to start us off: “TA is the study and evaluation of existing, new and emerging technologies. It is an interdisciplinary approach to solving existing and potential problems with the aim to prevent potential damage.”

But it comes in several flavours. There is, for instance, Expert TA, where scientists assess technologies and technology options. Or Participatory TA, that involves non-experts or citizens with stakeholders and policy makers. The objectives of TA can be different too. It can function as an early warning system and point to risk factors. It can take on the shape of Parliamentary TA (PTA), which offers unbiased, scientifically based information to members of parliament or to policy makers. There is Constructive TA, which brings value to the design phase of a technology and Discursive or Argumentative TA, which



Figuring out ways to escape the very early morning drilling in our boarded up hotel really added to the group atmosphere.

deals with debates and culturally shaped values regarding science and technology. “We are servants to the political discourse”, concludes Johan.

Later that day, António Moniz from ITAS-KIT wraps it up nicely: “TA has three dimensions. The cognitive dimension – we create an overview on (technical) knowledge, relevant to policymaking. There is the normative dimension: we establish dialogue in order to support opinion making. And there is a pragmatic dimension; we establish processes that help decisions to be made.”

### Spice and power relations

The afternoon sessions are high pressured TA workshops. We get stiff deadlines and appointed project leaders, assistants and communications officers, who have to regularly report to the plenary. The group atmosphere is good and the participants are highly ambitious and creative.

One group has to design a EU project proposal for investigating the views of citizens on renewable energies. Another has to develop a proposal on renewable energy for cities. When can photovoltaics (solar energy) create value? What kind of technological and societal challenges are there? We have to map out all possible stakeholders. Are there opposing or overlapping interests? Legal obstacles? Environmental or health issues? Possible ways to help introduce the technology? Technological and policy options? Oh, and a budget and communications plan, please. Well, it does show us something about messy problems.



Jürgen Ganzewies from the Rathenau Institute finds TA can be dangerous when an angry and disturbed young man accidentally kicks in the window of our bar.

## *‘We are servants to the political discourse’*

Every now and then the organizers intervene in our work, to give us more insight into a TA practitioner’s daily job. We are suddenly landed with a negative newspaper article about our solar energy plan. Angry journalists are demanding a rapidly written ‘damage limitation’ press statement and a 30-second piece-to-camera. No easy task and certainly not for thoughtful scientists.

### Picking the right tool

On Wednesday Dr Danielle Bütschi from TA-SWISS takes us through the various TA methods. “All our work is based on sound scientific research,” explains Bütschi, “but TA has a toolbox. And doing TA means picking the right tool.” She sketches a rough distinction between Scientific, Interactive and Communicative TA methods.

The research methods used in Scientific TA include data and discourse analysis, quantitative and qualitative techniques such as questionnaires and expert interviews, to modelling and simulation. It’s about providing knowledge on technology-driven issues; their impact on the economy, the environment, or health. Other important research questions are: what are the related ethical and legislative questions, and what are the interests and values at stake?

Interactive or participatory TA is used for conflict management and resolution. It can also help mobilise citizens for shaping future technologies. Often involving concerned citizens, it assesses the local implementation of a technology to formulate concrete solutions and action proposals based on the participants’ own experience. Examples include expert hearings, consensus conferences, focus groups and scenario workshops. According to Bütschi: “Interactive methods are not just about participation: but about inclusion, procedural fairness and transparency.”

Communicative TA is about awareness raising and political opinion forming by using a variety of tools such as websites, newsletters, policy briefs and social media. But there are more playful and engaging tools too, such as science festivals, cafes or even a science theatre play. The aim is to produce ‘some well needed spaces of reflection’ and engage debate.

### I love PTA

After the participants sweat to present their project proposals on Friday, the week finishes with a ‘constructive critique’. It comes from Irishman Paidi O’Reilly from University College Cork.

“I love PTA”, O’Reilly begins, “And if I had a T-shirt with that quote on, I would be wearing it.” But he quickly becomes serious. “Although your work is impressive, it seems that in your project designs the citizens came last. TA could rapidly evolve into a ‘let’s feed it to the citizens practice.”

Ouch. O’Reilly believes people are losing trust in national and European governments. “EU citizens are still very much pro science and technology”, he continues, “And they want to be part of the decision making. But there is a growing gap between civilians and elites. Citizens feel that the decisions taken are escaping them. Or that they do not know how decisions are taken.”



Students and teachers mingle well and are as one when choosing this summer school’s fashion colour scheme.

### Derailing technology

O’Reilly calls on TA practitioners to find new and innovative ways to close this gap and cites as an example the fierce debate currently going on in Ireland over shale gas and fracking - a technology used to drill for unconventional gas. “This debate is happening at the local level with small villages of 200 citizens. And then there is the national or even international level with policymakers, experts and large companies. We see these two sides going in opposite ways. Scientists are stating that the local dialogue is not important. And communities

are organizing themselves, locally, nationally and internationally. They are sharing knowledge. They are protesting. And they are effectively putting bans in place. If PTA wants to have a successful future, it must take into account the increasingly complex networks of stakeholders and build trust between them.”

So can TA help solve the big problems society is facing? As a summer school participant I conclude there are perhaps too many answers to that question. But as a citizen, I can only wish for society to recognize its necessity. That we need unbiased expertise that can analyse our messy problems and protect us from the unwanted effects of science and technology and indeed, help to bridge gaps in society. Seen from that perspective, TA is not only a democratic effort, but in the end, a wise and civilized thing to do too.



Exhausted summer school organizers Benedikt, Aline and Pierre share a farewell drink with Joëlle Kapompol, member of the Walloon Parliament.

# Nuclear stress tests 25 billion euros upgrade?

Europe's nuclear power plants have hundreds of defects, with dozens of reactors failing to meet international standards, according to the European Union. What do members of parliament think about these results?

Text:  
Claartje Doorenbos  
Photo:  
gettyimages

After carrying out stress tests on its 132 nuclear reactors as a response to the nuclear disaster in Fukushima, Japan, in March 2011, the EU have reported “further improvements are needed in almost all of them.” The largest number of concerns was found in France. The main aim of the stress tests was to assess their safety and robustness in facing extreme (if unlikely) natural events, especially flood and earthquakes. The costs of safety upgrades could be up to 25 billion euros, a European Union report revealed in October 2012. What do members of the European Parliament think about the tests and results?



## Improving safety

“This exercise should be about striving to continually improve nuclear safety, not about questioning its existence or seeking to over regulate it out of existence. It would be extremely disappointing if this became an exercise in forcing Germany’s position on nuclear energy down the throats of other countries.”

Konrad Szymanski (Poland), European Conservatives and Reformist [www.konradszymanski.pl](http://www.konradszymanski.pl)

## Shut down older plants

“We must be aware that these stress tests evaluated only the bare minimum. They didn’t even manage to detect microcracks on Belgian reactors, and they do not include the risks of a terrorist attack or a plane crash, which are treated separately because they relate to security and not to safety issues. In short, works will be numerous and an estimated 30 to 200 million euros will be spent per reactor. The final costs will exceed 10 billion euros for France alone. Here is a very basic and simple lesson to learn: the most vulnerable and older nuclear plants must be shut down as a priority and for good.”

Michèle Rivasi (France), the Greens/European Free Alliance [www.michele-rivasi.eu](http://www.michele-rivasi.eu)

## Focus on transparency

“In light of the Commission’s report, the legal framework has to be reinforced, as well as the self-organisation of the EU’s nuclear energy sector. We should particularly focus on transparency, the cooperation between regulators and with the European Nuclear Safety Regulators Group. A proper safety framework and culture should aim to be the most ambitious worldwide so as to ensure that nuclear energy can play its future role in a competitive low-carbon EU economy.”

Romana Jordan (Slovenia), Group of the European People’s Party (Christian Democrats) [www.rjordancizelj.si](http://www.rjordancizelj.si)

## All EU states must act

“Basically, it doesn’t change the German nuclear phase-out plan at all. But it cannot be that we in Germany turn off safe nuclear power plants whilst neighboring countries continue to use unsafe plants for another 20 years. Therefore, all EU member states must now take action. Thus, where upgrades are not possible or are more costly with regard to the remaining terms [of the reactor’s life], we must discuss the possibility of closure.”

Jürgen Creutzmann (Germany), Group of the Alliance of Liberals and Democrats for Europe [www.juergen-creutzmann.de](http://www.juergen-creutzmann.de)

## Read more?

Communication from the Commission to the Council and the European Parliament on the comprehensive risk and safety assessments (“stress tests”) of nuclear power plants in the European Union and related activities. Brussels, 4th October 2012. COM(2012) 571 final.

[http://europa.eu/rapid/press-release\\_IP-12-1051\\_en.htm](http://europa.eu/rapid/press-release_IP-12-1051_en.htm)