Issue 3
December 2007

RESEARCH
EUROPEAN RESEARCH & INNOVATION REVIEW

DODS

THE NEXT INDUSTRIAL REVOLUTION
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PLUS

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Giles Chichester

Eurovision

Jorgo Chatzimarkakis on fostering brilliant ideas for Europe

SAFENUT

Safeguard of hazelnut and almond genetic resources:
from traditional uses to novel agro industrial opportunities

http://safenut.casaccia.enea.it/

Programme type: Grant under Council Regulation (EC) N. 870/2004 AGRI GEN RES
Thematic Areas: Recovery, characterization, core collection and utilization of genetic resources in agriculture

General information

Nuts represent economically important crops for the European Community, particularly in the bio-geographic Mediterranean area. The interest towards these species is also related to their excellent nutritional properties. The cultivation of species such as hazelnut and almond is strongly related to traditions and cultural identity of people, also contributing to a suitable use and recovery of marginal lands. In many regions where these crops are not a major agricultural resource, they represent an interesting source of income for the local sustainable production system, according to a multifunctional concept of agriculture widely supported by the European Union.

Main Objectives

- To increase the knowledge of the European hazelnut and almond germplasm (*Corylus avellana* and *Prunus dulci*) in order to enhance its characterisation, preservation and utilisation
- To recover and valorise local endangered germplasm in the traditional productive areas of the Mediterranean basin
- To create a core collection both for hazelnut and almond species
- To set up a web based inventory linked with the major thematic international databases and to create a strong European network
- To promote a wider application of traditional knowledge to raise stakeholders awareness on the values of biodiversity in the framework of the sustainable development.

Actions and means involved

The first action will be a survey on available germplasm and recovery of endangered varieties of hazelnut and almond. This action will include: data acquisition on the genotypes available in *ex situ* and *in situ* collections, both at the local and national level. Chemical and genetic characterisation of germplasm will be performed in order to define the genetic profile and validate proper cultivars classification. Emphasis will be put on nutritional and nutraceutical aspects. A questionnaire will be used to pursue the objective of recovering memories of traditional uses and agricultural practices as well as social and historical information.

A specific action will be aimed at the conservation and management of genetic resources: core collections for both almond and hazelnut will be established, taking into account the biodiversity value, the recovery of old varieties and the traditional knowledge linked to them.

The final objective of the project, namely dissemination and exchange of information on traditional use of hazelnut and almond genetic resources in sustainable agricultural systems, will be achieved by developing an interactive web-system. Surveys of available knowledge at all biodiversity levels - genetic, varietal, ecosystemic and landscape - will be carried on.

Start date and duration:
01/04/2007; 36 months
Total funding 1.114.000

Co-ordinator:
ENEA, Ente per le Nuove Tecnologie, l'Energia e l'Ambiente
Partners:
- Universita' degli Studi di Torino (UNITO), Italy;
- Consorzio di Ricerche Applicate alla Biotecnologia (CRAB), Italy;
- Istituto Sperimentale per la Frutticoltura (CRA), Italy;
- Institut de Recerca i Tecnologia Agroalimentàries (IRTA), Spain;
- Centro de Investigación y Tecnologia Agroalimentaria de Aragón (CITA), Spain;
- National Agricultural Research Foundation – Institute of Olive Trees and Subtropical Plants (NAGREF - ISPOT), Greece;
- National Agricultural Research Foundation – Pomology Institute (NAGREF), Greece;
- Institut National de la Recherche Agronomique (INRA), France;
- Univerza v Ljubljani, Biotehniska Fakulteta, Slovenia;
- Universidade de Trás-os-Montes e Alto Douro (UTAD), Portugal;

Participants:
- ONG Lega Ambiente
- Farmers' Association (Coldiretti)

The EU-DEVELONUTRI project:

Developing sensitive and fast analytical analysis methods for food micronutrients

Micronutrients, such as vitamins, antioxidants and minerals, are essential components of our diet. They are present in food in trace amounts and are thus difficult to quantify. Highly sensitive methods for their quantitation are available, but not yet routine. These methods can help assessing which treatments, before and after harvesting, help preserving the nutritional value of food.

The DEVELONUTRI project will develop and validate state-of-the-art analytical techniques for rapid quantitation of micronutrients. It will analyse three widely consumed crops (potato, wheat and tomato) throughout the production / processing chain. Both traditional and GM varieties will be analysed.

The project involves partners from 7 European and 2 extra-European countries. Advanced methods for micronutrient quantitation will be validated in different labs, and the results will be made available in plain language through a public web-site, for the information of EU citizens and policymakers.

For further information: www.develonutri.org.

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Piebalgs: More money for EU energy

Energy commissioner Andris Piebalgs has said he would like "more money" for the EU's new strategic energy plan. He was defending the new SET plan last month from suggestions that it's just another unnecessary layer of administration without any monetary value. "The added value of the plan is to say we need to concentrate research in areas where we can make breakthroughs," the energy commissioner said.

Energy research is already funded under the seventh framework programme, as well as the competitiveness and innovation programme. There will be no new funding for energy research under the commission's proposals for SET, which pushes for the better use of existing resources instead. "I would like to have more money for it," Piebalgs said. He explained that Europe's energy research budget has declined substantially since the 1980s.

If governments were investing today at the same rate as in 1980, the EU would be spending around €8bn instead of the €2.5bn it spent last year. The proposals under the SET plan include the creation of 'European industrial initiatives' to bring together resources in particular sectors; the setting up of a European energy research alliance to coordinate research across European universities; planning the reorganisation of energy infrastructure networks; and a regularly updated information system on energy technologies.

However, the plan has come under fire from environmental NGOs, who say that it fails to provide a true 'strategic' vision on how to power Europe with energy that is both environmentally safe and secure in supply.

Healthy statistics

Europeans are more interested in medical and health research than in international news or economic affairs, according to a recent Eurobarometer survey.

According to the European commission, 71 per cent of those polled said they were interested in medical and health research, and 60 per cent expressed an interest in science and technology.

In comparison, international news and economic affairs were of interest to 70 per cent and 68 per cent of Europeans respectively. "This Eurobarometer shows the growing interest in research issues among Europeans, particularly in areas that affect them directly," said science and research commissioner Janez Potočnik.

"The desire for information about health and medical research is undoubtedly linked to the ageing of the population, but it is also encouraging to see the interest among the younger generation as well for science and technology. This study highlights our responsibility to communicate the results of the research we support to the public."

Take off

The European commission has unveiled 36 innovative projects selected in the first EU-wide call for research proposals in aeronautics and air transport under FP7. The commission hopes that the first call will bring important advances into greener, safer, more secure air transport and improved cost efficiency in aeronautics.

Some €217m is available for this first batch of projects, out of a total of €2.1bn for aeronautics research from 2007 to 2013. "Research holds the key to many of the challenges we face in today's world, including how to make air transport safer, greener, quieter and more efficient," said Potočnik. "The projects selected from the latest round of proposals all address one or other of these vital issues."

The four largest projects include DREAM (validation of radical engine architecture systems), a project to develop new engine concepts based on open contra-rotating rotors, with a target of a seven per cent reduction in CO_2 emissions and three decibel reduction in noise. MAAXIMUS (more affordable aircraft structure through extended, integrated and mature numerical sizing) will focus on improving the composition and design of fuselages, while HIRF SE (high intensity radiated field synthetic environment) will create simulators to test new aircrafts' reactions to electromagnetic interference.

Finally, SCARLETT will develop new and advanced modular avionics platforms for a range of aircraft types. →

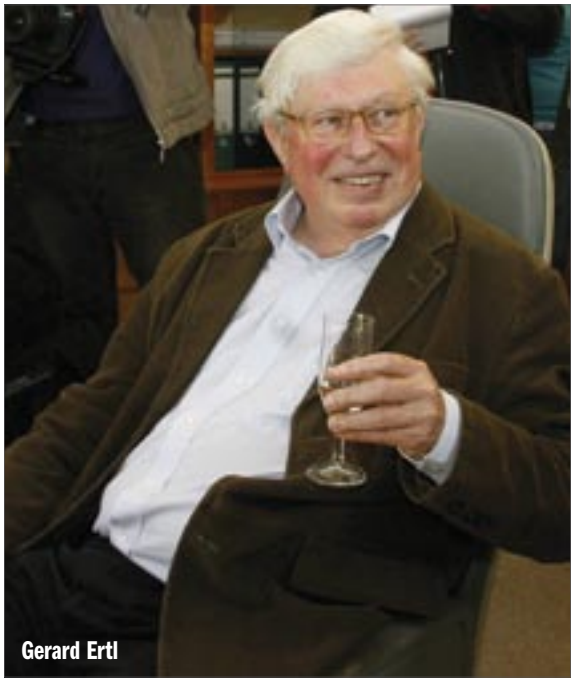
Prize performers

Four European scientists were awarded Nobel prizes for medicine, physics and chemistry earlier this year. Sir Martin Evans of Cardiff university shared the Nobel prize for medicine with two scientists based in the US for their work on mouse genetics, while Albert Fert of Université Paris-Sud and CNRS and Peter Grünberg of Forschungszentrum Jülich shared the Nobel prize for physics for their discovery of the effect underlying data retrieval from hard disks.

Gerhard Ertl of the Fritz-Haber Institute of the Max Planck Society in Berlin was awarded the Nobel prize for chemistry for his study of chemical processes on solid surfaces. "We have to go back many years to find the last time that the majority of Nobel laureates in the science prizes were Europeans," said science commissioner Janez Potočnik.

"Their sense of achievement will first and foremost be a personal one, with the prizes recognising their contribution to science. But I hope they will also feel a sense of pride in showing that European science is alive and well, and producing world-class results."

European commission vice president Günter Verheugen, who last year gave the award for inventor of the year to professor Grünberg for the same discovery which led to his Nobel prize, welcomed the Nobel prize for professors Grünberg and Fert as a "major achievement for research and innovation in Europe".



Gerard Ertl

Positive feedback

The results of a public consultation on the future of the European research area were published in October. Science and research commissioner Janez Potočnik said that the feedback from research institutions and universities would help provide ideas on how to reinforce and extend the ERA.

"European research is so much more than the EU's framework programme," he said. "It's about working together to create an environment that supports and rewards scientific excellence, so that our economies can develop and the quality of life of our people can improve. That is the aim of the European research area. I am encouraged by the impressive feedback."

The consultation identified a number of key issues, including public investment, globalisation of research, private sector investment, the emergence of new scientific powers and the specialisation of research activities at EU, rather than member state, level.

The six priority areas suggested by the commission – researchers, infrastructures, excellent research institutions, knowledge-sharing, international cooperation, coordinated programming and evaluation, and opening ERA to the world – were confirmed, with knowledge-sharing emerging as the most pressing if the ERA vision is to be achieved and the most important in terms of need for European-level action.

Satellite science

The ESA earth observation centre, also known as Esrin, has been drafted in to help scientists monitor the state of the earth's air quality. Located in Frascati, Italy, Esrin is one of the five specialised centres of the European space agency located across Europe.

In mid-October, scientists and researchers from around the world gathered to discuss the contribution of satellite data in monitoring pollution levels, specifically the levels of nitrogen dioxide in the atmosphere. They also presented the latest results of their ongoing atmospheric research, which included identifying hotspots, analysing trends and monitoring the effectiveness of mitigation efforts.

For example, Dr Sachin Ghude of the Indian institute of tropical meteorology (IITM) commented that emissions of gaseous pollutants have increased in India over the past two decades, and attributed this phenomenon to rapid industrialisation, urbanisation and traffic growth experienced in the region.

Animal health

Janez Potočnik has welcomed the launch of the action plan for the future of animal health research. With the action plan, the European technology platform for global animal health (ETPGAH) enters into its implementation phase to develop medicines for current and emerging animal diseases.

A key feature of the plan is a disease prioritisation model that will list diseases by their impact for society, based on parameters such as its relevance on human and animal health, the ability of the disease to spread and food security. "We have seen the importance of a strategic approach for research on animal disease in the case of both avian influenza and bluetongue," said Declan O'Brian, managing director of IFAH-Europe.

"The ETPGAH had predicted the emergence of bluetongue as a major threat to Europe a year before the diseases reached central and northern Europe in 2006."

An ocean of opportunities

There are many ways in which the EU can help improve marine research – but they need to be better coordinated, says Charlotte Jagot

With the recent adoption of the so-called 'blue book' on maritime policy, the launch of the seventh framework programme for research and development (FP7), and the publication of a green paper on the European research area, 2007 has been a particularly busy year for stakeholders involved in marine and maritime affairs. Ifremer, the French research institute for marine science and technology, whose activities cover the full spectrum of research on the marine environment as well as underwater technologies, has actively taken part in this process, either individually, with other key research partners such as the German marine research consortium or the national oceanography centre in Southampton, UK, or as a member of European associations such as the ESF-marine board or EFARO.

The debates about future maritime policy and the European research area have indeed given key European research players a great opportunity to voice their views about the future of maritime Europe. Addressing specific research needs will be instrumental in delivering competitiveness and sustainability to the maritime regions of Europe. For example, increasing RTD funding on climate change, sustainable observing systems, deep-sea resources, fisheries, aquaculture and renewable energies will be key if a successful integrated maritime policy is to be fully embraced by Europe. FP7, which identifies marine sciences and technology as a priority cross-cutting theme, as well as the future strategy for marine and maritime research due to be released before summer 2008 by the European commission, will be powerful catalysts to tackle such a challenge.

Although FP7 is the main programme covering European research and promoting competitiveness in line with the Lisbon agenda, the role of regional incentives should not be underestimated. On the one hand, the development of maritime regional clusters enables regional authorities and public

and private stakeholders to contribute to the region's competitiveness in certain fields such as maritime security. On the other hand, actions supported at EU level by regional policy are particularly helpful to exploit research results in order to address a specific regional concern.

The new territorial cooperation objective that replaces the Interreg programme for 2007-2013 could prove one of the most successful instruments to promote cooperation between European regions. The transnational approach is especially well-adapted to tackle Europe-wide challenges since it enables the various regional actors to collaborate at sea basin scale. Since living marine resources ignore national boundaries, this is particularly useful for addressing environmental, security or economic concerns shared by different European regions.

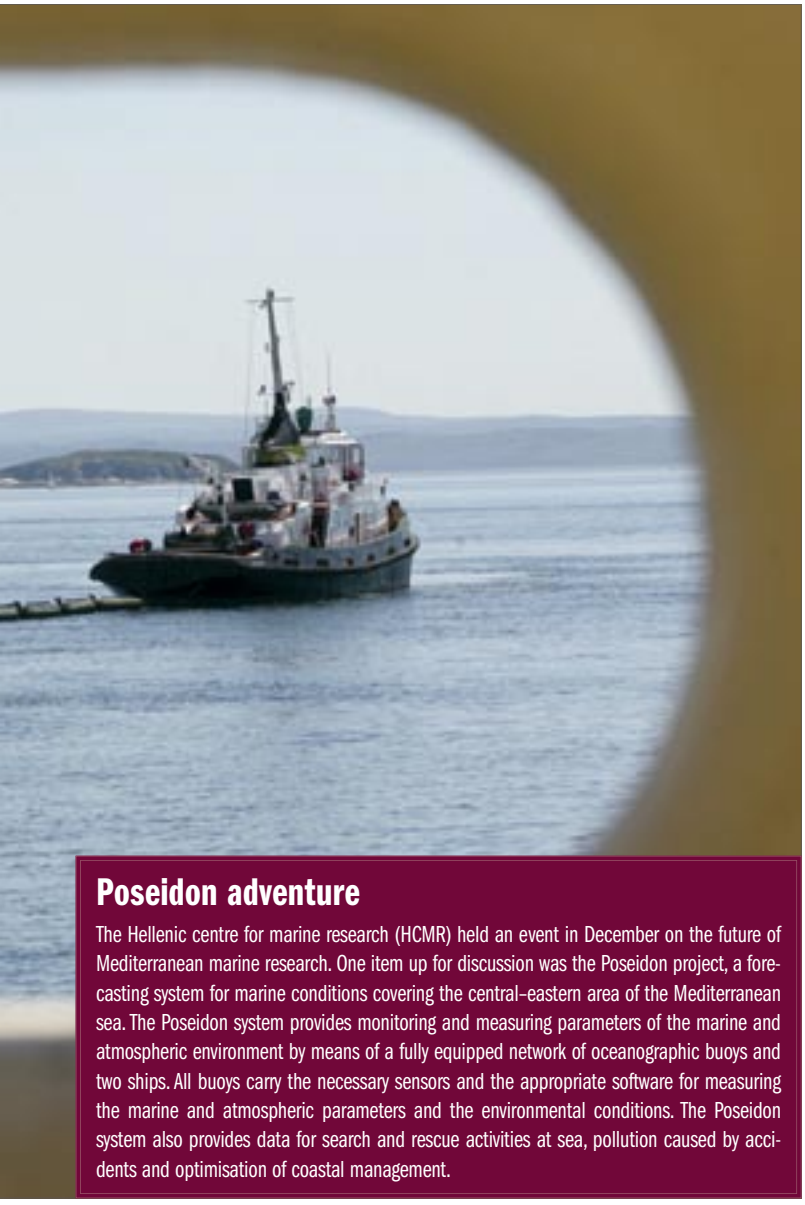
Ifremer has been involved in more than 15 transnational Interreg projects over the 2000-2006 period, covering the whole French seashore. Some of them have proved particularly well-suited to applying research in support of European environmental policies such as the water framework directive (WFD), the habitat directive or the future marine strategy directive. For example, the Cycleau project in northwest Europe or the Mytilos project in the Mediterranean both contributed directly to the WFD.

While the former focused on innovative ways to improve water management, the latter was instrumental in assessing the level of chemical contamination in the Mediterranean with the help of caged mussels placed along the shores. Finally, the MESH project (mapping European seabed habitat) was instrumental in delivering a coherent framework methodology for seabed mapping. Given the various pressures on our oceans, and variety of uses to which they are put, these maps can provide valuable information for policy implementation since they can contribute to balancing economic demands with conservation mechanisms in the most sustainable way.

Beyond Interreg projects, other regional initiatives such as maritime clusters that pool the knowledge and resources of regional public and private actors to promote the competitive edge of a region are worth mentioning. At French level, for example, the Pôle MER PACA (Provence-Alpes-Côte d'Azur) and the Pôle MER Bretagne are two examples of clusters from CPMR (Conference of peripheral maritime regions) regions in the field of maritime security and sustainable development. Ifremer is actively taking part in these clusters, which bring together industry, researchers and universities. About 2000 people are involved in the PACA region cluster alone, covering both the public and private research sectors.

There is a real ocean of opportunities for marine research in the coming years, provided that the complementary use of EU programmes for research and innovation is better explained and fully exploited on the ground. Although the EU has recently been working hard to promote the synergies between the different EU programmes, there is still much progress needed to make it happen. The challenge ahead is to improve the dialogue between European and regional partners in order to develop a better coordination between them, thus avoiding unnecessary duplication, scattering and waste of public funding. ★

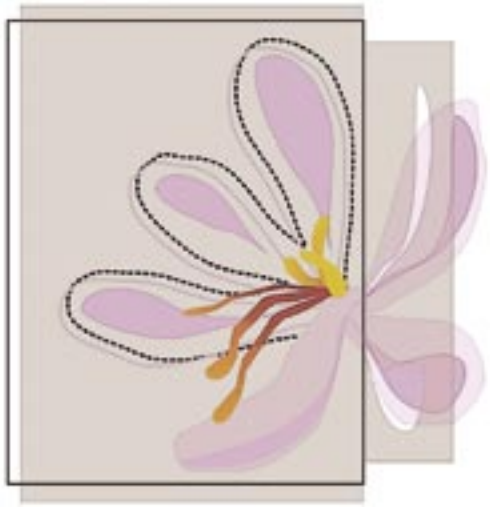
Charlotte Jagot is spokeswoman for Ifremer in Brussels



Poseidon adventure

The Hellenic centre for marine research (HCMR) held an event in December on the future of Mediterranean marine research. One item up for discussion was the Poseidon project, a forecasting system for marine conditions covering the central-eastern area of the Mediterranean sea. The Poseidon system provides monitoring and measuring parameters of the marine and atmospheric environment by means of a fully equipped network of oceanographic buoys and two ships. All buoys carry the necessary sensors and the appropriate software for measuring the marine and atmospheric parameters and the environmental conditions. The Poseidon system also provides data for search and rescue activities at sea, pollution caused by accidents and optimisation of coastal management.

Conservation of Genetic Resources of Saffron: a Sustainable Crop with Potential Medicinal Applications



Saffron is made from the dried stigmas of the saffron flower (*Crocus sativus* L.), a triploid sterile plant that is vegetatively propagated by means of bulbs. Saffron is mostly used as spice (the most expensive food product) and food colorant and, less extensively, as a textile dye or perfume. However, due to its analgesic and sedative properties folk herbal medicines have used saffron for the treatment of numerous illnesses for centuries. Nowadays strong research is being carried out on saffron nutraceutical, chemopreventive, and pharmaceutical properties. Saffron is currently being cultivated in Iran, India (Kashmir), Greece, Morocco, Spain, Italy, Afghanistan and China.

While the world's saffron production is estimated in more than 200 tons per year, Iran is said to produce 80 percent of this total. Saffron crop is suited to water deficit areas and it is well adapted to low input cropping systems. The lost of land surface dedicated to saffron crop in many areas has resulted in a corresponding genetic erosion. Sterility in saffron limits the application of conventional breeding approaches for its further improvement. Besides different commercial products are known that could suggest the existence of different saffron ecotypes or commercial varieties, the actual genetic variability present in *C. sativus* at worldwide scale is currently unknown. In order to stop this loose of biodiversity the CrocusBank project pursues to create, characterise and exploit a germplasm collection (bank) in *Crocus* species, including saffron, at a world global scale. The project "Genetic Resources of Saffron and Allies (Crocus spp) (CrocusBank)", funded by European Union through its Community Programme on the Conservation, Characterisation, Collection and Utilisation of Genetic Resources in Agriculture (AGRI GEN RES), is being carried out to prevent genetic erosion and preserve biodiversity in this ancient crop. **The objective is** to create, characterise and exploit a germplasm collection (bank) in *Crocus* species, including saffron crocus (*C. sativus* Linn.).

The collection has two main goals:

- First, to collect and reproduce saffron bulbs, coming from all the countries that cultivate saffron, for direct use of this plant material in selection programmes all over the world; and

- Second, to create a collection of saffron allies for conservation, since they are endangered and threatened taxa and populations in *Crocus*, and for research in taxonomy and evolution, genetics, physiology, ecology and agronomy. This *Crocus* species are exploitable sources of resistances and other agronomical interesting traits to be transferred to saffron, through appropriate breeding programmes and technological tools.

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Scientists of the future

Teams from Germany, Hungary and Ireland won the three first prizes at the 19th EU contest for young scientists, held earlier this year in Valencia, Spain. The projects, which analysed flashing water drops, how plants defend themselves against pests, and RSA encryption, were selected from among 81 entries.

The contestants were aged from 14 to 20 and represented 30 countries from across Europe, as well as China and the US. "If there are two crucial elements of Europe's future, it's our young people and our research ability," said science and research commissioner Janez Potočnik. "So it's very heartening to see the interest from around the world in this contest for young scientists, as well as the many innovative ideas on display."

The contest is part of the EU's science in society programme. Its aim is to encourage young people to pursue their interest in science and embark on scientific careers. This year the prizes were awarded by the European commission's director-general of research, José Manuel Silva Rodríguez. →

First-prize winners Abdusalam Abubakar, Florian Ostermaier, Márton Spohn and Henrike Wilms

Water behaviour

Contestants Florian Ostermaier and Henrike Wilms from Germany were recognised for their project on flashing water drops. Visiting a stalactite cave last summer, one of the young scientists made the observation that every time a droplet fell, it seemed to flash at a certain height.

The two tried to reproduce the phenomenon at home, and found that the effect only occurred when a light source was placed in a specific position. "During our work we found out the relevant factors and we can now exactly say, under which conditions these flashes occur," they said.

"In addition to that we succeeded in describing the phenomenon mathematically and we know now that the light reflections within a falling droplet change because the droplet itself oscillates. With our research we found a completely new phenomenon that, as far as we know, has never been analyzed by anyone else so far."

On the attack

Abdusalam Abubakar from Ireland devised an extension of Wiener's attack on RSA encryption. In 1990 Wiener showed that if RSA is used with a small decryption exponent it can be successfully attacked.

He based his attack on the properties of continued fractions, in particular on a very well-known theorem of Legendre concerning the approximation of irrational numbers by simple continued fractions. In 2004 Hinek proved that if a very large decryption exponent is used, the RSA system can be successfully attacked.

Using a small decryption exponent, d, has the advantage of allowing rapid decipherment. It might be thought that this advantage could be retained by increasing d just beyond the range vulnerable to Wiener's attack. In attacks of the Wiener and Hinek types the condition must be obeyed for the success of the attack to be guaranteed.

Self-defence

Márton Spohn from Hungary examined how some plants, especially members of the mint family, can defend themselves against their pests by emitting scents that attract natural predators of the pests.

This phenomenon has been studied by biologists and chemists, but a contradiction remained unnoticed: chemicals that are held responsible directly for this effect cannot evaporate. Spohn's project was aimed at finding the reaction pathways taking place in the plant during an attack to convert the furanoterpenoides – chemicals responsible for self-defence – into volatile compounds.

Experiments were made with plant extracts which mainly involved chromatographic methods to discover possible pathways. By discovering more details of floral self-defence, more environment-friendly pesticides may be developed.

Science in society

The science and society theme of 'structuring the ERA' in the sixth framework programme was one of the first such initiatives at the European level. With an €80m budget, the theme was designed to increase awareness among actors and decision-makers of the need to bring a range of research related societal issues to the top of the policy agenda.

The new science in society theme for 2007-2013 has a significantly bigger budget of €330m. It also addresses new and emerging themes such as supporting multidisciplinary research, encouraging civil society organisations and their involvement in research and combining science in society expertise with policy design and implementation.

The overarching objective of the theme is to make the science in society perspective a core element of EU research policy. The title 'science in society' recognises that research activities are a specific type of social activity that is embedded in a wider societal context.

Throughout the framework programmes a conscious effort has been made to embed science in society concerns into all EU research. For example, all EU-funded research activities must comply with a strict ethical code and the European commission carries out an ethical review of project proposals that raise sensitive ethical issues and then takes it into account when deciding on the proposals to be funded. Additionally, projects are required to take appropriate measures to engage with the public and the media about their research. Gender issues are taken into account during the negotiation process with successful applicants.

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ProMiNaS (Prototyping in the Micro and the Nano Scale) offers hands-on laboratory courses in the area of Micro and Nanotechnology to train young researchers in the experimental tools needed to close the gap between conventional microelectronics—its technologies and materials, and the novel, exotic and possibly contaminating materials and systems in nanoelectronics.

Financed by the European Union (€600,000) as part of the Marie Curie Conferences and Training Courses, the six scheduled courses plus a final 3-day workshop take place at Technion in Haifa, Israel, the Institute of Photonics and Nanotechnology (IFN-CNR) in Rome, and the Département de Recherche sur la Matière Condensée, CEA Grenoble, France.

International participants at the ProMiNaS workshop gain hands-on experience at Technion's state-of-the-art clean-rooms.

The re-invention of sainfoin: an example of a novel resource for sustainable agriculture

A new Marie Curie Research Training Network called 'HealthyHay' is to investigate how feeding an ancient food to livestock could be of huge benefit to the environment.

Ruminants, especially dairy cows, are major contributors to environmental pollution, but by eating sainfoin, an almost forgotten traditional fodder legume, the animals' polluting emissions could be cut significantly. Sainfoin (*Onobrychis viciifolia*) was widely grown in Europe before the use of commercial fertilisers and synthetic veterinary drugs, and has a very high voluntary intake by cattle, sheep and horses. As ruminants utilise sainfoin protein very efficiently and make better use of the energy in sainfoin compared to grass of equal metabolisable energy content, this leads to less environmental pollution, in terms of nitrogen and methane emissions.

HealthyHay takes a holistic approach to a unique sainfoin germplasm collection, and will develop a scientific and technical basis for animal feeding systems based on lower chemical inputs by re-popularising a traditional fodder legume for more efficient, animal- and environment-friendly farming systems.

HealthyHay

Marie Curie Research Training Network

HealthyHay brings together 13 teams from 10 different countries: Armenia, Austria, Denmark, Greece, France, Spain, Sweden, The Netherlands, and United Kingdom. It aims at training young researchers in the field of agriculture, veterinary medicine, nutritional science, chemistry, biochemistry and molecular biology. HealthyHay will employ 15 Early Stage Researchers (graduated students) and six Experienced Researchers (post-graduated students). The current young researcher team is coming from Austria, Croatia, France, Greece, Germany, Italy, Poland, Portugal and Bulgaria. In addition to the individual scientific work of each researcher, seven complementary skills workshops (soft skills and personal skills training) and five scientific workshops (quality assurance & good practice for research work and background information in the related scientific fields) will provide an in-depth and broad preparation for future professional careers.

More information about this project:
http://healthyhay.vt.tuwien.ac.at/

Using mice as models of human disease
On the way to evidence based medicine

The relevance of the mouse as a model of human disease

The mouse shows great similarities in development, physiology and biochemistry to humans. This makes it a key model for research into human disease. It also has a very similar genetic make-up. The identification of all the genes in mice and humans in the Human Genome Project has shown that about **99% of the genes in mice have a homologue in humans**. This is important as, to date, around 5000 human diseases have been shown to be caused by an error in our genetic make-up, for example: Cystic fibrosis and Down syndrome. In numerous other diseases, as in diabetes, genetics is a contributory factor. The similarity of the mouse and human genetic make-up means that genes associated with disease in humans can be investigated in mouse models. Conversely, fundamental research using mouse models can identify genes associated with disease. This knowledge can then be transferred to understanding and treatment of disease in humans.

The key challenge for mouse functional genomics in the 21st century will be the generation of a mutant mouse for each gene in the mouse genome. By the collaborative effort of the International Mouse Knockout Consortium more than 30000 mutations in ES cells will be engineered and thousands of mouse disease models will become available over the next years. The bottleneck for the exploitation of this valuable resource will be access to a systematic functional and molecular characterisation. In addition, mouse models should be preserved and made available to the entire European mouse genetics, biomedical and translational research community which is strongly dependent on new mouse disease models.

EMMA – The European Mouse Mutant Archive is a resource centre for the deposition and distribution of mouse disease models and research tools. Mouse mutant lines are stored as frozen embryos or sperm and the most demanded lines are kept as live mice. The EMMA network is a non-profit making organisation and is currently comprised of ten partners who operate as the primary mouse repository in Europe. EMMA is funded by the participating institutes and the European Commission Research Infrastructures Programme.

Objectives of EMMA

- Develop a world class repository for maintaining and distributing mutant mouse strains
- Develop a dedicated resource database containing data of cryopreserved mouse strains
- Organise courses in cryopreservation
- Develop links and common procedures with other repositories worldwide

Access and submission to the EMMA repository

All applications for archiving and requests for mutant mouse strains are submitted through the EMMA website at http://www.emmanet.org. Since its inception the number of mutant mouse strains submitted to EMMA and the number of requests has steadily increased. Up-to-date more than 1300 mouse mutant lines were submitted to EMMA and nearly 800 requests of customers worldwide were fulfilled by the EMMA network. Among the mutants archived by EMMA are targeted mutant strains including numerous Cre-expressing lines and knock-outs, transgenic lines and ENU-induced mutant strains. Phenotypes of archived strains cover neurological defects, hearing defects and strains with skeletal malformations among many others.

Value for research community

The mouse is the key model organism to study mammalian gene function mainly due to its excellent genetics and a plethora of available mutants modelling human diseases. These **mouse mutants offer the opportunity to decipher molecular disease mechanisms and provide a basis for**

Contact

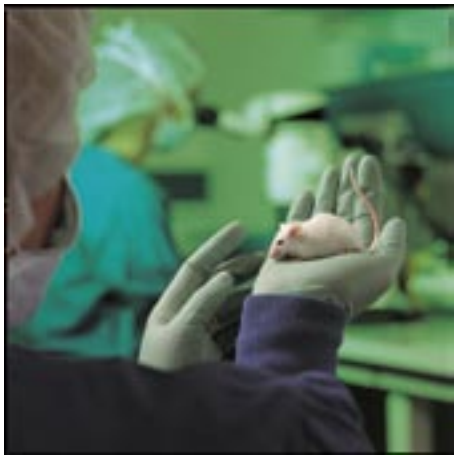
Prof. Dr. Martin Hrabè de Angelis
GSF National Research Centre for Environment and Health

Institute of Experimental Genetics
EMMA Director

the development of diagnostic, prognostic and therapeutic strategies. Therefore it is essential that these valuable resources are retained in a central repository from which they can be readily made available to interested investigators. Thus EMMA plays a crucial role in exploiting the potential benefits to human health presented by the research in mammalian genetics.

Infrafrontier - The European infrastructure for phenotyping and archiving of model mammalian genomes (www.infrafrontier.eu)

Existing facilities across Europe can only offer capacity for the phenotype analysis, archiving and dissemination of a few hundred disease models per year. Thus it is imperative to organise and establish now an efficient distributed infrastructure for the phenotyping, archiving and distribution of mouse models on a well-concerted, large-scale and pan-European level. This will be a prerequisite for maintaining Europe's leading role in the functional annotation of the mouse genome. Infrafrontier will organise two complementary European infrastructure networks for large scale, systemic phenotyping in mouse clinics (Phenomefrontier) and for archiving and dissemination (Archivefrontier) of mouse models. EMMA will co-ordinate Archivefrontier.



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Roadmap to the future

Manuel António Gomes de Almeida de Pinho and Andris Piebalgs outline the technologies required to meet the demands of the next industrial revolution

The world is changing fast around us. Not long ago, forecasts that oil prices could exceed $90/bbl, compared to $40/bbl in early 2005, or that the legendary northwest passage in the Arctic ocean could be declared fully navigable, would usually have been met with scepticism. Both became facts this year. Indeed, security of supply and climate change are arguably among the main challenges of the new century. The investment needed to face these two challenges is evaluated in trillions of euros, and the impact it may have in the economy could be positive or negative depending on our choices.

Europe's choices are well known. The EU has committed itself to a coherent set of targets on renewables, energy efficiency and emission reductions for 2020, establishing a crucial milestone on the way towards a sustainable future. But this is not enough. The time has come for Europe to choose the best path to fulfil these commitments.

> ***"We need a roadmap to guide us to what the European parliament has acknowledged is no less than a new industrial revolution, which like previous industrial revolutions will be technology-driven"***

This implies both a comprehensive assessment of technological options and also a long-term guiding vision for the transformation of current energy systems. We need a roadmap to guide us to what the European parliament has acknowledged is no less than a new industrial revolution, which like previous industrial revolutions will be technology-driven.

The vision proposed will turn Europe's security and competitiveness dilemma, stemming from rising energy prices, into an opportunity for economic activity and job creation while resolutely taking on the environmental challenge. In energy issues there is no silver bullet. No single technology holds, on its own, the promise of an environment-friendly, secure and competitive energy future. This fact, and the new solutions that might appear in 20 years' time, demand more investment to be made in available clean technologies and call for a flexible roadmap.

The first priority is energy efficiency. The biggest economically available reservoir of energy is wasted energy. Doubling the 2020 energy efficiency target

by 2050 will be possible through the adoption of technologies in areas such as new building standards, home appliances, cogeneration, industrial machinery and hybrid vehicles. Another priority is the accelerated commercial deployment of existing supply technologies such as wind farms, hydro, first generation biofuels and biomass. It is critical that we ensure incentives and market conditions in order to increase current levels of investment in the energy sector, accelerating the full adoption of these technologies. Additionally, focused R&D in technologies with the highest perceived potential such as off-shore wind farms, second generation biofuels and biomass, wave energy, carbon sequestration, nuclear fusion and hydrogen is also critical.

Finally, a radical change is needed in the network infrastructure. This will require better interconnection between countries, abundant storage capacity and state-of-the-art intelligent grids. The information technology revolution applied to energy networks will enable a similar change of paradigm to that introduced by the internet in the world of communications, i.e. the creation of an open and multi-directional network in which generation and transport are piloted in real time.

Europe has already begun investing in all these objectives and has significant assets to spearhead the change. The main weakness so far has been a lack of integration of the different initiatives and a weak link between R&D and the economy. The Portuguese presidency and the EU commission want to propose a roadmap addressing this shortcoming, by ensuring that technology development is encouraged to align with policy goals, and that the appropriate resources are directed towards this endeavour. Europe has been spending less public funds in R&D than the US and Japan, €2.1 billion, against 2.5 and 3.0 respectively in 2005. In order to keep a leading edge in technology, Europe should double that amount in three years, making sure that this effort is distributed on a more evenly manner among the more promising technologies.

All in all, by leading the way towards a new industrial revolution based on efficient use of energy, renewable sources, advanced thermal generation and open and intelligent energy systems, Europe will both rise to the challenges of security of supply and climate change and accomplish, in a sustainable way, the promises of the Lisbon agenda.

Thomas Edison, the man who proved that technology can change things for the better, once said that "if we all did the things we are capable of doing, we would literally astound ourselves". Europe has now a great opportunity to astound the world with a technology based energy revolution. We should not miss it. ★

Manuel António Gomes de Almeida de Pinho is Portugal's minister of economy and innovation

Andris Piebalgs is the EU's energy commissioner

A sustainable future

The new technology platform on sustainable nuclear energy is a welcome and timely development, says Alejo Vidal-Quadras

Many of us are already convinced that nuclear energy is one of the more sustainable means of electricity production, at least when compared to conventional fossil sources. Discounting the aberration of Chernobyl, the impact of the nuclear industry on the environment is practically zero: there are virtually no greenhouse gas emissions and the amount of waste produced is small – less than 0.5 per cent of total industrial toxic waste – and therefore not difficult to segregate and dispose of or store in a safe manner. Known reserves of uranium, according to the OECD, will last for 270 years at current rates of consumption, or 675 years if phosphate deposits are included. It is true that high level radioactive waste will remain more toxic than the natural uranium from which it was produced for in excess of 10,000 years but you have to remember that chemical wastes like mercury and arsenic remain toxic for ever. So, on any reasoned assessment, nuclear power is a relatively sustainable provider of electricity.

There are, however, two principal avenues of research underway that could lead to a vast improvement in the sustainability credentials of nuclear fission. The first is the development of fast neutron reactors to replace the present light water designs. This could lead to a dramatic 50-fold improvement in the energy yield of each tonne of uranium. The second is the possibility of removing and destroying, through the process known as "partition and transmutation", the longer-lived radionuclides in the spent nuclear fuel or high level waste. By this means, the toxic lifetime of such wastes could be brought down to as little as 300 years. Such research goals are impressive and should be pursued in a co-ordinated way with the support of parliament.

That is why I welcome the inauguration of the new technology platform on sustainable nuclear

energy (SNETP), launched in Brussels on 21 September. The SNETP will bring together nuclear energy stakeholders to implement in a joint activity the strategic R&D necessary to realise the sustainability goals I have outlined above. They will produce in the coming months a strategic research agenda and a deployment strategy that will set out a co-ordinated programme linking public and private initiatives in the member states with the work being funded under the Euratom framework programme. These objectives are of course fully in line with the low carbon energy developments called for in the commission's strategic European energy technology plan (SETP) adopted last week, on which the parliament and council will comment in due course, and also with the sentiments expressed in parliament's recent report on conventional energy sources and energy technology.

Japan, Russia, India, China and the United States are already embarked on fast reactor development under the umbrella of the international generation IV programme. In 2006, France announced that it would construct a prototype sodium-cooled fast reactor by the year 2020, heralding the re-emergence of European interest in this technology. The technology platform aims to co-ordinate a wider European involvement in fast reactor research, including the closing of the fuel cycle to optimise energy recovery and diminish waste requiring geological disposal.

"With world energy consumption likely to double by 2050, I believe nuclear energy will need to constitute a growing proportion of our low-carbon energy supply"

As well as the fast reactor, the platform's vision report entertains the prospect of developing the high temperature reactor pioneered in Germany and presently being exploited in South Africa. Potentially able to deliver process heat at above 900C, the HTR offers the possibility of direct chemical production of hydrogen from water, coal or other organic feed stocks without carbon dioxide release. This has interesting possibilities in the context of future CO2-free transportation.

Another important element of the platform is its focus on education and training in the nuclear field. Being a professor of nuclear physics myself, I can wholeheartedly endorse this objective. The research projects and infrastructures envisaged under the platform will provide a much-needed boost to the opportunities available for our students to learn and practise the skills we will need more abundantly in the future.

With world energy consumption likely to double by 2050, I believe nuclear energy will need to constitute a growing proportion of our low-carbon energy supply. In order to further improve the safety and performance of existing nuclear reactors, develop even safer ones for the coming decades and minimise their long term impact on the environment, the sustainable nuclear energy technology platform is a particularly welcome and timely development. Europe has traditionally been the world leader in nuclear technology. We don't want to sit back and watch while the rest of the world expands its nuclear capacity when Europe could make a more significant and potentially profitable contribution to a sustainable global energy future. ★

Alejo Vidal-Quadras is vice-president of the European parliament

ERA-PRO:
New life for old data

The ERA-PRO project is funded by EC 6th FP, under the EURATOM programme for the period 2006 – 2009. It includes two Partners, the Federal Office for Radiation Protection, Germany, and the Cambridge University, UK. Nature and goal of the project is preserving data from past studies with radiation exposed animals. The assessment of radiation risks is based on the knowledge gained from epidemiological studies of radiation-exposed populations, in conjunction with data from experimental animal studies, and on fundamental information from biophysical, molecular biological and cellular *in vitro* studies. Recent developments in molecular and genetic research are providing major opportunities to further quantify radiation exposure at the individual level. The ability to perform retrospective analysis of earlier epidemiological and animal data using information gained from these more recent studies is an important resource for modelling and evaluating new risk parameters. This is also important against the background that animal studies like those from the past will not be feasible today, namely to ethical reasons. Thus, the project can help to minimise animal studies.

In the past, the European Union and the European Late Effects Project Group (EULEP) created a database containing data from almost all of the available animal radiation biology studies carried out in Europe, the US and Japan between 1960 and 1998, plus those of two human cohort studies. This database is called the European Radiobiology Archives (ERA) and includes 122 studies from 19 different laboratories.

ERA-PRO will put into effect an easy-to-use database for further exploitation by the international scientific community. The predominant objective of the project is to transfer the existing database into a sustainable form. Close collaboration with relevant Japanese and American groups (JRA and NRA, respectively) are continued. A major first step is to standardise the pathological nomenclature and ontology used in the current database in accordance with internationally accepted standards.

B. Grosche (BfS, left) and P. Schofield (Univ. Cambridge, right to him)) during the Project's Kick-off Dinner

The project's Advisory Board

A starting point: paper archives

Project information
Acronym: ERA-PRO
Full title: Promotion and update of the of the European Radiobiological Archives
Contract Number: 28275 (FI6R)
Duration: 3 years starting from 1 April 2006
EC funding: 386 508 €

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3D REPERTOIRE OF MOLECULAR MACHINES
Towards understanding how a cell works

What is 3D repertoire?
In February 2005 the 3D repertoire project got kicked off in Heidelberg. Eighteen organizations across seven different countries are now working together (Figure 1) to solve the 3D structures of all amenable protein complexes in the model eukaryotic organism, budding yeast. To reach its goal, the project embraces a multidisciplinary team with expertise from protein biochemistry, mass spectrometry, X-ray crystallography, Nuclear Magnetic Resonance, Electron Microscopy (EM) & Tomography to Bioinformatics.

Why solving structures? What is our biological goal?
Proteins do most of the jobs in the cell but quite rarely work alone. Proteins establish "collaborations" and form "complexes" to perform the complicated functions required for life. Understanding how a cell works requires understanding how complexes work and structural analysis is compulsory to achieve this knowledge. Moreover, elucidation of the three dimensional structure of proteins will unravel the molecular mechanisms of multifactorial diseases related to key cellular processes. 3D Repertoire is one of the few currently running structural genomic initiatives in Europe and certainly it was the first to take the challenge of solving 3D structures of complexes with an additional unique contribution from bioinformatics.

Achievements
In the first two years and a half, 3D repertoire succeeded in:

- delivering seventeen X-ray crystal structures, 16 EM structures and the cryo-EM tomografic reconstruction of the 26S proteasome;
- developing innovative methods in diverse fields, such as EM structure determination and complex prediction by *in silico* tools;
- building a database where all the experimental results from the project are deposited and which will be released in the future to the scientific community;
- establishing core facilities (mass spectrometry and EM quality control, large scale fermentation);
- providing high quality training;
- fostering extensive collaborations between the partners and joint publications in peer review journals (Figure 2).

For the future…
3D Repertoire has two more years ahead and is fully committed to speed up the pipeline for production and structural characterization of complexes, while further enhancing collaborations with other European consortia towards a common structural genomic platform in Europe.

Figure 1
Top: Networks of collaborations within 3D Repertoire.
Below: 2nd Annual Meeting at the Center of Genomic Regulation in Barcelona, 2007.

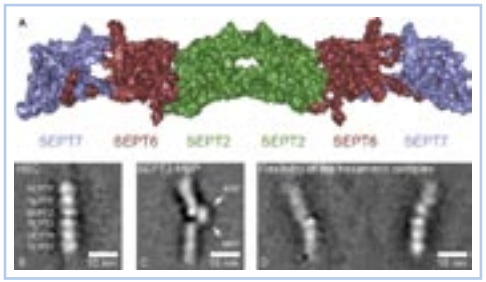


Figure 2
*The human septin complex is an example of a fruitful collaboration between partners **A** Crystal structure of the complex of the septin complex **B-D** Electron microscopy reconstruction of the septin complex. (Sirajuddin, M., et al., Nature, 2007. **449**(7160): p. 311-5.*

Kindly provided by Holger Stark.
www.3drepertoire.org

3D repertoire

Funded by the EC under Framework 6
Coordinated by Professor Luis Serrano,
Center of Genomic Regulation (Barcelona)
Scientific Project Manager
Dr. Michela Bertero

What's in store

Hydrogen and fuel cell technologies could be an important means for the storage and conversion of energy in a low-carbon future, says Janez Potočnik

While we are already becoming aware of hydrogen and fuel cell technology in road transport – with some cities already running hydrogen fuelled buses – their potential goes much wider, including powering mobile phones or lap-tops and generating heat and power.

However, a number of technical and non-technical barriers still exists which are hampering their commercial development and lessening their potential to contribute to climate change mitigation. These include cost and durability of fuel cells components and systems, finding efficient pathways by which the hydrogen is produced and ensuring safe, efficient distribution and storage of hydrogen.

The problem is that the research needed to take a leap forward in hydrogen and fuel cell development is so complex and requires so many resources that no single company or organisation can cover it alone. There has been a lack of an agreed strategy, which would allow the various parts of the industry to work in tandem and commit their resources. Or put in simple terms: the distribution industry has not seen the value of investing if there are no applications, particularly hydrogen fuelled cars; industry, particularly automobiles, is waiting for the establishment of a distribution network. But if the sector can work together as a whole, identify a strategy for its research needs and committing the means to implement it, hydrogen and fuel cell technologies could come to the market much more quickly.

There are various technological breakthroughs which still need to be made, for instance in the development of efficient processes and technologies that will be able to supply the required quantities of hydrogen from carbon-lean energy

NASA satellite fuel cell

sources, such as renewables. We need to develop new materials for the critical components of the different fuel cell types (e.g. membranes, electrodes, catalysts, electrolytes) and for the innovative storage media which allow the uptake and release of hydrogen with the capacity, kinetics, safety and durability needed, particularly for transport applications.

This is the basic philosophy behind the creation of the fuel cell and hydrogen joint technology initiative, a public-private partnership set up to bring together European funding for this research, match it with new commitments from industry and bring in researchers working in this field. Its objective will be to deliver robust hydrogen supply and fuel cell technologies to the point of commercial take-off.

The time-scale identified by the industry to bring these innovative applications to market is 2015-2020 for road transport and 2010-2015 for power generation and portable applications with 10 to 20 per cent of the hydrogen demand supplied via CO_2 lean (or free) pathways by 2015. The rationale is not just about reducing emissions from road transport. There are many other ways in which fuel cell and hydrogen technologies can be of use.

For instance, fuel cells can be used for domestic or commercial power production, with the potential to offer increased efficiency compared to conventional technologies as well as being compatible with other fuels such as natural gas and biomass-derived fuels. Fuel cell-based units can also provide power to run different services in aircrafts and ships, and can provide back-up emergency power for essential critical services in hospitals, or communication systems in the event of power loss.

At the smallest end of the market, fuel cells may replace current batteries for portable equipment, from mobile phones and laptops to small electric wheelchairs since they offer longer running times and can be recharged instantly by simple swapping in a fuel pack.

Hydrogen systems could also be used together with renewable energy sources, such as wind and solar, which are by nature intermittent, in integrated hybrid systems that can help to overcome the problem of storing surplus energy, with considerable potential for applications also in isolated areas and regions not connected to the electricity grid, which would make a big difference in most of the developing world. The commission made its proposal to create this joint technology initiative in October 2007.

This was based on preparatory work by the hydrogen and fuel cell technology platform, which brought together the whole sector to establish a strategic research agenda. It is hoped that the council and European parliament will give their green light in early 2008, and that work will then be able to begin very quickly to undertake the research necessary to move this promising area of technology forward. ★

"The problem is that the research needed to take a leap forward in hydrogen and fuel cell development is so complex and requires so many resources that no single company or organisation can cover it alone"

Janez Potočnik is European commissioner for science and research

The future of fuel

The European parliament backs the commission in its drive towards a stronger focus on hydrogen and renewable energies, writes Jo Leinen

The project of the European integration started off with energy collaboration – the European treaties on coal and steel (European coal and steel community) and nuclear energy (Euratom). Now, more then 50 years later a new era is coming up – the era of energy efficiency and renewable energies with a green hydrogen economy. The EU is in the best place worldwide to become the spearhead of the development towards a new energy policy based on the immense potential of renewable energy sources.

On 10th October the EU commission took a first step by presenting its hydrogen package with two concrete proposals. The first proposal concerns the setup of the fuel cells and hydrogen joint technology initiative (JTI). The second proposal focuses on hydrogen cars of which a number is already ripe for market introduction and the commission proposes a simplified approval for their day-to-day use.

Renewable energies with hydrogen as a vector have the potential of completely reforming our energy policy, the production as well as the consumption side. The crucial element will be a focussed research and development approach that leads to the realisation of industrial revolution. A new energy era based on climate protection and sustainable energy policy, that decentralises the production of energy and thus contributes to the development of new employment opportunities as well as to a secured supply of energy, independent from unstable foreign production and transit regions.

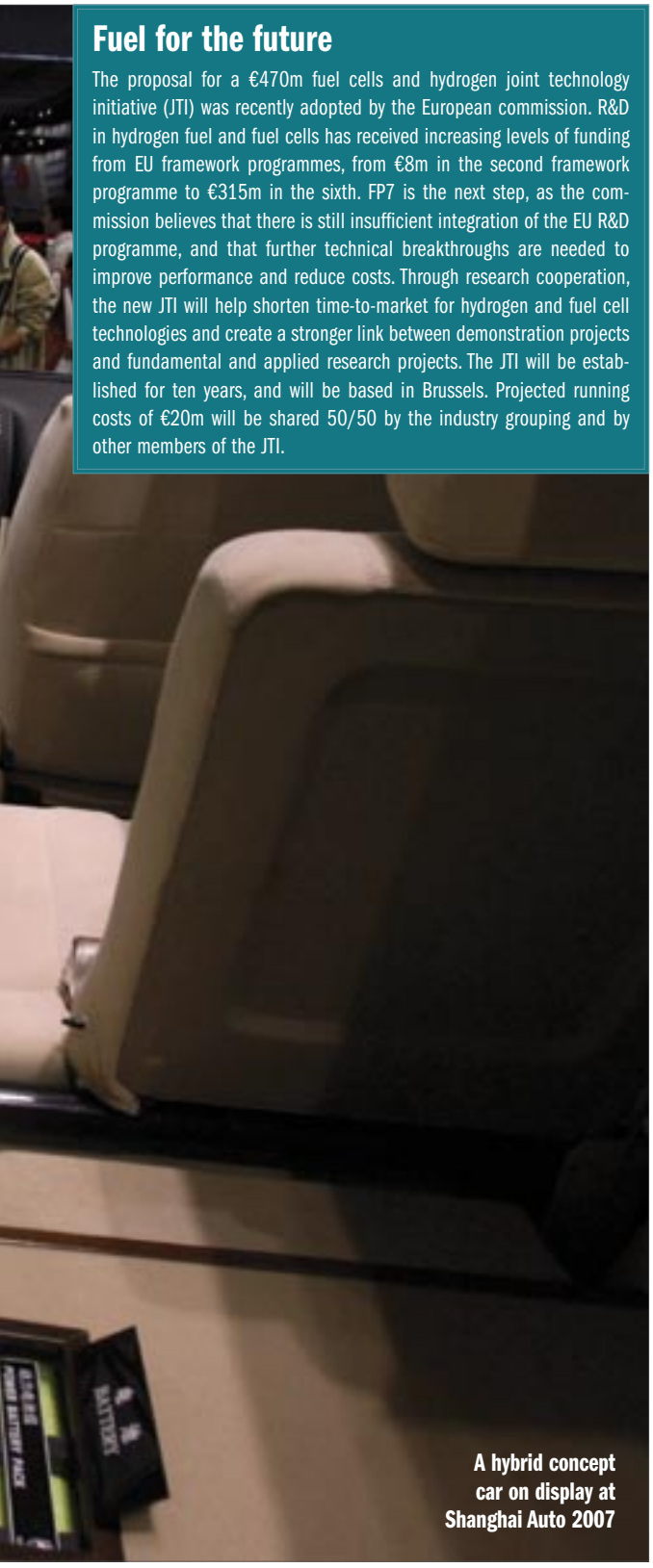
The JTI is an ambitious programme that aims, over the next six years, to speed up the development of hydrogen technologies and wide-spread market introduction between 2010 and 2020. To this end the commission has foreseen a financial contribution from the EU of €470m and expects an analogous input from the private sector.

The European parliament has voted for a stronger focus on hydrogen and renewable energies. In a written declaration

"The JTI is an ambitious programme that aims, over the next six years, to speed up the development of hydrogen technologies and wide-spread market introduction between 2010 and 2020"

Fuel for the future

The proposal for a €470m fuel cells and hydrogen joint technology initiative (JTI) was recently adopted by the European commission. R&D in hydrogen fuel and fuel cells has received increasing levels of funding from EU framework programmes, from €8m in the second framework programme to €315m in the sixth. FP7 is the next step, as the commission believes that there is still insufficient integration of the EU R&D programme, and that further technical breakthroughs are needed to improve performance and reduce costs. Through research cooperation, the new JTI will help shorten time-to-market for hydrogen and fuel cell technologies and create a stronger link between demonstration projects and fundamental and applied research projects. The JTI will be established for ten years, and will be based in Brussels. Projected running costs of €20m will be shared 50/50 by the industry grouping and by other members of the JTI.



A hybrid concept car on display at Shanghai Auto 2007

from April 2007, signed by 420 MEPs, it demanded concrete steps to start into the hydrogen era and bring about a radical change of behaviour towards the energy sector. In various other reports and declarations the parliament recognised the importance of this sector and the chances for the EU and the European economy lying within. It also underlined the relevance of developing new technologies that will contribute to energy security while at the same time combating the effects of climate change.

Establishing a European wide renewable energy policy has to become the next major project of the European integration. With the reform treaty the EU will receive competences in the energy policy field. It quickly has to utilise this new competence and apply the vast knowledge within the EU to develop a green hydrogen economy, encompassing all industry areas, reaching from transport issues via building management to energy grids.

Against this background the European parliament fully supports the commission in its work towards more research and development in the hydrogen sector. However, it will be important that SMEs will be included in the activities and can receive the financial incentives for their activities as well. Thereby, the parliament will make sure that the interest and the potential of SMEs are respected in this regard, bearing in mind that it often are small enterprises that are most innovative. Since climate change and global warming can only be stopped if energy is produced in a carbon free way one of the main points of EU activity will be to establish an economic and political framework that increases the competitiveness of renewable energies over fossil fuels and nuclear energy.

The aim of the parliament's activities will be to ensure that the economy, the labour market and the environment profit equally from initiatives such as the JTI. While the development of renewable energies sources and the implementation of respective goods and products in general should be supported, hydrogen and fuel cells offer some specific features that make it particular interesting for the development of a new energy policy. Fuel cells are a very efficient energy conversion device and can be applied in a wide range of products, e.g. cars, laptops or power generators. Hydrogen is a clean energy carrier. It does not produce any carbon emissions (carbon monoxide, carbon dioxide, unburned hydrocarbons or particulates). Thus, using hydrogen will contribute to the improvement of air quality in cities.

In order to make full use of these features some barriers still have to be overcome, for example the sustainable production of hydrogen from green and non-fossil sources or the durability of fuel cells. The commission's slug of capital combined with the private sectors contribution will help the sector to advance and create long-term solutions for the challenge of energy supply security and the dependence from gas and oil as well as for the issue of climate protection. ★

Jo Leinen is chairman of the committee on constitutional affairs

A question of priorities

Hydrogen should play a role in the EU's future energy mix, but it should not be a priority at the moment, argues Claude Turmes. Matt Williams reports

Hydrogen should not be a current priority, argues veteran Green MEP Claude Turmes. According to the Luxembourg deputy, pure hydrogen doesn't occur naturally, and rather than used as an energy source, it is more a carrier of energy. The technology used to produce hydrogen is incredibly inefficient, he says, with electrolysis, the dominant method of producing hydrogen today, using an enormous amount of electricity. The technology is, he argues, only about 30 per cent efficient, with similar energy losses to that of a standard coal power station.

"The other method of producing hydrogen is through a process known as 'gas reforming' which involves converting hydrogen from natural gas or biomass. Gas reforming is more efficient than electrolysis, and therefore has potential, but a lot of work still needs to be done for this method to become effective. There are additional methods, for example the hydrogen found in plankton, but these are not yet commercially viable."

However hydrogen can play a role says Turmes, but only in an economy where there is a high level of intermittent renewable sources of energy, such as wind, wave or solar power. "We have huge hydroelectric storage capacities at the moment, and over the next fifteen to twenty years we have the potential to really develop wind power, to combine it with existing hydroelectric power plants and gas-based electricity production which can easily be switched on and off. This sort of combination can provide an effective way to store intermittent renewable energy and to integrate it into existing electricity system."

For Turmes, the EU's top priority should be energy efficiency. "If China and India continue to follow the resource-inefficient economies of the US and Europe, then our planet is on a collision-course. The only way to solve this is to have very quick and very deep efficiency gains. Without this, it is not even worth considering energy supply from coal and nuclear. Additionally, energy supply from hydrogen only makes sense if you have very high levels of energy from renewable sources." When it comes to hydrogen cars, Turmes says that his frequent involvement with the European car industry has shown him that while manufacturers had a lot of hope in the potential of hydrogen about five or ten years ago, this optimism has declined.

"The car industry invested a certain amount of money into research, but has since encountered a lot of technical problems. Cars are one of the most difficult applications for hydrogen fuel cells. It is a problem of space, and although it is relatively easy to use hydrogen fuel cells in ships or buses, in cars the practical application of fuel cells is very difficult. These kinds of setbacks mean that it is uncertain how quickly fuel cells will be available for cars. At the moment, the breakthrough technology for cars is hybrid-based."

There is, he adds, more optimism regarding new scientific breakthroughs with car batteries, such as improving their ability to store a higher proportion of electricity, than there is regarding hydrogen and fuel cell technology. "I am quite astonished that, while I am being informed by car engineers that hydrogen is not the top priority, the EU is investing a lot of money into hydrogen cars rather than hybrid or 'hybrid-plus' cars."

The problem with the car industry, Turmes says, is that they are not concentrating on downsizing existing engine technology. "There is a conflict between existing, high value cars, and the environment. The only way out of this trap for the car

Target practice

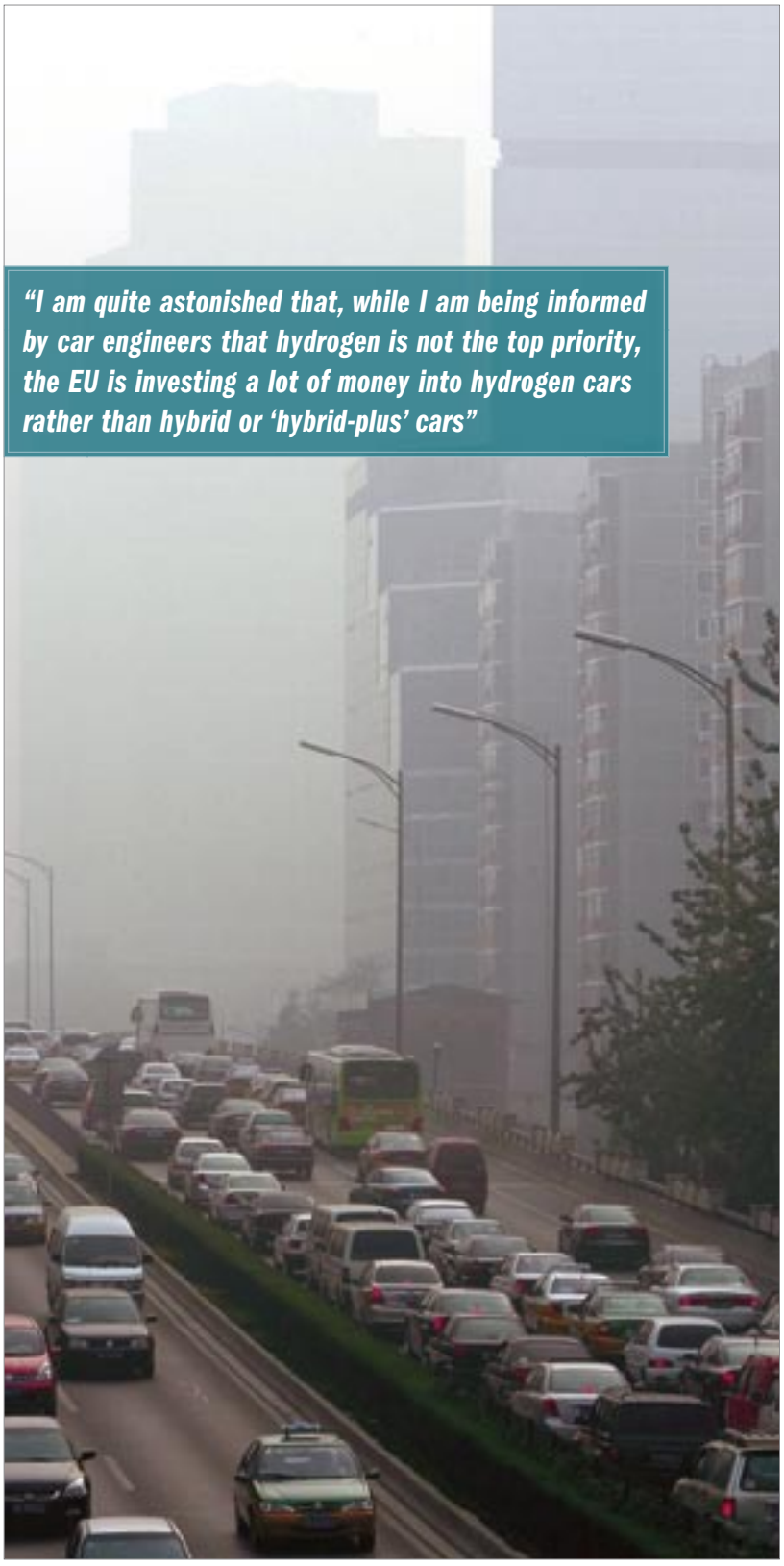
- In 2006, the average new car sold in the EU emitted 160g of CO_2 per kilometre
- The European commission has called for average emissions from new cars to be reduced by 2012 to 130g of CO_2 per kilometre by technical improvements to engines and to further reduce vehicle emissions to 120g through additional complimentary measures such as the use of biofuels.
- The European parliament in October proposed that this target should be reduced to 125g/km, and that the target date should be extended to 2015.

industry is for legislators to impose clear regulations. This is the only way that the economics will change in favour of energy efficiency. If we want the 20 per cent reduction in CO_2 emissions by 2020, as we have agreed, then we need a corresponding share of CO_2 reductions from the car industry. Around 830m tonnes of CO_2 need to be reduced between now and 2020, and of this, the car industry needs to reduce somewhere in the region of between 80 and 100m tonnes."

In the October Strasbourg plenary session, parliament adopted a report which proposed a new CO_2 reduction target for vehicle emissions of 125g CO_2/km from 2015, a different target to that agreed earlier on in the environmental committee. The change was brought about as a result of an agreement between UK Tory and liberal deputies, led by liberal MEP Chris Davies. Turmes was furious at the time and responded bitterly. "We must now look outside this house to the member states to ensure this vote is overturned and that EU climate policy does not fall at the first hurdle."

The Greens described the change as putting "the brakes on EU climate policy", and Turmes feels that the move seriously undermined the work of the environment committee. "The trouble with Mr Davies is that instead of looking for a majority in the parliament on the vote, he tried to reach a deal within his own liberal group." For Turmes, the only way to achieve effective reduction goals is to return to the original reduction target of 120g/km by 2012, followed by a target of 80g/km by 2020.

The next essential step to achieving these goals, Turmes believes, is for the European commission to produce concrete legislative proposals on mandatory standards. "These standards must enable us to achieve these targets. If not, we will have to look at cutting emissions elsewhere in order to achieve the CO_2 reductions that the car industry is not delivering." ★



"I am quite astonished that, while I am being informed by car engineers that hydrogen is not the top priority, the EU is investing a lot of money into hydrogen cars rather than hybrid or 'hybrid-plus' cars"

Legislators must impose clear regulations to tackle pollution, says Claude Turmes

HySafe at the second International Conference on Hydrogen Safety in San Sebastian, Spain

Hydrogen Safety - the key to a hydrogen economy

The European Network of Excellence HySafe is a world leading consortium of industrial and research institutions, as well as regulatory bodies and academia involved in the generation and dissemination of knowledge on hydrogen safety.

Research coordination is reached by integrating fragments into large scale internal projects, which address the gaps identified in regular ranking and prioritization activities. Existing and newly generated knowledge, available hardware and software tools are maintained and disseminated in suitable databases and reports, via the International Conference on Hydrogen Safety and via the website www.hysafe.net.

HySafe provides guidance in hydrogen safety issues, organizes special workshops and reviews of new safety relevant information.

However, without contemporary safety provisions and a skilled workforce at all professional levels there will be no hydrogen economy! Therefore the establishment of hydrogen safety engineering as a new profession is the principal objective of the HySafe's e-Academy. One key element, the world's first postgraduate course in hydrogen safety, is highly successful in attracting people from around the world.

The International Academy of Hydrogen Safety with its postgraduate and doctoral programmes is the next step in higher education and training activities in Europe which is in line with the Bologna process.

All HySafe activities comply with the European Commission's objective to improve interaction between the European Research Area, the European Higher Education Area and the private sector. The associated integration and communication will establish an excellent safety culture, which will be the key for the safe introduction of the alternative energy carrier hydrogen.

Burning giraffes facing some fearless NoE HySafe members

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Joining forces

Integrating European and African research in order to fight HIV/Aids, malaria and tuberculosis is already reaping positive results. Anthony Fletcher reports

The European and developing countries clinical trials partnership (EDCTP) is about applying science and research and knowledge to solve global problems. It is about using existing funding structures to better target resources. And it is fundamentally about saving lives.

Established in 2003 as a European response to global health crises, the programme unites 14 EU member states plus Norway and Switzerland with 47 sub-Saharan African countries. The partnership helps EU member states to integrate and coordinate their national research programmes and form partnerships with African counterparts. "The focus at the moment is on sub-Saharan Africa," says EDCTP executive director professor Charles Mgone. "The overall goal is to alleviate poverty, and to achieve this we are looking at using different tools."

EDCTP's purpose is to use clinical trials as a means of addressing some of the most serious problems affecting the region: namely HIV/Aids, malaria and tuberculosis. By identifying an existing weakness in tackling these issues, Mgone believes that the partnership has the capacity to make a significant difference.

"The focus of our clinical trials is on phase II and III – trials into efficacy and side effects – which we believe have been neglected. Unless we drive forward from phase I, we will never get to phase IV and eventual deployment. We also realised that there must be capacity to conduct these trials in Africa; many north-south collaborations achieve something then leave. This partnership is designed to create both sustainability and capacity."

> ***"This partnership is between European specialists and African researchers. The idea is to enhance African leadership in research and to encourage African project coordinators to take the lead"***

Already some projects are coming to fruition. In Zambia, an EDCTP-funded trial designed to address the fact that there is no treatment in Africa targeted specifically at HIV/Aids-infected children is nearing completion. In August, the US federal drug administration (FDA) gave a tentative approval to a fixed-dose anti-HIV drug specifically formulated for paediatric use. The fixed-dose combination is administered twice daily, according to a simple weight-based table, allowing for easy prescribing. It can also be snapped in half and dissolved in water for young children who cannot swallow tablets.

In addition, a €5.3m EDCTP-funded trial sponsored by medicines for malaria venture (MMV) is currently underway in Gabon and Malawi. This will evaluate the efficacy of two intravenous artesunate dosing regimens in clear-

→

ing Plasmodium falciparum parasites in children with severe malaria. Severe malaria kills more than one million African children each year, and while anti-malarial chemotherapy is the mainstay of treatment, intravenous artesunate is now recommended by the WHO. However, there is little information on its efficacy in children in high transmission regions, such as Africa – which of course is where EDCTP comes in.

"From a research perspective, the role of the partnership is to move on from clinical trials to getting these drugs out to people," says joint programme manager David Coles. "This means that the partnership needs to be linked to health systems and development agencies. The idea is to create an interaction with all these parts." Mgone agrees. "It is good for us to work in parallel, and to ensure that development is firmly integrated with research. To do this, we need to work hand-in-hand." Underlining all this of course is the free flow of research knowledge that the partnership enables. "This partnership is between European and African researchers," says Coles. "The idea is to enhance African leadership in research and to encourage African project coordinators to take the lead."

Tackling the health epidemics that continue to ravage sub-Saharan Africa remains the focus. The task however is daunting. About three million people died of Aids in 2003, three-quarters in sub-Saharan Africa alone. Another five million were newly infected. And each year, more than eight million people become sick with tuberculosis. Malaria kills more than one million people a year, with 90 per cent of these deaths occurring in Africa, mostly in children under 5 years of age. But both Coles and Mgone insist that the partnership can fulfil a vital niche.

"We have representatives from all member states on the board, and are able to look at our strategy and agenda," says Coles. "We are aware of what our objectives are, and we can see exactly where we can participate." ★

Joined-up thinking

The EDCTP represents a new partnership between European countries and African partners based on Article 169 of the European treaty, which enables the European community to participate in research programmes undertaken jointly by several member states.

All research proposals directed to EDCTP must include funding by at least two member states and the involvement of at least one African centre. There are currently eight HIV/Aids projects, two malaria projects, nine tuberculosis projects, 38 capacity-building projects and 11 networking projects.

The total budget until 2010 is €200m from the European commission and €200m from member states. The partnership is currently part of the European commission's sixth framework programme (FP6) for research and technological development. At the end of the programme in 2010 EDCTP, is anticipated to move to the seventh framework programme (FP7).

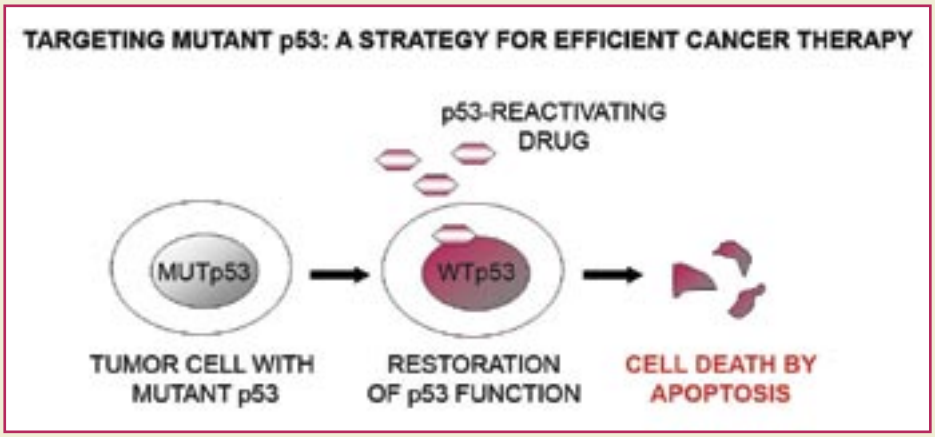
TB mobile clinic in Kisumu, Kenya

Mutant p53 as a target for improved cancer treatment

The Mutp53 project is sponsored by the EC FP6 in Research and Development. This five-year integrated project was ranked number one by the EC and is expected to provide better understanding of the properties of mutant p53 (mutp53) and produce novel, more efficient cancer therapies. The p53 tumor suppressor gene plays a critical role in the prevention of cancer and is found mutated in around 50% of human cancers. Recent research indicates that p53 mutations not only inactivate the anti-cancer function of p53 but also generate mutant proteins with novel oncogenic properties which actively contribute to cancer formation.

Part of the Mutp53 project focuses on molecular studies, investigating unique properties of mutant p53. Several partners within the consortium identify novel genes regulated by mutant p53 and proteins interacting with mutant p53. Mouse models for studying mutant p53 driven cancer development have been generated within the project.

The Mutp53 project is also clinically oriented and strives to translate the theoretical knowledge into improved cancer treatment. Mutant p53-carrying tumors often show poor response to radiotherapy and conventional chemotherapy. Therefore, investigators within the consortium study clinical samples to assess the impact of p53 mutations on clinical outcome. A major focus of the Mutp53 project is to explore mutant p53 as a new target for improved cancer treatment. Small molecules with the potential to restore wild type p53-like activity to mutant p53 have been identified. One of these molecules, PRIMA-1, shows great anti-cancer potential and Phase I clinical trials will be initiated during 2008. Due to the high frequency of p53 mutations in cancers, success of this project will have impact on a large number of patients worldwide.



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Global knowledge

By investing part of its research budget into new clinical interventions against HIV/Aids, malaria and tuberculosis, the EU is helping to provide global solutions, says Romana Jordan Cizelj

Somali children carrying water cans

Two leading European policies – the Lisbon strategy and fighting climate change – have common mechanisms for achieving their goals. The most important are knowledge, research and innovation. With the establishment of various instruments, the so-called "knowledge society" is developing fast. But we are not alone in the world. Fulfilment of our goals also depends on circumstances and actions in third countries. We must try to achieve synergy and synchronise cooperation as much as possible.

> *"The EU has the knowledge, technology and resources to eliminate poverty and to create a better world for future generations"*

Fighting against poverty, hunger, gender inequality, environmental degradation and HIV/Aids, improving access to education, health care and clean water, all these are known as the millennium development goals (MDGs). The implementation of the MDGs will at least somewhat reduce differences in the world and is thus tightly correlated with the implementation of other European and global policies.

Let me come back to the knowledge society and the promotion of scientific and research work in the EU. Our main instrument for funding research is the seventh framework programme for research and technological development (FP7). Running from 2007 to 2013, the programme has a budget of €53.4 billion and is the largest funding allocation yet for such programmes. While it is the European programme financed by European tax-payers, its door is also open to third countries.

By investing in international cooperation, the EU has shown its responsibility and readiness to take part in global development. But our concerns and compassion are not enough. One of the most important fields of international cooperation is health. HIV/Aids, malaria and tuberculosis are the most harmful diseases in many third countries. HIV/Aids infects over 450 people every hour, and in total more than four million people a year. In 2005, there were 40.3 million people with HIV, approximately 95 per cent of them in developing countries.

Women make up almost half of the total number of people infected with HIV. Sub-Saharan Africa remains the region most affected and is home to approximately two-thirds of all people infected with HIV. By investing part of its research budget into basic and clinical research to develop new clinical interventions against HIV/Aids, malaria and tuberculosis, the EU is helping those suffering in the poorest countries in the world.

Research into sustainable development must include short-term decision support projects and long-term visionary concepts and has to tackle problems of a global and regional nature. There is still a strong need for further research in the interplay between social, economic and ecological systems. Consistency and synergy between different programmes running to achieve MDGs are of utmost importance. For example, HIV/Aids-related research is without doubt indispensable, but not sufficient for eradicating the disease. To be successful we have to implement them in parallel with other programmes, supporting education and rising awareness of people.

Achieving the MDGs is a challenge that will certainly require firm determination and large amounts of political will. The EU has the knowledge, technology and resources to eliminate poverty and to create a better world for future generations. Our support of balanced sustainable development across the world will enable developing countries to build up their own capacities and contribute to global prosperity. ★

Romana Jordan Cizelj is vice chair of the committee on development

Carol Davila University of Medicine

"Carol Davila University of Medicine - Research centre on the pathology and treatment of the systemic rheumatic diseases" -**RCRD** - was developed with the aim to bring together top-quality Romanian researchers in the field of Rheumatic disorders. Our activity is focused on three directions:

- Bone structure, collagen and elastic tissues in Rheumatic diseases
- Normal and pathological inflammation in Rheumatic
- Epidemiology and socio-economics in Rheumatology

In 2005 RCRD won the FP6 - call aimed to select and support **"the best / most promising Romanian research center in life area".** The objectives of the **ARMS project**, the abbreviation for Adveced Romanian Mobilisation Scheme was to increase the quality of our research center. Grace to this success RCRD received a financial support in amount of app 1 Mil. EURO to purchase new equipments, train researchers and enforce RCRD participation in European Research Area. Several top-quality equipments are now available:

- one VEECO **Multimode Atomic Force Microscope** (today it is the most advanced unit in Romania)
- Several high volume deep-freezers (-86 and -150 C)
- High-resolution fast fan-beam DEXA scan
- Wi-Fi high-speed network and e-learning support

RCRD has a budget of app 2 mil. EUROS is now involved in 8 large scale research projects (6 national and 2 international – in co-operation with units from Canada, SUA and EU). For the next future RCRD intends to establish new research partnerships with EU units. In this regard we will already organized five international scientific meetings in the last years covering advanced areas of research in Rheumatology: from the Atomic Force Microscopy to New techniques in Bone assessment and Outcomes in Rheumatology.

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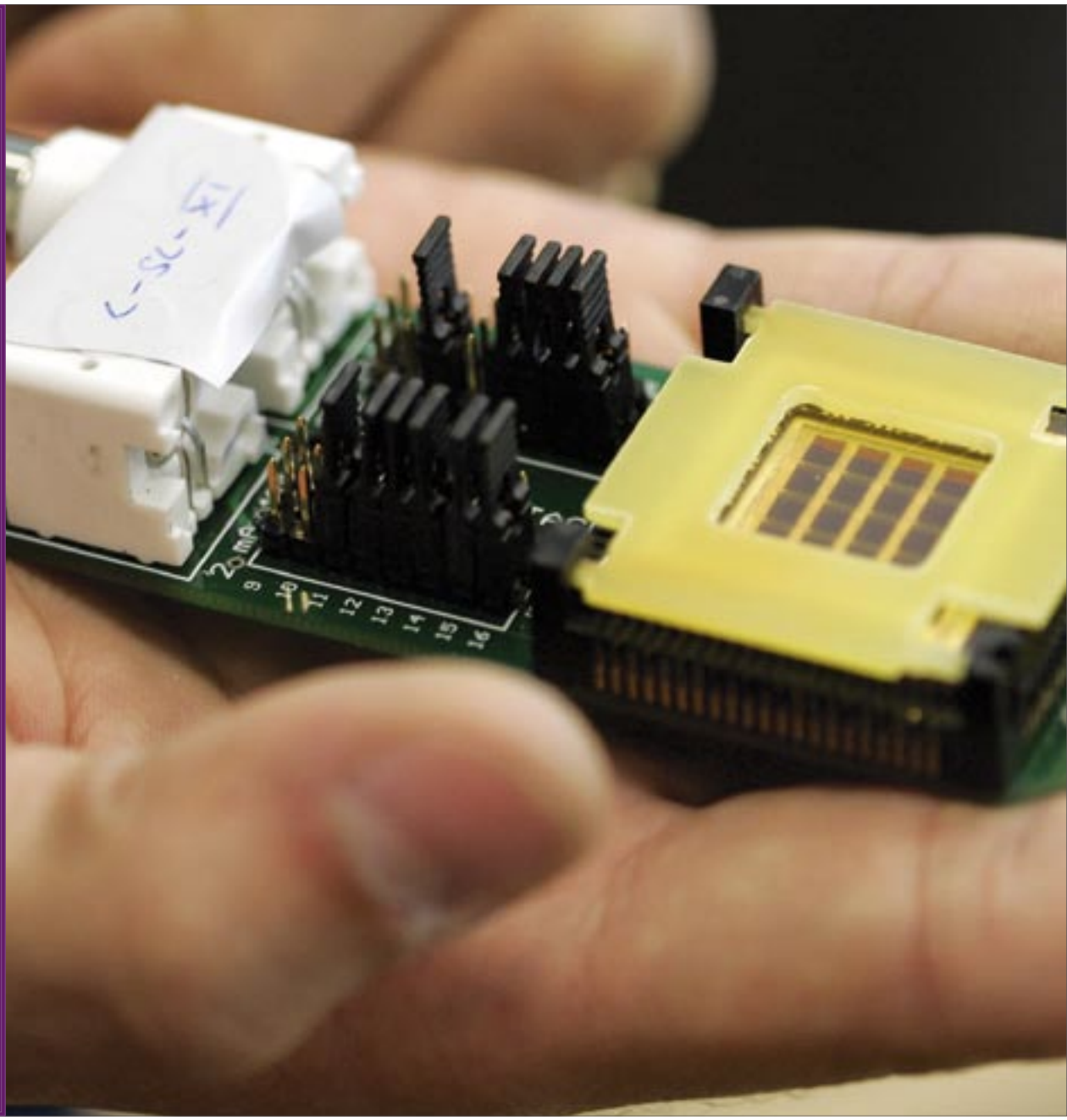
A helping hand

Body and soul

Competition commissioner Neelie Kroes gave a speech on European SME policy and the challenges ahead at a conference co-organised by the EPP-DE and UEAPME in November. She described SMEs as the "body and soul" of the European economy, and pointed out that 99 per cent of all European companies are SMEs. "But precisely because of their size, SMEs often face difficulties," she said. "This is why SMEs sometimes need support from policy makers – just as policy makers need their input to shape the right policies." Kroes said that the state aid reform launched in 2005 is playing a key role in helping unlock SME growth potential, and that all the instruments delivered under the state aid action plan have a strong focus on SME development. "We are delivering on more generous treatment," she said. "We have included the principle that SMEs should get larger aid intensities in all of our instruments, from regional aid to environmental protection. On top of this more favourable approach across the board, we have also put forward specific aid measures to specifically target SME problems."



A new bottom-up approach designed to encourage technological innovation within the SME sector is good news for Europe, says Luuk Borg

Since it began in 1985, the intergovernmental network EUREKA has championed a bottom-up approach to technological innovation. This approach has been particularly appealing to SMEs who today make up over 42 per cent of EUREKA's entire project portfolio. Eurostars, the newest member of the EUREKA family, is the fruit of an acknowledgement by EUREKA that something targeted had to be done to support the important SME sector. Eurostars is also an acknowledgement that EUREKA and the European commission can be more productive together. Launched in October 2007 by research commissioner Janez Potočnik, it is the first joint EU-EUREKA funding and support scheme to be specifically dedicated to R&D-performing SMEs.

"In order to sharpen Europe's competitive edge in a global market, actors in the European research area need to come together to address the fragmentation of research activities in Europe"

Over the last few years, it has been steadily realised that, in order to sharpen Europe's competitive edge in a global market, actors in the European research area need to come together to address the fragmentation of research activities in Europe. The SME sector accounts for two-thirds of Europe's employment and almost 60 per cent of economic output, making it the most dynamic in terms of innovation and job creation. Although state schemes exist for funding research, access to finance — especially in the critical stages after successful R&D but before commercialisation, remains a serious bottleneck in the flow of new technologies to market.

Eurostars will speed up and harmonise funding for small but ambitious international R&D projects, giving new impetus to research-oriented SMEs. The Eurostars definition of a research-performing SME is one that invests 10 per cent of turnover or full time equivalent effort into research. Eurostars fits well with the objectives of the European research area to coordinate and optimise regional, national and EU research programmes, and with EU plans to revitalise the Lisbon strategy for a knowledge-based European economy.

The programme targets small consortia: two to three SMEs and an R&D supplier, such as a laboratory or institute. Application for Eurostars funding can be done through national EUREKA offices. Standard EUREKA conditions apply in that partners must come from at least two EUREKA (but also Eurostars) member countries.

In addition to the community contribution of €100m, 22 member states and five countries associated with the EU seventh framework programme (FP7) will jointly contribute another €300m, giving a total investment of €400m over six years. It is hoped that this will, in turn, mobilise up to €400m in additional private funding, resulting in an estimated €800m package. By pooling national programmes and research funding in favour of SMEs, Eurostars is intended to result in better, more efficient use of funds from participating countries.

The operational side of the Eurostars programme is managed by a team based in the EUREKA secretariat in Brussels under the authority of the Eurostars high level group of representatives from the 22 participating countries. Projects are evaluated centrally by an independent panel of experts, working to a common set of agreed criteria. Once a project receives the go-ahead, Eurostars funding is implemented locally to provide a single payment combining both national and central EU funding. The maximum amount of funding is given as grants, loans or in whatever form is used nationally. And funding is available at the same time in all countries concerned. ★

Reach for the stars

Eurostars offers a focus on ambitious R&D-performing SMEs in high technology sectors and is designed to stimulate market-oriented innovation in any non-military technological area. It offers centralised, harmonised evaluation but local support from the EUREKA network offices, and ensures predictable procedures, short lead times and guaranteed funding, synchronised across the project consortium.

Luuk Borg is the new head of the EUREKA secretariat in Brussels

Effects of ARVs on African health systems, and maternal and child health (ARVMAC)

The EU funded INCO DEV 6th framework project ARVMAC is exploring health system consequences of the rapid scale-up of HIV treatment programmes, focusing on maternal and child health outcomes related to the MDGs 4 and 5.

With 25 million infected with HIV in sub-Saharan Africa, increasing access to life-prolonging antiretroviral treatment (ART) is an obvious emergency. The response from global actors including the European Commission to rapidly increase ART access nearly doubles the total current health budgets in many affected countries and is the largest health intervention ever in Africa. This poses serious challenges to the overall functioning of fragile health systems and is bound to have major health effects. ART scale-up has been much slower than expected and evidence-based strategies are lacking. How to absorb funds for ART, prioritize among different types of care, correctly distribute, monitor and sustain large-scale life-long ART in under-resourced health systems without harming the most vulnerable remains to be solved.

The overall impact of large health interventions is rarely evaluated on a population-scale in low-income settings. ARVMAC has a unique possibility to do so through comprehensive cross-country comparisons by using three demographic surveillance sites (DSSs) in Tanzania, Burkina Faso and Uganda, where an infrastructure for regular registration of births, deaths, migration and diseases for about 225,000 people already exists.

Entering the 2nd year of the project, launch workshops have been held to establish contacts with local village leaders and policy makers in all three DSSs, formative research has clarified possible challenges related to the study of these sensitive issues and data collection is ongoing. In relation to health outcomes, we are analyzing health policy, human resources, capacity, quality, equity and access to health services to identify bottlenecks for scaling-up, sustaining and integrating large-scale ART with maternal and child care. Results will be widely disseminated.

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The ARVMAC webpage:
www.arvmac.eu, has project information and links to all partner institutions (listed below). This homepage is currently under revision but will be completed during this week.

Participating partners:

1. Division of International Health (IHCAR), Department of Public Health Sciences, Karolinska Institutet, Stockholm, Sweden (KI) *(coordinating partner)*
2. Makerere University, Institute of Public Health Kampala, Uganda (IPH)
3. Swiss Tropical Institute, Basel, Switzerland (STI)
4. Ifakara Health Research and Development Centre, Tanzania (IHRDC)
5. Institute of Tropical Medicine, Antwerp, Belgium (ITMA)
6. University of Heidelberg, Hygiene Institute, Department of Tropical Hygiene and Public Health, Heidelberg, Germany (ITHOEG)
7. The Centre de Recherche en Santé de Nouna, Kossi, Burkina Faso (CRSN)

Coordinated Action on Ocean Energy

Co-ordinated by RAMBOLL DANMARK A/S,
Kim Nielsen at KIN@RAMBOLL.DK
www.ca-oe.net


Marine Curent Turbine


Wave Dragon

Ocean Energy is finally recognised as a significant contributor to the energy mix, tackling EU's major challenges: securing the energy supply, improving the environmental sustainability and the EU economical competitiveness, if you read the latest version of the EC communication 'Towards a European Strategic Energy Technology Plan" & the Council's "vision paper for the SET-Plan",

From a resource potential perspective, the western seaboard of Europe offers an enormous number of potential sites. The total European resource potential is estimated to be in the order of 230 GW securing a European supply potential between 10 and 20%. The DTI has estimated that, by 2050, ~ 6 TWh/y will be produced from ~ 200,000 MW of installed wave and tidal energy power.

This article is placed with the hope to update the parliament magazine readers on the medium and longer-term actions needed to stimulate Ocean Energy development and its resource potential.

The Coordinated Action on Ocean Energy is a FP6 funded project linking 41 partners within EU and 6 INCO partners into a network comprising SME´s, Universities, large private companies and utilities all with an interest in generation electricity from Ocean Waves or Tidal Current.

Ocean Energy technology today is at a pre-commercial stage, different principles have proved their concept and generated power successfully over longer periods of time in different locations. Given sufficient economic investment Ocean Energy will become cost competitive to other renewable energy sources.

The factors that will shorten the time until Ocean Energy becomes cost competitive are as follows:

- R&D: need for increased and clear focus in the R&D investments
- Investment in the human resource base through promoting education and training
- Generate engineers and 'master on ocean energy' i.e. via EUREC
- Demonstration zones in the sea with grid connections
- Setting a stable regulatory framework and for creating the right incentives to stimulate private investment such as initially high feed in tariff's.


Ocean Power Delivery


Archimedes Waveswing

Playing catch-up

Increasing SME R&D spending in Europe is the best means of ensuring that we catch up with the rest of the pack, argues Ullrich Schröder

At the Barcelona council in 2002, EU leaders committed themselves to increase the EU research effort to three per cent of the GDP by 2010. Five years later and despite some timid signs of improvement, private sector investments in R&D represent around 1.2 per cent of Europe's wealth, with the total research effort standing at less than 2 per cent. What went wrong?

One might wonder whether the three per cent goal was unrealistic to begin with. The answer is not really, since it was reached already both in the United States and in Japan some time ago. So, why not in Europe? After all, statistics do not show a significant difference between large firms in Europe, US and Japan in the total amount they spend on R&D. The difference between Europe on one side and the US and Japan on the other is due to SMEs. On average, an American small firm has an R&D budget seven to eight times higher than a European small firm. This evidence suggests that increasing SME spending on research and development in Europe is virtually the only means to achieve the three per cent target.

The EU has of course a key role to play in this respect. The seventh framework research programme (FP7) marked a significant enhancement over its predecessors when it comes to encouraging SME spending. However, much remains to be done. First of all, SME-related budget lines were particularly hard-hit by recent cuts. Moreover, the long duration of projects funded under the EU framework programmes, the inclusion of several partners, the focus on high technology and the large budgets involved still make it difficult for many SMEs to participate. On the contrary, leaner budget lines with less bureaucratic procedures and bottom-up requirements such as the CRAFT programme are highly sought after, to the point that they tend to run out of funding opportunities very quickly.

Even if it is by far the largest source of R&D funding, FP7 is not the only opportunity available. One of the most recent additions to the plethora of initiatives at EU level is the Eurostars programme, the very first European funding and support programme to be specifically dedicated to market-oriented research and development activities undertaken by SMEs. Some of the key features of Eurostars are indeed very interesting, *in primis* its focus on SMEs' innovation potential. Moreover, UEAPME fully shares the market-driven nature of the

programme, which will exclusively support projects aimed at the development of new and viable products, processes or services. Europe needs more transformation of knowledge into commercial products, and the Eurostars programme goes exactly in this direction. However, as it is often the case, the devil is in the detail: Eurostars funding will be initially available only to SMEs investing ten per cent or more of their annual turnover in research activities. This will create a niche market and *de facto* prevent the vast majority of European small businesses, including hi-tech undertakings below the threshold, from applying to the first round.

In fact, the programme's definition of "R&D-performing SME" goes well beyond internationally recognised standards such as the OECD criteria, which label hi-tech enterprises as those spending more than five per cent of their budget on R&D. By artificially reserving funding to a handful of super hi-tech SMEs, the Eurostars programme runs the risk of preaching to the converted and limiting excellence instead of fostering it.

One possible solution to this drawback would be to allocate Eurostars funding in future rounds to all businesses fulfilling the EU-adopted definition of SME, provided that their submitted R&D project proposals are competitive. In fact, the European commission decided to earmark 100 million Euro for the Eurostars programme out of a budget line of the 7th research framework programme that was originally meant for all R&D performing SMEs, regardless of the percentage of their R&D expenditure.

Applying the same conditions to Eurostars is not only a matter of common sense – it would potentially transform Eurostars from a small niche project to a huge success story. Only if the ten per cent clause is done away with, UEAPME would be in a position to support a serious increase in Eurostars-earmarked funds out of the FP7 cooperation budget line. After all, 100 million for seven years for 27 countries are barely enough to really make a difference. Moreover, deleting the ten per cent clause would create a win-win situation: hi-tech SMEs would be in no way hampered or prevented from applying, while other small businesses could also consider this opportunity and take advantage of such an innovative way of funding.

Eurostars' motto is "aim higher" – we trust that its next funding rounds will also aim in the right direction. ★

"Despite some timid signs of improvement, private sector investments in R&D represent around 1.2 per cent of Europe's wealth, with the total research effort standing at less than 2 per cent. What went wrong?"

Ullrich Schröder is a research and development advisor at UEAPME

Sky's the limit

Giles Chichester explains how the EU can help SMEs take full advantage of EU research and innovation

The ITRE committee is well aware of the importance of SMEs for the European economy and of their potential for growth and innovation and has consistently supported measures to increase their participation in community programmes. Europe's 23 million SMEs account for about two thirds of Europe's GDP and employ more than 100 million people and make up more than 75 per cent of employments in sectors such as textiles, construction and furniture.

EU support for SMEs covers hi-tech businesses as well as low and medium tech organisations with little research capability that can benefit from the dissemination of research results and the outsourcing of research tasks. The European parliament has insisted on special support measures for SMEs including minimum funding quotas, a wider choice of funding schemes, higher overhead claims and higher funding rates. There are four main EU instruments available to SMEs in this field.

SMEs and research: the seventh framework programme

Within the cooperation specific programme, research performing SMEs can participate in collaborative research in any of ten thematic areas. Each work programme identifies the research areas of particular interest to SMEs and provides concrete measures to increase their participation. The aim, at the request of parliament, is to enable at least 15 per cent of the funding to go to SMEs. The dissemination and transfer of knowledge are important features in each thematic area.

Within the capacities specific programme, research outsourcing SMEs can participate in two schemes to build their research capacity and technological know how. Research for the benefit of SMEs covers all fields of science and technology and aims to complement national programmes by supporting transnational research cooperation and technology transfer. Support is offered for increasing research efforts, outsourcing research, extending networks and acquiring technological know how.

Research for SMEs associations on the other hand supports short term collaborative projects involving several SMEs to solve common problems, such as conforming to European standards or meeting regulatory requirements, through research. Results are then disseminated to members of the SME associations. In both schemes projects are required to include activities promoting the use of research results. They also have special rules for ownership and access rights. Also, a people specific programme allows SMEs to participate in joint research partnerships supported by experienced researchers and staff secondments between public and private sectors.

Risk sharing finance facility

This facility, a new feature of FP7, is supported by parliament and is designed to improve access to debt finance. A contribution is provided from the EU to the EIB to finance more risky RTD projects. This will facilitate an increase in the amount of RTD actions financed by the EIB, such as joint technology initiatives, large projects, including EUREKA projects, new research infrastructures and projects run by SMEs, to help overcome market deficiencies.

The Eurostars initiative

This initiative, which is currently going through parliament, is a trans-national support scheme for research performing SMEs. It is a joint initiative between 27 countries, the Eureka network and the European commission, providing funding for SMEs to lead international market driven collaborative research projects. The scheme combines the centralised management of the framework programmes with the decentralised network of Eureka. 22 Member States and seven associated countries have pledged €300m and the European commission is contributing €100m from the seventh framework programme.

"Parliament has insisted on special support measures for SMEs including minimum funding quotas, higher overhead claims and higher funding rates"

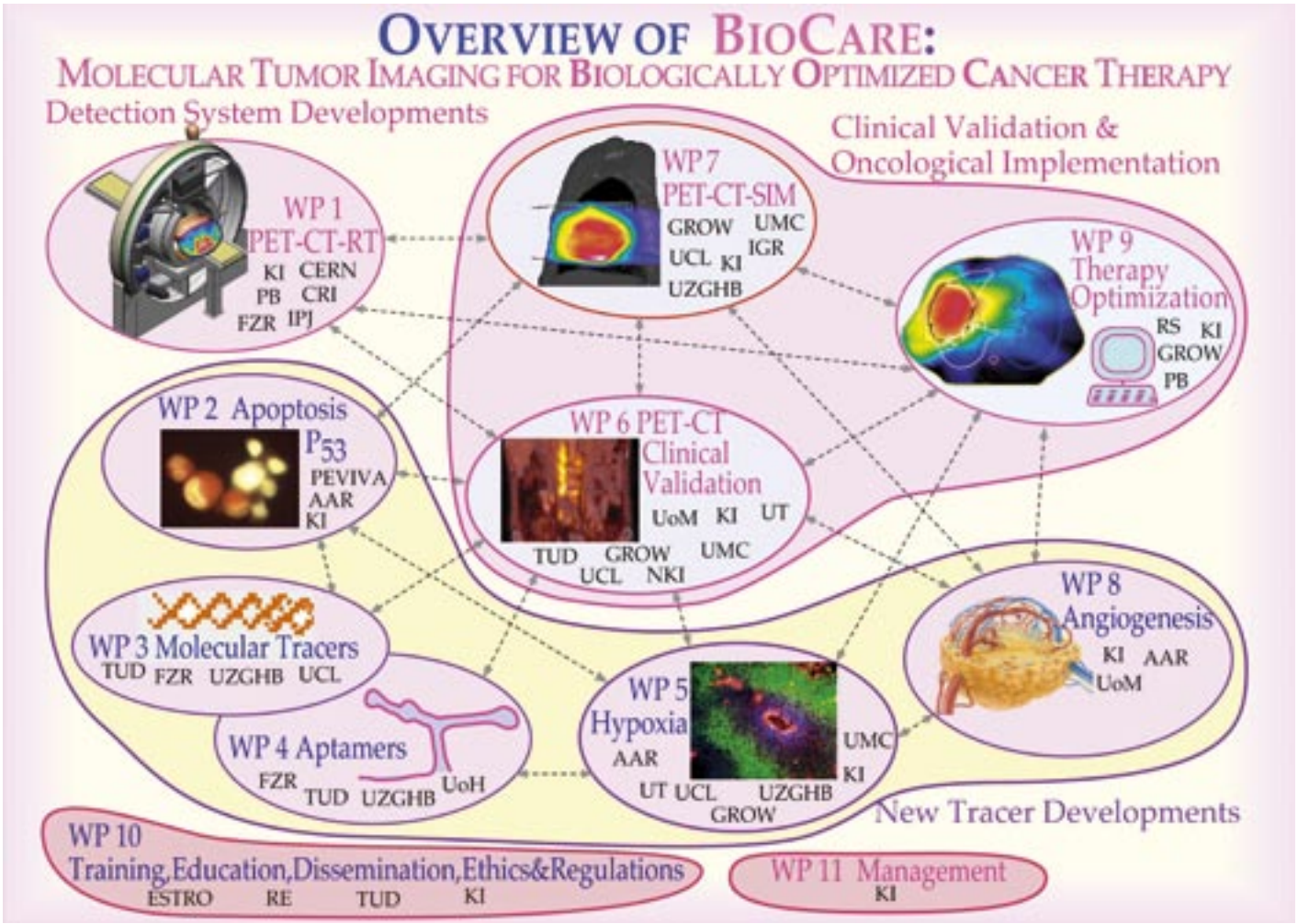
SMEs and innovation: the competitiveness and innovation framework programme

The programme supports innovation activities by SMEs and helps them increase their use of information and communication technologies (ICT). It also promotes energy efficiency to increase competitiveness. SMEs can participate in its three specific programmes – the entrepreneurship and innovation programme, the ICT policy support programme and intelligent energy Europe.

There have always been obstacles in the way of SME participation in framework programme projects but this time we have tried hard to make it easier. The jury is out on some of these initiatives so maybe it is a little early to draw any conclusions but I am moderately optimistic that things will be better this time around. ★

Giles Chichester is a member of the committee on industry, research and energy

BioCare



Early tumour detection and response monitoring require maximum sensitivity and specificity of the imaging method. This Integrated project focuses on the clinical evaluation and development of new, more specific molecular tracers for the early detection of tumour cells. A large number of new and potentially more specific tracers than fluorodeoxy-glucose (FDG) will be tested including amino acid analogues, small tumour-binding peptides, aptamers, peptides binding to nanoparticles. The more tumour specific the tracer, the more accurately it will be possible to image the true tumour cell density, and more importantly, the true response of the tumour to therapy.

There is also a need to consolidate experience in the use of recently developed molecular tracers to assess radiotherapy and chemotherapy response in order to improve on state-of-the-art treatments. To maximize the sensitivity and tumour image quality, a high-resolution, wide field-of-view, ultra-sensitive fully integrated PET-CT camera, capable of imaging half the human body in a few minutes, will be designed. Furthermore new adaptive therapy planning and biological optimization codes and a dedicated PET-CT detector for incorporation in treatment units will be designed in close collaboration with university researchers and SMEs. This will allow an efficient clinical integration and high patient throughput. The associated increase in accuracy of tumour imaging and the three-dimensional *in vivo* tumour responsiveness data will hopefully allow the clinical introduction of accurate biologically based adaptive treatment optimization methods.

The overall goals are two-fold namely:

- to improve and speed up the implementation of PET-CT imaging in cancer management
- to develop new European intellectual property to improve tumour imaging by more specific tumour

Partners:

Karolinska Institutet (KI), University of Technology Dresden (TUD), University of Manchester (UoM), Forschungszentrum Rossendorf e.V. (FZR), University of Maastricht (GROW), Radiation Oncology UMC St. Radboud (UMC), Aarhus University Hospital (AAR), Radiation Oncology Department, Institut Gustave-Roussy (IGR), University of Hamburg (UHH), Université Catholique de Louvain (UCL), Universitair Ziekenhuis Gasthuisberg (UZGHB), The Netherlands Cancer Institute (NKI), Soltan Institute for Nuclear Studies (IPJ), University of Turku (UT), C-Rad Innovation, PEVIVA, RayClinic (RayEducation, RE), European Society for Therapeutic Radiology and Oncology (ESTRO), European Organization for Nuclear Research (CERN), C-Rad Imaging (CRI), RaySearch (RS)

Countries participating in the project:

Sweden, Germany, UK, The Netherlands, Denmark, France, Belgium, Poland and Finland.

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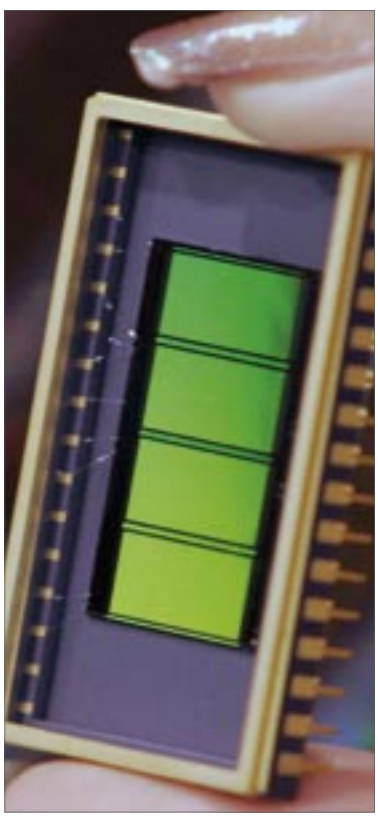
Under the microscope

Nanotechnology has the potential to provide new jobs and enhance economic growth, argues Miloslav Ransdorf

The prefix "nano" comes from a Greek word for "gnome" or "dwarf". One nanometre is about 1/80,000 of a human hair, a virus is approximately 100 nanometres in size, and one paper-sheet is 100.000 nm thick. More then 2400 years ago the Greek philosopher Democratus claimed that our material world was made up of atoms that were only one tenth of nanometre in size.

Johanes Kepler, the famous astronomer who served in Prague for the Czech king Rudolph II, published his ideas on atoms in 1611 having pointed out that "the regular shape could only be due to a simple, uniform building block". In 1912, the first practical proof on atoms in minerals and crystals was obtained in Germany at the University of Munich.



Since then the development of nanosciences and nanotechnologies has come a long way. Today nanosciences and nanotechnologies provide us with a lot of possible solutions to many current problems by means of smaller, lighter, faster and better performing materials, components and systems. As I pointed out in the report "Nanosciences and nanotechnologies: an action plan for Europe", adopted by the European parliament in September 2006, nanosciences and nanotechnologies open up new opportunities for industry, infrastructure, wealth creation and employment, solving global and environmental challenges, realising more specific products and processes, saving resources, energies and producing lower waste and emissions. →

Nanotechnology components and structures exhibit revolutionary new physical, chemical and biological characteristics. Materials from carbon nanotubes are 100 times stronger than steel, but six times lighter. The biomedical field is manufacturing artificial bone composites stronger than stainless steel. Other novel products based on nanosciences include long- lasting batteries, self cleaning textiles, anti-graffiti paints, advanced coatings, flexible display systems etc.

Nanotechnologists are also investigating ways in which new methods of surgery and new medicines can be discovered and administered, and how new security techniques can help in crime prevention. Advances in nanotechnology may help improve diagnostic tests and enhance cancer therapies. Semiconductor technology based on nanotechnology could enable rapid processing for drug discovery, genotyping, and other biological applications. It is estimated that the demand for nanotechnology health care products will exceed $100 billion by 2020.

Nanosciences and nanotechnologies combine different technological disciplines (micro-electronics, microsystem technology, chemistry, physics and biotechnology) in a single multidisciplinary field. Where these technologies meet, existing technological barriers can be approached from various scientific angles to develop new possibilities. Nanotechnology is therefore a superb multidisciplinary arena.

It opens a new window of opportunities and solutions for modern society. Nanosciences and nanotechnologies are expected to have an impact on nearly every industry and are considered to be one of the key technologies for the 21st century. It already has a predicted market potential of several hundred billion euros. The US National Science Foundation even estimates that the global market for nanotechnologies will reach $1 trillion within 10 to 15 years.

Overall spending at global level on research and development (R&D) in the field of nanosciences and nanotechnologies is estimated to stand at around €8 billion per year, of which approximately 37 per cent was spent in the US, 28 per cent in Japan and 24 per cent in the EU. The per capita public investment in the EU in 2004 was €3, compared to €4.5 in the US and €6 in Japan. In the field of private investment, the EU lags even further behind with approximately €1.5 per capita from private investment, compared to almost €6 in the US and more than €12 in Japan.

The amount proposed in the 7th framework programme for "Nanosciences, nanotechnologies, materials and new production technologies" was €4270 million for seven years (thus €610 million per year). In comparison: the US government spent more than $1 billion on R&D in this field in 2006 alone. In China, nanotechnology has enjoyed state funding since the 1990s through a national R&D plan which currently provides more than €4.5 billion for nanotechnology products and systems, a figure set to grow to more than €120 billion by 2015.

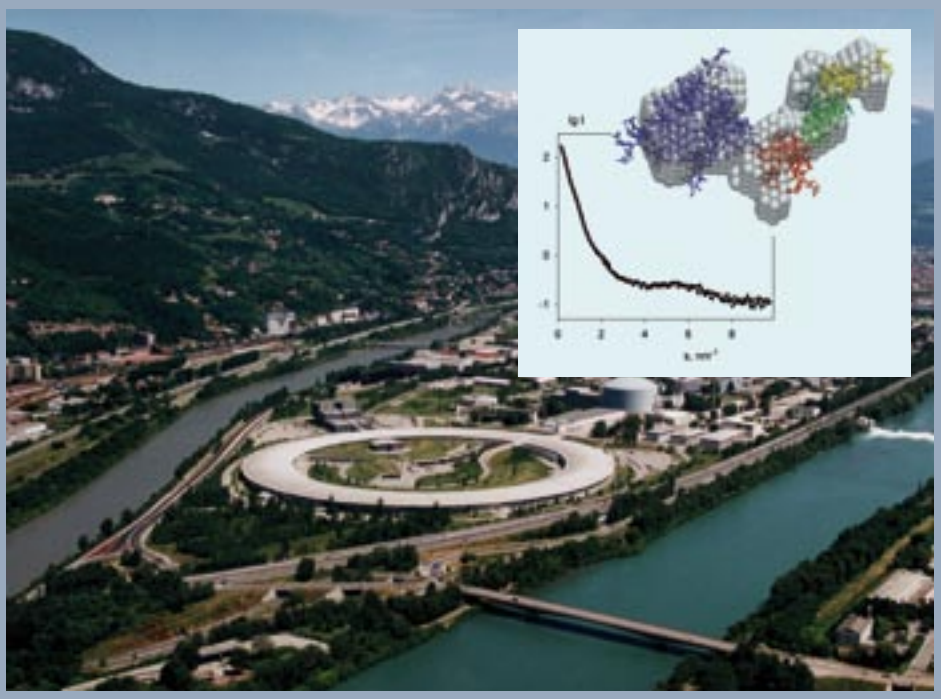
Further cuts on R&D funding will bring the EU away from meeting the Lisbon goals and the EU's desired competitiveness. Through its technology platforms, "triangles of knowledge", expert advisory groups, and action plans, the EU has a good chance to create useful instruments in order to help develop agreed research agendas and deployment strategies in nanosciences and nanotechnologies, and thereby create new jobs, enhancing economic growth. An essential element of a responsible strategy is the integration of the social, health and safety aspects into the technological development of nanosciences and nanotechnologies.

All applications and uses of nanosciences and nanotechnologies in the EU must comply with the high level of protection for human health, consumers, workers and the environment, as laid down by the EU. The EU must insist on the codification of nanomaterials, which will lead to the drawing up of standards and will in turn boost efforts to identify any risks. The public must be properly informed, for a climate of trust can only be based on an awareness of the possible risks, and possible benefits, that are associated with the use of nanotechnology.

Last but not least all participants in the global, competitive environment of nanosciences and nanotechnologies need to work towards deeper and more constructive international cooperation. It is therefore a positive sign that the European comission is pushing for better relations in this area with the US, Japan, Russia, China, India and other interested countries. ★

Miloslav Ransdorf is a vice-chairman of the European parliament's Industry, Technology, Research and Energy committee.

SAXIER: Small-angle X-ray scattering at high brilliance European synchrotrons for bio- and nano-technology



Left: An aerial view of the European Synchrotron Radiation Facility in Grenoble, France. Insert displays an X-ray scattering pattern and the derived low resolution model of a protein (about 10 nm across); Right: An artist view of the Petra-III synchrotron ring (under upgrade in Hamburg, Germany), and a high throughput robot at the EMBL SAXS beamline.

X-rays were employed to probe the structure of matter since the early 20th century. For crystalline objects, X-ray diffraction elucidates the atomic structure, whereas for non-crystalline substances, small angle X-ray scattering (SAXS) is more appropriate. SAXS does not see individual atoms but instead elucidates the shapes and sizes of particles in nanostructural materials and of biological macromolecules like proteins in solution.

The best X-ray source for SAXS is a synchrotron, and there are nearly 20 of these machines in Europe. The new "third-generation" synchrotrons produce especially intense and narrow "high brilliance" X-ray beams allowing measurements in sub-millisecond times and with sub-micron spatial resolution. On these SAXS beamlines, structural changes during biological processes can be followed in real time, or, in "scanning" mode, organisation of solid nanomaterials can be studied. SAXS became an extremely valuable rapid tool for biology, nanotechnology and materials science, and the SAXS beamlines are among the most demanded at all synchrotrons. The four-year SAXIER project, started 1 December 2005, responds to this challenge by developing novel technologies for high brilliance SAXS facilities in Europe. These developments include:

- Construction of sample stages with nanomanipulators to precisely scan the micrometer-sized samples
- Combination of SAXS with Raman spectroscopy, on-line characterisation of chemical species
- On-line gel filtration chromatography and infra-red spectroscopy, to study transient phenomena
- Microfluidic-based SAXS with applications in fluid mechanics and surface chemistry
- Adaptation of SAXS to cryogenic temperatures, to stall (bio)chemical reactions and to reduce radiation damage
- SAXS measurements in gas phase using mass spectrometry and electrospray techniques
- Automation of SAXS experiment and of the data analysis for high throughput studies

SAXIER is a Design Study under the Infrastructure programme of FP6, and the Commission is contributing €3.6 million out of a total budget of €7.2 million. The project includes Europe's main SAXS laboratories at synchrotrons in France, the UK, Germany and Italy. During the first two years, prototypes of the major devices were constructed including a nanomanipulator with a Raman spectrometer, a high throughput liquid handling robot, cryo-SAXS, microfluidic and microelectrospray setups, and an automated data analysis system. These prototypes are currently being tested at the partner's synchrotron sites to ultimately create a unified European SAXS infrastructure for bio- and nanotechnology.

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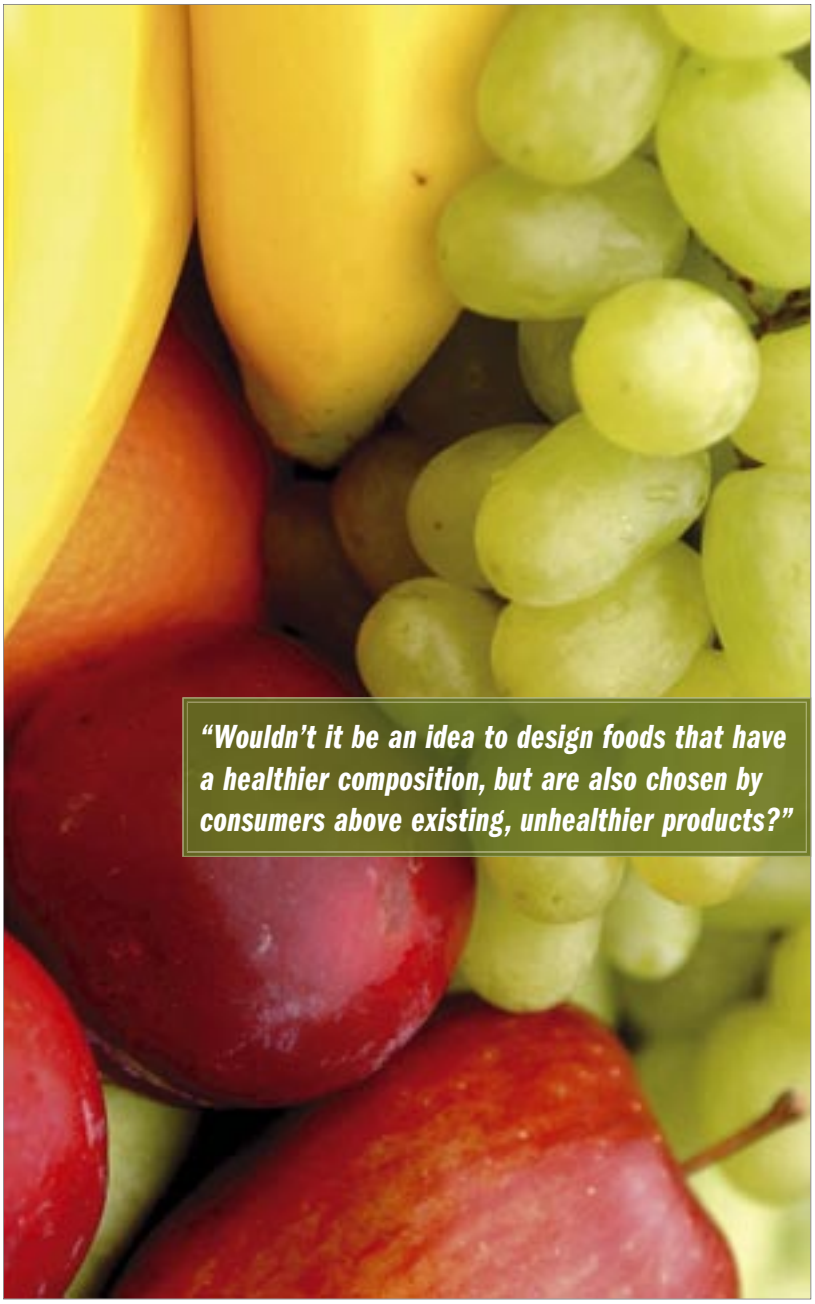
Web page: www.saxier.org

A healthy future

The advent of micro- and nanotechnology could help us make more efficient use out of our precious food resources, argues Remko Boom



"Wouldn't it be an idea to design foods that have a healthier composition, but are also chosen by consumers above existing, unhealthier products?"

Many people regard the application of nanotechnology for food with some reserve. Do we have to meddle with our foods? Do we need to have nanoparticles in our food? Shouldn't we leave our food as it is? My answer to that is: we do not want to meddle with our food, we may not even want to put in nanoparticles, but we cannot leave the production of our food as it is.

Foods will become a difficult issue in the future, with an ever-increasing population and pressure on our fossil resources. And everyone is looking towards the use of renewable resources for the production of chemicals and energy. Agricultural feedstock will thus be in high demand, and not only for producing foods. That means that we have to be extremely efficient at using it.

Surprisingly, the advent of micro- and nanotechnology may offer us some help here. For example, the application of pulses of electric fields over a slurry of sugar beet pulp can be used to open up plant cells, leading to quick release of sugar without having to use high temperatures. Proteins and antioxidants are not affected and can be separated separately (e.g. with those micro-engineered membranes).

So, micro- and nanotechnology may actually help us in obtaining our foods more efficiently, and producing more products from the feedstock, in milder processes, yielding fresher products, using less energy. In this scenario, nano- or microtechnology may not end up in our foods, but help in having our foods available.

Food for thought

Professor Remko Boom, was a speaker at an EU conference on micro- and nanotechnology held in Braga, Portugal on 20 November. One of the major topics up for discussion was innovation in food production.

Is this the only way that micro- and nanotechnology is helpful? Maybe there is more. As you know, many people have major health problems. Due to an imbalanced diet, obesity has become an epidemic, together with related ailments such as cardiovascular diseases, diabetes and some forms of cancer. This is the reason that advisory organisations and governments advise people to eat more fruit and vegetables and less junk food. Unfortunately, this is not very successful. People tend to choose the foods that they like, and the best tasting foods are usually not the healthiest ones. We're only human, after all.

So, wouldn't it be an idea to design foods that have a healthier composition, but are also chosen by consumers above existing, unhealthier products? Let me give an example, using emulsions. Mayonnaise owes its nice sensory properties - creamy, thick consistency - from its very high fat content (70 to 80 per cent). We can make such a product 'light' by using less oil, but then we need a thickening agent to mimic the consistency of the original product. And this is never completely successful: people still prefer real mayonnaise over the 'light' product.

With micro-engineered systems, we can actually produce an emulsion, in which much of the oil inside the droplets is replaced by water. Thus, we still have the same amount of droplets, and the product will have similar properties to the original product, but now it contains much less oil, without having to use thickening agents.

Another example is the use of plant proteins for producing high protein foods. As we move towards seven billion people on the planet, it will become impossible to supply enough meat. Direct use of plant proteins would be much more efficient. But meat of course tastes great, while most meat replacing products such as tofu have a rather bland taste. The good taste of meat is due to its incredibly fine structure. Meat is a naturally nano-structured material. This fine structure gives a slow release of flavours during chewing. Plant protein based products do not have this fine structure, and therefore taste blander.

A recent finding is that by using a combination of self-assembly of proteins, together with the application of a very well defined flow field, we end up with strings of protein, which can be solidified into a product that shows the same fibrillar structure as meat. Using this as the basis for a plant protein based product could actually lead to products that would have a taste experience similar to meat.

It may be clear that micro- and nanotechnology has much potential in the area of food. Not for meddling with our food, but for more sustainable food production, and for a diet that is better balanced and still enjoyable. We should not want to apply all that nanotechnology has to offer in our food – there should be limits and guarantees that food remains ultimately safe and of high quality. But if we do that, the food industry, one of Europe's strongest industries, can remain in the lead with innovative products and sustainable production, contributing to a healthy future for Europe. ★

Remko Boom is a professor in food process engineering science at Wageningen University

EURONS - A new European infrastructure for nuclear structure research

The UNILAC — a 120-meter long linear accelerator at GSI, Darmstadt - accelerates the ions to 20 percent of the speed of light

Photo: G. Otto

We still know little about the many exotic nuclei that could exist. To study their structure and behaviour, they must be made in laboratory experiments. This requires large accelerators – facilities which accelerate beams of nuclear particles to high speeds and onto a target, or onto each other. The impact leads to reactions in which nucleons are rearranged and emerge as different nuclei, most of them exotic species. These are collected and, after selection, used in various experiments to study their properties. Such facilities are complex and large, housing sophisticated equipment. They are, therefore, challenging to build and require effort to maintain. Furthermore, no single facility can meet the demands of every experimental programme, so a variety of accelerators is needed.

A joint European effort

Europe has a strong tradition in nuclear research which has been carried out largely at independent, nationally-run accelerator complexes in different countries. To maximise opportunities for tackling future scientific and technological challenges, the European nuclear structure community has come together to set up a more coordinated framework for research. The initiative, EURONS – a so-called Integrated Infrastructure Initiative – involves a consortium of nuclear-structure scientists from 45 laboratories in 21 countries. Supported by the EU, it comprises three strands:

Transnational access (TNA) to the facilities
Universal access to seven world-class facilities offering complementary experimental resources and strengths, and also one centre for theoretical physics.

Joint Research Activities (JRA)
Eleven JRAs set up to identify, realise and coordinate the necessary technology development, such as new instruments for improving research infrastructures for particular scientific goals. JRAs involve more than one facility and rely on strong participation of European university groups.

Networks (N)
Eight networks to coordinate the strategy, including management of the consortium, fostering of future collaborations, pooling of resources, broad dissemination of results, promotion of integration of researchers from the new EU member and candidate countries.

Management structure
EURONS is run by a scientific committee consisting of the coordinators of all activities (TNA, JRA, Networks) and the EURONS management, as well as by an administrative general assembly consisting of one representative from each participating laboratory which ensures feedback to the community and monitors the overall progress.

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Lift off

Carbon nanotubes are key to the future development of a space lift, says the European space agency's Laurent Pambaguian

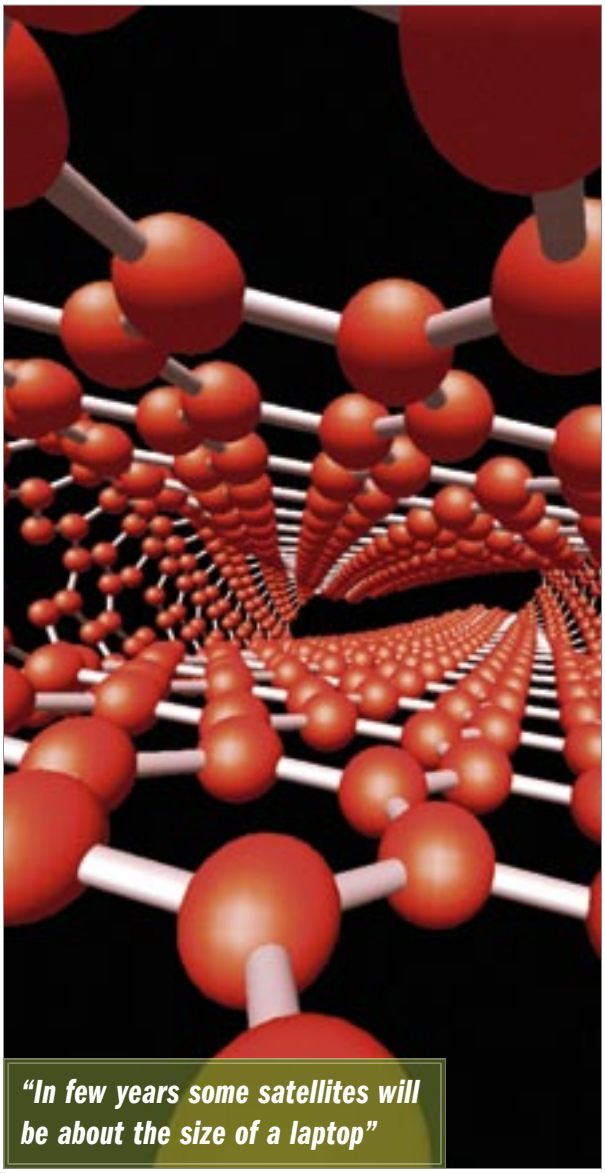
One limitation of space activity arises from the need to escape the Earth's gravity field. This partly explains the high cost per kilogramme of sending objects to space. To lower costs, one solution is to reduce the size of the spacecraft. The European space agency (ESA) is already active in this field; within its technology programme, several initiatives covering micro and nanotechnologies are aiming to substitute satellites sub-systems with micro-electro-mechanical-systems (MEMS) weighing a few grams. The expected outcome is similar to what has occurred for computers – in few years some satellites will be about the size of a laptop.

Another solution to lower the launch costs would be to launch from a higher altitude. The most attractive solution would be to launch from so high that the gravity field is already overcome. This is the space-lift concept in which a cable attached to the Earth is used as a climber to bring spacecraft to a platform remaining permanently in space. This space-lift concept requires a cable several thousands kilometres long and strong enough to support its own weight. Such a cable was unthinkable before Sumio Iijima discovered the carbon nanotube (CNT) in 1991.

A CNT can be described as chicken fence – rolls of carbon atoms capped at each extremity. The facets are hexagonal. In fact, the strongest chemical bond known is the one that bonds two carbon atoms in a hexagonal configuration as formed in a CNT structure. This chemical structure makes the CNT the ultimate material with strength orders of a magnitude higher than steel.

Others properties of the CNT are just as amazing. For instance some CNTs could transport an electric current 1000 times the density of the best conductors. Also, the heat conduction of a CNT would be 2000 times better than that of the best metals. In addition, CNTs are light, with a density close to 1.4 g/cm^3. This is about 50 per cent lighter than aluminium.

The challenge today is to engineer CNTs into usable materials. The production problem is twofold. Firstly it is necessary to establish processes allowing synthesis in large quantities. Existing European production facilities produce several kilogrammes per day, compared with few grams five years ago. The quality of these CNT has also significantly improved while their price has been reduced. Secondly, it is necessary to manufacture these CNTs into macroscopic materials.

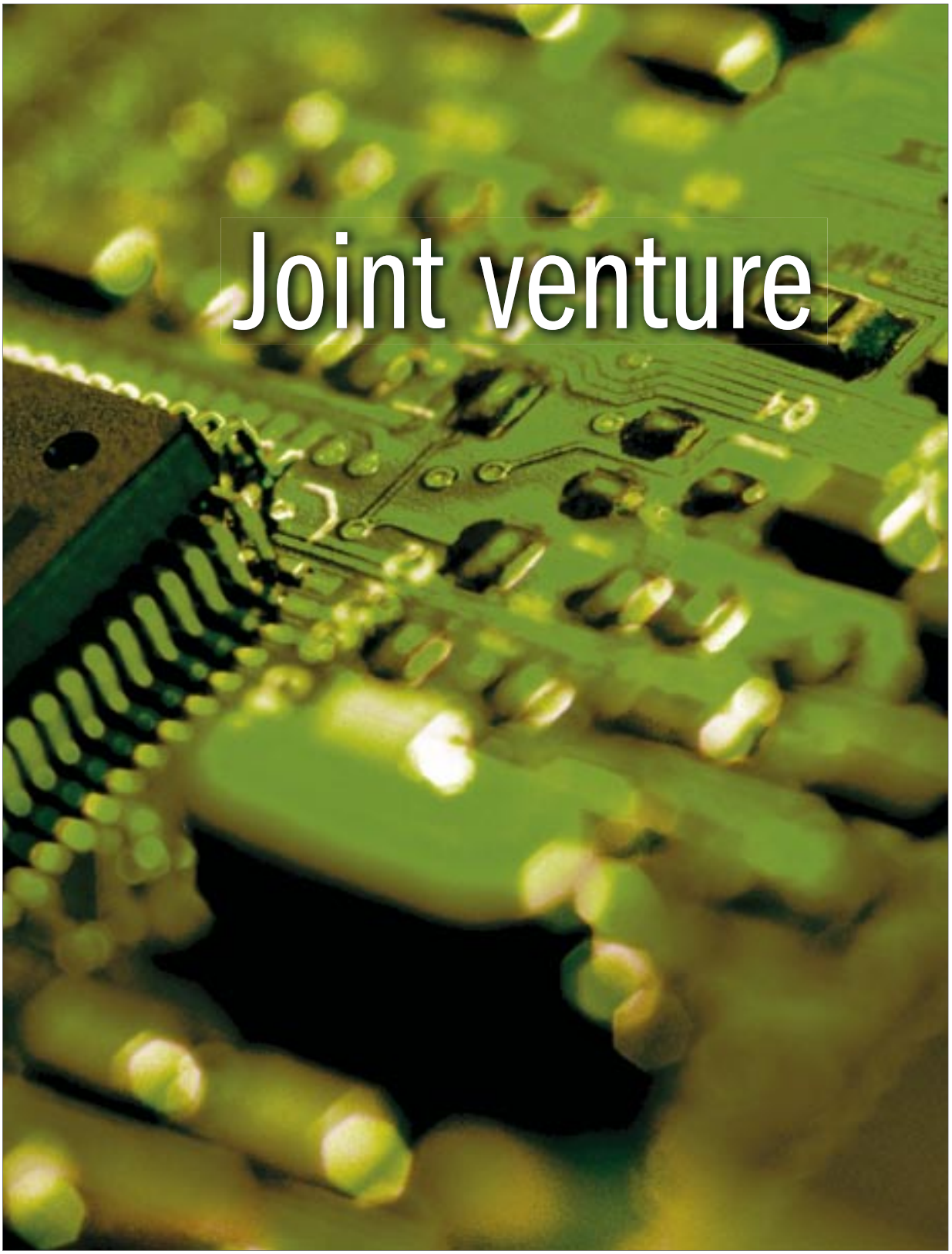


"In few years some satellites will be about the size of a laptop"

In the next years, considerable improvements are anticipated for nano-composites by increasing the amount of CNT in the nano-composite, by aligning all CNTs in one direction or by making fibres composed of CNTs followed by fabrics or ropes made from those CNT fibres. At the same time as developing these concepts, it is critical to develop a better understanding of how CNT-based materials behave.

The space-lift is the most ambitious foreseen application of CNTs but commercial pressures are already present. When it becomes possible to build such a thing, our society will have been changed fundamentally by nanotechnologies… but that is another story. ★

Laurent Pambaguian works for the ESA's material mechanics and processes section



Joint venture

Research into embedded systems will benefit greatly from the newly established joint technology initiative, says Yrjö Neuvo

After two years of planning and negotiations, a new cooperation scheme called joint technology initiative (JTI) based on partnership between public and private R&D actors is getting ready for the first calls for projects. The objective is to bring leading European industries, the EC and the union's member states together in unique collaborations focusing on areas where research and technological development can make a major contribution to European competitiveness and quality of life.

The European embedded systems industry was one of the first subscribers to this new scheme-in-the-making. Embedded systems is a branch of ICT where computer technology is used to add intelligence to virtually everything we come into contact with, from mobile phones, domestic appliances, to cars, and many more. The result is safer, more effective, environmentally cleaner, easier-to-use and more competitive products and the same for the manufacturing processes used to make them. Creating jointly a strong competence base, tools and methods to deploy embedded systems is the best way to enable innovation and high added value in many traditional industries. The JTI on embedded systems is Artemis.

Artemis was created in June of 2004 as a European technology platform (ETP), by bringing together a group of some 25 European players closely involved in embedded systems and including industry leaders such as Airbus, ABB, Bosch, Daimler-Chrysler, Finnmecanica, Nokia, Philips, Siemens, ST and Thales. Artemis' goal is to secure and enhance Europe's position as worldwide leader in the increasingly competitive field of embedded systems. How?

By encouraging all players in this field to set aside their old habits of conducting their research and development activities on their own or in small groups, and to engage in large scale collaborative R&D work, effectively pooling the resources and abilities of all involved. By bridging the gap between large industrial corporations, small and medium sized technology companies, research institutes and other academic bodies, Artemis will create a dynamic industrial ecosystem focused on embedded systems: increasingly advanced technology, more compelling products, increasingly effective training of a skilled workforce all over Europe and defining emerging standards that we expect will gain worldwide de facto acceptance.

Through this approach, Artemis expects to drive the R&D actors to double their annual investment in collaborative R&D to €450m. To achieve this, Artemis has been designed with the objective of having industry's efforts matched by public funding provided by the European commission and European member states, effectively gathering federated resources of about €2.7 billion to fuel these ambitious R&D efforts. To make this possible, Artemis embarked very early on in the production of a strategic research agenda, effectively outlining every aspect of our goals and methods, as well as on the setting up of a joint technology initiative to organise this novel funding approach.

What's the situation today? Over the past year, Artemis has leveraged considerable energy, goodwill and skills among all participants, to move from defining a programme and organising research topics, to creating all the necessary structures and bodies. In January 2007, the Artemisia Association was created; a legal entity responsible for managing the contributions of the R&D actors to the Artemis programme.

On November 23 the council agreed on the general approach on four proposals aimed at the establishment of JTIs on Artemis, nanotechnology, medicine and aeronautics. The council will decide on the detailed approach of Artemis after receiving the opinion of the European parliament. Things are now moving forward very quickly, and we anticipating making a first open call for projects early next year, clearing the way for our research activities to start later in 2008 and 2009.

"Artemis has leveraged considerable energy, goodwill and skills to move from defining a programme and organising research topics, to creating all the necessary structures and bodies"

In order to be ready for the first calls Artemisia has been organising so-called summer camps where first priority topics have been identified and consolidated under eight themes. These themes have been drawn and further developed from the Artemis strategic research agenda (SRA). The SRA takes a holistic view on the challenges and opportunities on embedded systems, and is available at Artemis website.

Artemisia is also preparing a series of concrete actions to create a more favourable innovation environment for embedded systems in Europe. These include pro-active standardisation and regulation to support use of novel embedded systems, specific actions to promote SME participation in projects and educational issues. On the lighter side, and to increase the visibility of embedded systems to students and the general public, Artemisia also organises the Artemis Orchestra contest where teams develop embedded systems that play real musical instruments such as piano or violin. The ultimate goal is to reach a level where an unmanned orchestra plays under the control of a human conductor. ★

Yrjö Neuvo is president of the Artemisia association and chief technical officer at Nokia

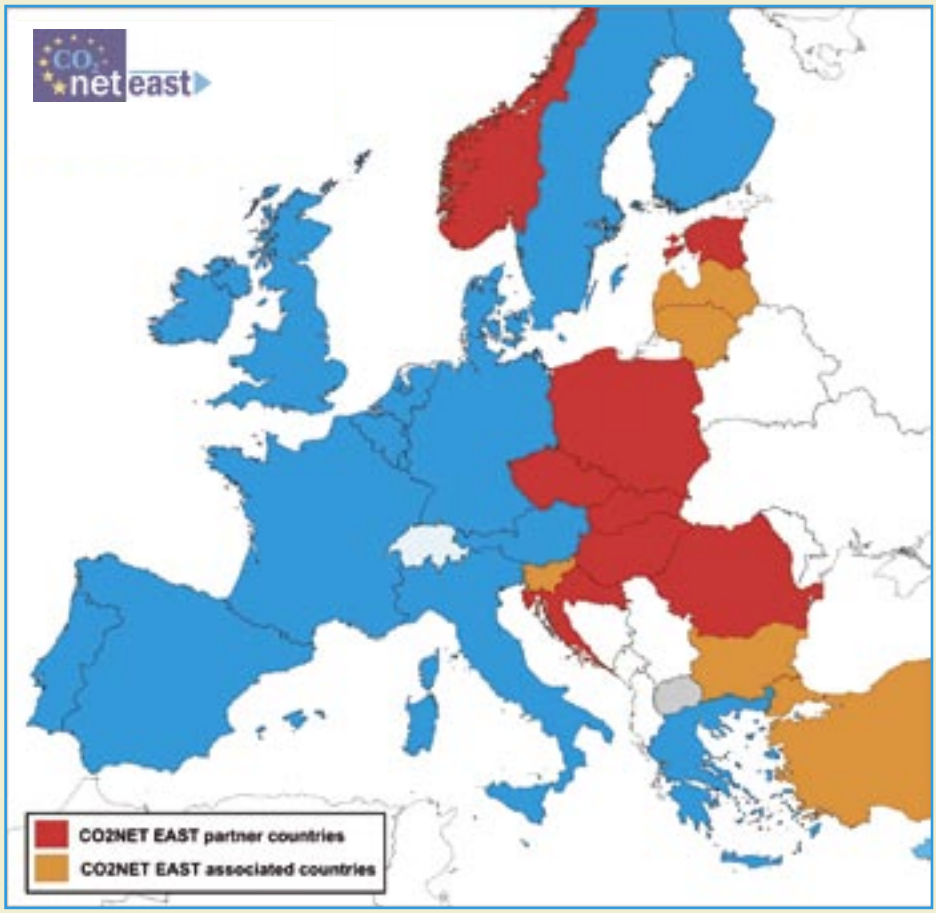
CO2NET EAST – CO_2 capture and storage networking extension to new member states

CO2NET EAST is a project co-funded by the European Commission within the 6th Framework Programme (FP6). It is a Co-ordination Action proposed as a mechanism to involve new EU Member States and Associated Candidate Countries in the current European CO_2 Capture and Storage (CCS) networking activities. The project is built on East-West cooperation, helping the new member states to add to the co-ordination effort to fast-track the development and commercialisation of CCS technology for Europe.

CO2NET EAST was started on October 1, 2006 for a period of 3 years. The project consortium consists of:

- Czech Geological Survey (Czech Republic)
- University of Zagreb – Faculty of Mining, Geology and Petroleum Engineering (Croatia)
- Eötvös Loránd Geophysical Institute (Hungary)
- Dionýz Štúr State Geological Institute (Slovakia)
- Institute of Geology at Tallinn University of Technology (Estonia)
- PBG – Geophysical Exploration Company (Poland)
- National Institute for Marine Geology and Geoecology (Romania)
- StatoilHydro ASA (Norway)

During the 1st project year, the partners created eight national CCS information websites, published an information brochure on CCS in eight Central&Eastern-European languages, organised an awareness-building workshop in Zagreb (Croatia) and undertook extensive knowledge dissemination and awareness raising activities in their home countries. This included numerous presentations at local events and to national stakeholders, publications in technical and infotainment journals, media briefings, participation in TV news and radio broadcasts, newspaper articles as well as educational activities at universities. Close links and liaison were established to all important European CCS entities like knowledge networks, the ZEP Technology Platform, etc. As a result, CCS is becoming more and more an important topic in new EU Member States and Associated Candidate Countries.



CO2NET EAST NATIONAL WEBSITES

Language	Institution responsible	Website address
Czech	CGS	http://www.geology.cz/co2net-east
Croatian	RGN	http://www.co2neteast.rgn.hr
Hungarian	ELGI	www.elgi.hu/co2net_east/index.htm
Slovak	SGUDS	http://www.geology.sk/co2neteast/co2net-east.htm
Estonian	IGTUT	http://www.gi.ee/co2net-east
Russian	IGTUT	http://www.gi.ee/co2net-east/r
Polish	PBG	http://www.pbg.com.pl/CO2_net_east.htm
Romanian	GeoEcoMar	http://www.co2net.ro
English	GeoEcoMar	http://co2neteast.energnet.com

Project Co-ordinator:
Vit Hladik (Czech Geological Survey)
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Star academy

Persuading the bright stars of today to remain in Europe is key to leading the world of research, Jorgo Chatzimarkakis tells Matt Williams

Jorgo Chatzimarkakis's interest in research goes back to when he was working for the German government as a science policy officer at the Bundestag, and then later on as the managing director of a technological consultancy. His interest was sparked by being part of the research world, a world of competitiveness, high-tech science and problems with competition law, along with the challenge of China and Asia, which he says was absolutely fascinating. "Being involved in this industry, advising companies about what they go do within Europe in order to be more competitive, is really what inspired me to become involved in this field."

Chatzimarkakis is currently a member of the committee on Industry, Research and Energy, as well as a substitute member of the agriculture committee. Part of his work, he says, has involved proposing projects as part of an ongoing process of 'Lisbonising' the budget.

"This idea of 'Lisbonising' the budget means, sticking with the same proportion of the budget for agriculture but instead of using this money to subsidise farmers, using the funds to improve the environment of rural areas and to make them more competitive, more technology-driven, rather than just giving these areas money simply to survive," explains Chatzimarkakis. "Using the money in a different way would transform the whole environment of rural areas in Europe."

Chatzimarkakis is optimistic about other ambitious research ideas circulating around the parliament, including the European Institute of Technology (EIT). The exact location of Europe's new technology institute remains to be decided. However Chatzimarkakis says that an EIT based in Strasbourg has a lot of potential. →

"Had we proposed Strasbourg as the EIT at the time when the idea was going through parliament, it would have likely had a negative effect on the whole proposal. Now that the EIT proposal will be implemented, we have to decide within 24 months where the seat will be. This is why we waited and remained calm about making the case for Strasbourg. I also waited until France had a new government, because Chirac would have been hopeless if he had been presented this idea but Sarkozy is more open-minded. The most important thing, however, is to turn Strasbourg into 'Science-bourg', to make it not only the seat of the EIT, but also of the European Research Council (ERC). There is also at the moment an idea of a university of Europe, which is a private initiative but which could become European. Strasbourg has the potential to attract researchers from all parts of the world to come to Europe. It is important to remember, however, that EIT is simply a framework; now we need to provide the content."

The key challenge, for Chatzimarkakis, is to foster brilliant research within Europe and to keep it there. "We have wonderful universities, it's true, but we have lost this aura, which now exists in MIT and the US, and increasingly in Asia. Recapturing this aura is something we are working on. We need to ask ourselves, where do we Europeans want to go with our research? We're not doing badly in research, in fact we're doing very well. Maybe we don't invest as much money as others do, but the output of ideas is very high. What we need is to bring these researchers back to Europe and to implement the ideas here."

Chatzimarkakis also has his own personal aspirations for the future of research in the EU. "I have a vision of turning Europe into the leading 'biozone' of the world. A zone where life is respected more than anywhere else in the world. We have excellent preconditions to achieve this, because we have a high standard of democracy here. We have the best transparency in the world. Everybody can come to our committees. We also have the highest standard of the rule of law and respect of human rights.

Guantanamo bay, for example, shows us that in other parts of the world, human rights are not respected as much as they are here. We have very high environmental standards. These features mean that we are perfectly set up to aim for this vision. Admittedly, maintaining these standards means that the decision-making processes are slower, and so we lose competitiveness, but this will change as the things that are required for sustaining life become increasingly important. For this, of course, we will need high standards of research, and learn how to combine our research efforts with this vision of a Europe with the highest respect for life." ★

Fluresist.eu

Research to the survival of influenza viruses in poultry commodities, poultry manure and the environment.

Avian influenza outbreaks have caused severe losses to the poultry industry and its stakeholders. In addition, the ongoing Asian H5N1 outbreak is a serious concern for food security and human health world wide. It is estimated that since 2000, 200 million birds have died or were culled following infection with influenza viruses subtypes H5 or H7. Importantly, human infections have been reported in infected regions instigating the fear of a new human pandemic.

Evidence is growing that HPAI H5N1 is not only spreading by trade but is also carried by wild birds. H5N1 infected wild birds in the European Union extend our consciousness that this subtype is becoming more and more endemic in wild birds. The finding of a cat and stone marten and raptors that died as result of infection with H5N1 uncovered the consequences of this development. The fact that little is known about the virus resistance in the environment and transmission modes makes it difficult to explain the infection dynamics, the route of entry and transmission.

More questions are raised about the risk of contamination of surface water and the environment for the health of other animals and humans. To answer these questions and to be able to assess risks involved in trading in poultry commodities and litter more knowledge about virus content of commodities of infected poultry, the stability of the virus in these products, in litter and the environment is needed.

The aim of our research is to provide knowledge to enable proper risk assessment of trade in treated and fresh poultry commodities and litter. Moreover, it will provide knowledge about virus survival under different physical conditions.

More information can be found on the website

www.fluresist.eu

21/22
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