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EDITORIAL

Preparing for the next pandemic

With the H1N1 vaccination campaign now in full swing throughout the EU, one assumes that people would be rushing to the vaccination centres — far from it. A substantial number of citizens are staying away from health centres, practices and hospitals, refusing to get their flu shots. This does come as a surprise. Fears of a worldwide killer pandemic were raised very early on by a number of experts, including those in the World Health Organization (WHO).



However, the deadly outbreak failed to materialise, with the overwhelming majority of infected patients merely going through the normal symptoms of the regular flu. Nevertheless, the efforts of the research community have not been in vain. Faced with one of the first global viral disasters of the 21st century, researchers have had the unique opportunity of testing the world's retaliatory arsenal on the grandest possible scale — and succeeded.

The first section on biology and medicine opens up with an article on the Europroc project dedicated to studying the development of cystic fibrosis. Researchers hoped to get a panoramic view of the complex molecular interrelationships that characterise cystic fibrosis by identifying the key role of certain proteins.

The lead article in the energy section presents the Metrol project, a European initiative established to study the presence of methane — an important greenhouse gas — in selected ocean margin sediments. Ultimately, the project aimed to reduce the environmental impact of drilling and facilitate the construction of pipelines.

The environment section begins with an article on the Access project, whose aim was to develop strategies to minimise the levels of certain herbicides in soils. Data collected during the project could then be incorporated into the actual design of farming practices to reduce soil pollution.

The Benogo project is highlighted in the opening article of the IT and telecommunications section. The goal of this project was to develop a novel visualisation technology, giving an observer the advantage of a virtual sense of presence in an environment which simulates actually being there. The results of the project can be used to better understand how human imperfections in vision can be manipulated in the creation of virtual realities.

Illustrating the everlasting quest for the minimisation of materials, the industrial technologies section begins with an article on the Nanomat project. Researchers working on this project have delivered a structure capable of lasing at a minuscule level. Results have already been incorporated into a prototype laser diode that may be at the heart of tomorrow's optical communication networks and high-speed data recording systems.

The events section offers a non-exhaustive overview of upcoming event announcements in the field of research.

Comments and suggestions on this supplement and on the *research*eu publications* in general are always welcome. Please address them to: research-eu-supplements@publications.europa.eu. We are looking forward to hearing from you.

The editorial team

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Differentiating the role of cystic fibrosis proteins

Cystic fibrosis (CF) is the most common monogenic lethal disease in all European countries. Research into the nature and role of the proteins involved in this disease have revealed new insight into the associated pathways and mechanisms.

Previous studies have shown that the main gene involved in CF, cystic fibrosis transmembrane conductance regulator (CFTR), transcribes a protein with multiple roles in a web of interconnecting pathways. As a result, many genetic, pharmacological and environmental factors affect the severity of this disorder.

Scientists in the Europrof project honed in on the most common mutation within the CFTR gene, F508. Changes in gene sequence in this region prevent the encoded protein from reaching the apical membrane of epithelial cells and fulfilling its ultimate role. Changes in protein profiles in CF and control cells were studied to elucidate the mechanisms responsible for the dysfunction of the CFTR protein.



Both HeLa and nasal polyp cell cultures were used to compare proteins from the wild type and mutated cells. Screening using 2-D gel strongly implicated members of the keratin protein family as being responsible for the loss of function and consequent degradation of CFTR. Low-temperature treatment and small interfering RNA (siRNA) silencing confirmed the importance of these cytoskeletal proteins.

Application of a blue native sodium dodecyl sulphate polyacrylamide gel electrophoresis (BN/SDS-PAGE) protocol overcame the limitations of 2-D gel screening. This then allowed proteomic investigation in the membrane compartment. Once at the apical membrane, the CFTR protein enables the production of mucus from goblet cells in exocrine glands. The scientists found that expression of a particular calcium activated channel, mCICA3, was significantly reduced in colon and lung cells of double negative CFTR mice.

Adding to the complexity of the situation, CF pathophysiology cannot be explained by malfunction of CFTR alone. The team investigated the abnormal inflammatory response evident in mouse colon, pancreas and lung and found that the anti-inflammatory protein annexin A1 was absent in double recessive CF individuals. This suggests that absence of annexin A1 worsens the expression of the CF phenotype.

Identification of key roles of this multifunctional transmembrane protein can lead to the elucidation of interlinked pathways affecting its maturation and ion gate function. A proteomics approach promises to yield a panoramic view of the complex molecular interrelationships that characterise cystic fibrosis.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: information exchange/training.

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Special biochip detects endocrine disrupting compounds

A highly specialised biosensor developed with European expertise can detect extremely low concentrations of harmful pollutants present in the environment.

One of the objectives of the 'Life quality' programme was to fund research and technological development (RTD) projects aiming to improve the quality of life of Europe's citizens through biotechnology. The Mendos project, which sought to develop biosensors to measure levels of endocrine disrupting compounds (EDCs), is one such example.

Scientists with ARC Seibersdorf research GmbH in Austria contributed by developing

a hydrophobic biochip capable of detecting modified oligonucleotides. It was constructed from an epoxy resin and PST-co-VBT (ARChip Epoxy and ARChip UV respectively).

The Austrian scientists dedicated considerable effort to maximise the performance of the biosensor. For example, by increasing the pH of the print buffer, they managed to boost the signal strength by a factor of 20. In addition, the energy density of the UV lamp used

for photoactivation was upgraded in order to enhance immobilisation capacity. Blocking with ethanolamine also helped limit interference from fluorescence from other species.

Trials during Mendos revealed that the biochip was able to detect concentrations of SH- and NH₂-modified oligonucleotides as low as two micromoles per litre. ARC Seibersdorf research GmbH is looking to exploit the results of the Mendos project to help improve management of EDCs.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: information exchange/training.

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Frequent acronyms

ERA	European research area	ICT	information and communication technologies
FP5/6/7	Fifth/Sixth/Seventh Framework Programme of the European Community for research, technological development and demonstration activities	IST	information society technologies
		R & D	research and development
		SMEs	small and medium-sized enterprises

Glowing beads identify endocrine disruptors

ARC Seibersdorf research GmbH in Austria led the development of an effective, inexpensive biosensor capable of detecting endocrine disrupting compounds (EDCs) in water samples.

EDCs have arisen as yet another chemical threat to both wildlife and humans. They are produced from a number of anthropogenic sources, for example pesticides from agriculture. Research supported by the 'Life quality' programme aimed to develop biosensors to improve detection of EDCs in the environment.

Biosensors incorporate biological and inorganic components into a single device. In the case of the Mendos project, yeast cells were immo-

bilised in hydrogel beads. The group experimented with different material combinations. While polyvinyl alcohol (PVA)-based hydrogels boasted higher luminescence and sensitivity values, alginate versions were selected due to ease of counting yeast colonies.

Volume ratios and induction times were subsequently optimised for alginate hydrogels. Yeast cultivation was very fast and could be stored for long periods of time

without degradation. Efforts to boost luminescence with coenzyme A (CoA) were made, but require further study due to the complexity of the system.

Finally, the new biosensor was subjected to water samples contaminated by EDCs, which it was able to successfully identify. In comparison with conventional detection methods, the biosensor offers speed, robustness, a long shelf life and lower costs. The Mendos research consortium therefore recommends it for use as an EDC screening tool for water samples.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: information exchange/training.

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Markers for oestrogen in zebra fish

*Zebra fish (*Danio rerio*) are often used in scientific research as a vertebrate model organism. Researchers investigating environmental exposure to endocrine disrupting chemicals (EDCs) used transgenic zebra fish to establish green fluorescent protein (GFP) as a marker for oestrogen exposure.*

The EDEN project was an interdisciplinary effort which studied the effect of environmental exposure to EDCs on human beings and wildlife. The Europe-wide consortium investigated the mechanisms underlying the actions of EDCs in order to evaluate experimental models for wildlife and human hazard assessments. Researchers also developed biomarkers for the early detection of effects.

Scientists from the EDEN consortium attempted to produce an oestrogen marker in transgenic zebra fish using an oestrogen responsive promoter connected to the GFP gene. The presence of the transgene in 50 % or more of the Filial 2 (F2) generation indi-

cated germline transmission of the transgene, allowing the line to be established.

The EDEN researchers identified factors which played key roles in the production of transgenic fish. The first was the number of eggs injected, since the greater the number of eggs injected, the greater the chance of creating a viable transgenic line. The second factor was the amount of time spent raising and screening the offspring. Rearing fish until they are of breeding age required a major commitment of time and money.

A batch of eggs took four to six months to reach sexual maturity, once they have been injected with the transgene. Screening was

then carried out to determine whether the transgene had been passed on to the next generation. A minimum of three generations, about 18 months, was required in total to determine if the transgene had been successfully integrated into the germline.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

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Risk presented by combination of endocrine disruptors

Guidelines for determining the threat associated with simultaneous exposure to multiple endocrine disrupting chemicals were established during the EDEN project.

Toxicologists with the University of London in the United Kingdom led a consortium of over 20 organisations during the EU-funded EDEN project. The goal was to improve our ability to assess the risks associated with endocrine disrupting chemicals (EDCs).

While the response of humans and wildlife to several individual EDCs is well documented, the combined effect of EDC mixtures upon these two populations is not well understood. It has been shown, in fact, that even when present at low concentrations that do not

produce observable effects, certain EDCs can cause harm when the subject comes into contact with other EDCs at the same time.

The scientists involved in EDEN took a comprehensive look at this problem and identified a number of key issues that need to be resolved. One of the main challenges is a lack of data for EDC mixture effects derived from population-specific, process-specific and product-specific studies.

The research consortium assessed the various advantages and limitations of dif-

ferent approaches to evaluating EDC mixtures. The types of testing evaluated included: whole mixtures, reconstituted laboratory mixtures as well as mechanistic approaches.

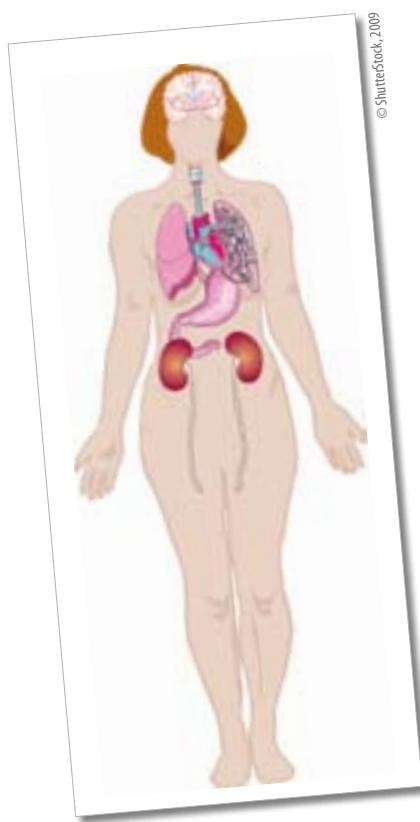
With respect to a quantitative method concerning the various types of mixture effects: additivity, synergism or antagonism, two possibilities were identified. The two types, dose addition (DA) and independent action (IA) have been shown to produce similar results for ecotoxicology studies. Furthermore, given its less demanding data requirements, the EDEN consortium proposed the use of the DA protocol.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

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Critical low doses of endocrine chemicals

As research continues, the fine details of adverse effects of endocrine disrupting chemicals are being confirmed. Researchers have investigated the means by which the effects of low-dose levels of these compounds can be best determined.



Studies show that reduction in fertility, reproductive tract abnormalities, skewed male/female ratios and foetus loss are just some of the effects that can be attributed to the action of endocrine disrupting chemicals (EDCs). Despite exhaustive studies on dose effects however, those involving low concentrations of many EDCs remain unclear.

As one of its main objectives, the EDEN project aimed to produce data on the low dose effects of EDCs that are relevant to hazard and risk assessment. At the University of London project partners analysed different testing and statistical methods in order to formulate an overall approach to the tricky problem of low dose effects.

Extensive low-dose studies using the stickleback, zebrafish and rat revealed that many low dose estimates had very small numerical values due to dose response curves with small gradients. High statistical power is required in these cases and resources are not always available for in vivo testing necessary to arrive at valid estimates. The concern then is that small size effects may not be identified.

The vast amount of data collected showed that on no account should the no observed effect level (NOEL) be equated with zero effects. For the EDCs under test, a wide range of dose response curves were plotted. No one model could be used for all EDCs and it was decided that the most appropriate must be selected from a pool of regression analyses.

Recommended overall was a combination of hypothesis testing using a large number of replicates together with regression analysis that should replace NOEL. This approach enables the use of statistical power and detection limits as the basis of testing protocols. However, the scientists pointed out that the required effect of a low dose should be defined in advance of low dose testing strategies.

Provided changes in toxicological testing are implemented, the constraints on low-dose testing should be considerably lessened by implementation of these recommendations. Improved results of exposure assessment will help the refinement of testing guidelines and risk assessment procedures for both humans and wildlife.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

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are the implicated effects of DBP from this study. Further research was planned to further elucidate the effects of this endocrine disruptor.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

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Hormonal effects of dibutyl phthalate

Scientists have developed an assay for insulin-like 3 (Insl3) in rats and measured levels of this hormone after exposure to the endocrine disruptor dibutyl phthalate (DBP). The role of Insl3 in sexual development was also studied.

The protein Insl3 is produced in the Leydig cells in gonadal tissue of vertebrates. It is thought to play an important role in the development of the urogenital tract and differentiation of the gubernaculum, important in testes descent.

To ascertain the effect of DBP at various stages of sexual development of the rat, an effective assay had to be developed. The EDEN project team at the MRC Human Reproductive Sciences Unit in Edinburgh tested several antisera for the development of an appropriate enzyme-linked immunosorbent assay (ELISA). After optimising buffer and incubation conditions, an antiserum produced from genetic immunisation of rabbits proved to have sufficient binding value and sensitivity.

Serum was taken from normal female and male rats as controls and compared with castrated male rats (no Insl3). Blood samples were collected from rats treated with DBP and control male rats. The castrated

rats allowed more accurate measurements as Insl3 free serum can be spiked to produce calibration curves in the same matrix as the sample under observation.

Two main results emerged from the ELISAs, both relevant to the action of EDCs. First, as regards the role of Insl3, there was an increase in the hormone at puberty, declining in adulthood although its presence indicates a function in the sexually mature rat. Furthermore, adult rats have ten times more blood Insl3 than humans.

Secondly, there was a dramatic reduction in blood Insl3 concentration after exposure to DBP in utero and this was independent of the stage of testicular development. Obstruction of the Leydig cells and possibly general testis function extending beyond puberty



Markers lead to better bean breeding

One of the most economically important diseases of the faba bean, rust, can cause major crop losses. Researchers from the EU-funded project Eufaba have identified genetic markers linked to a resistance gene.

The plant pathogen *Uromyces viciae-fabae* is the causative agent for rust in the bean *Vicia faba*, commonly known as the broad bean. The legume is grown globally and is an important fodder crop which can also be used as a vegetable with a range of culinary uses. Severe infection by rust can cause extensive defoliation resulting in bean yield reduction.

The most sustainable means of control is through the use of resistant varieties. Scientists from the project Eufaba investigated the genetics of one type of incomplete resistance and identified markers for the locus involved.

Resistance mechanisms rely on host-pathogen interactions. The team at the Centro IFAPA Alameda del Obispo in Córdoba investigated one type of hypersensitive resistance where timing of necrosis of the host tissue results in a reduction of the infection.

Analysis of the Filial 2 (F2) generation of a cross between a hypersensitive and a sus-

ceptible strain confirmed the monogenic inheritance of this type of resistance. Moreover, linkage of random amplified polymorphic DNA (RAPD) markers identified by bulk segregant analysis was confirmed by screening F2 progeny segregating for resistance.

As an integral part of any breeding programme, the use of genetic markers is paramount. The team succeeded in identifying three markers on the same chromosome as the resistance gene and two additional markers on the homologous member of the chromosome pair in question.

Concentrating on one of the markers in coupling phase, transformation into a sequence characterised amplified region (SCAR) marker enabled the scientists to obtain a complete association between the marker and the resistant genotypes.

Due to issues concerning health and safety, vegetable crops high in protein have gained in popularity when compared with animal sources. Identification of markers closely linked to disease resistance genes will accelerate the goal to improve varieties. Disease resistance and other characteristics such as tolerance of adverse environmental conditions are among the main breeding objectives.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: information exchange/training.

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Low vicine and convicine content in faba beans

Researchers used cleavage amplified polymorphism (CAP) markers to select low levels of antinutritional factors (ANF) in the faba bean, Vicia faba.

Faba beans contain vicine and convicine (v-c), which hinder their wider utilisation as a food and feed crop. This is because the glycosides v-c cause the disease favism in people who have a hereditary loss of the enzyme glucose-6-phosphate dehydrogenase in their red blood cells.

Susceptible individuals are exposed to the disease either by inhaling pollen from the flow-

ers of the faba bean or by eating the beans. This causes haemolytic crises where the red blood cells break open, releasing haemoglobin into the surrounding fluid. Vicine and convicine can also cause reduced animal performance and low egg production in laying hens when the beans are fed to livestock.

The discovery of the spontaneous mutant allele named vc-, which can reduce v-c content by 20 times, can allow faba beans to be used more widely. However, this is hampered by high cost and difficulty in the chemical detection of v-c, which seriously limits advances in breeding selection.

The Eufaba project identified random amplified polymorphic DNA (RAPD) markers linked to the v-c gene.

Researchers analysed a Filial 2 (F2) population derived from a cross between a line possessing high v-c content and a vc- genotype. Scientists used bulked segregant analysis (BSA) to identify two RAPD markers linked to the vc- allele. These were then further converted into sequence characterised amplified regions (SCARs) although the initial polymorphism, or genetic variation, between pools was lost on amplification.

Researchers explored a number of techniques for recovering the polymorphisms. These included restriction digestion with selected enzymes which showed distinct differences between the parental lines. The two CAP markers were used simultaneously to enable accurate genetic fingerprinting of faba bean plants. This was employed during breeding selection to efficiently track the incorporation of the vc- allele into the gene pool. The result was the development of cultivars with low levels of v-c and improved nutritional value.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support; licence agreement; information exchange/training.

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Shining light on molecular shuttles

Nature provides living organisms with a wealth of molecular machines from moving muscles in the human body to photosynthesising plant's food from sunlight. The Mechmol project partners were interested in developing simpler, fully artificial structures that operate through the same mechanisms.

Mechanically interlocked molecules that can convert light received from an external source into biased Brownian motion are promising candidates for transporting macroscopic cargos. Such artificial molecular machines could, in the near future, control the movement of drugs around the human body so that they reach the exact point where they are needed.

Furthermore, they could be employed in smart materials that could change their size or electrical conductivity at the flick of a switch. The design, synthesis and investigation of chemical systems able to function as molecular machines is therefore of interest not only for basic research, but also for the advancement of nanotechnology.

Years of research have enabled Mechmol project partners from the University of Edinburgh to gain an unprecedented degree of control over the way molecular machines can be built. They have developed a technique for covering a gold surface with a single layer of rotaxane molecules — organic molecules consisting of a straight backbone and an encircling ring.

Transport of a liquid droplet of a few microlitres was achieved by using the biased Brownian motion of rotaxanes to expose or conceal fluoroalkane residues and thereby modify surface properties. The light-responsive surface was irradiated with a beam of ultraviolet light, focused on one side of the droplet; this created a gradient in the surface properties across the droplet.

The light-responsive surface was proven to be stable and could be used repeatedly for transport experiments with the same results even after several minutes of ultraviolet irradiation. Nevertheless, whether photochemical reactions, rather than just the shuttling of fluorinated rotaxanes, might be contributing to the observed phenomena was investigated.

Freshly prepared samples were exposed to ultraviolet light with wavelengths longer than 240 nm for different periods of time and the oxidation of sulphur was monitored by means of fluorescence spectroscopy. The first signs of degrad-

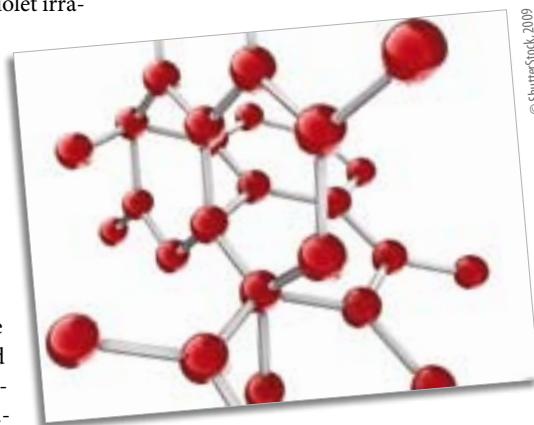
ation could be identified with confidence only after 15 minutes of continued radiation, indicating that transport experiments should be carried out in this time frame.

These chemical systems are already viewed as a prototype for how molecular machines may be driven. The applications envisaged include using the change in the position of its subunits as a minuscule switch to vary physical properties such as fluorescence.

Funded under the FP5 programme IST (User-friendly information society).

Collaboration sought: information exchange/training.

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Cell penetrating peptides deliver the goods

An efficient delivery system is required to transport functional biological cargo for the purposes of gene therapy. European scientists have studied a range of cell penetrating peptides (CPPs) as carriers and gauged their effectiveness in terms of uptake efficiency and cytotoxicity.

Despite the hope that viral vector systems would be the most efficient vehicles for cargo delivery into cells, researchers have encountered various setbacks. In trying to develop suitable and safe systems, disadvantages have arisen including the possibility of

mutagenesis of the virus and host immune responses. In response to this pressure on the direction of research, members of the project consortium CPP studied cell penetrating peptides as an alternative to viral vector systems.

standing carriers. These were transactivator of transcription (TAT) and antennapedia which, as the name suggests, controls the placement of legs in arthropods.

Furthermore, the delivery of single strand RNA (siRNA) antisense material using TAT and antennapedia was successful both in *in vitro* and *in vivo* systems. Using *in vitro* human cell lines, knockdown by as much as 80 % was achieved using a TAT-siRNA conjugate against a protein activated kinase involved in shock response. *In vivo*, knockdown of 40 % for the same kinase was achieved in mouse lung cells.

The development of CPPs to be used as vectors is an important part of the new generation of therapeutics. Because of their potential specificity, unpleasant unnecessary side effects could be avoided. Selective tissue and cell delivery has obvious benefits for cancer treatment as well in the field of diagnostic agents.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: information exchange/training.

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Cell cargo delivery efficiency determined

The future for cell penetrating peptides (CPPs) as vehicles for biomolecular cargo into cells looks promising. Researchers in the EU-funded project CPP have used site-specific recombinase activity to screen the effectiveness of these vectors.

Research into non-viral alternatives for the delivery of cargo molecules into cells for intracellular biological activity has uncovered a large number of peptides that have vector potential. The need therefore for advanced high-throughput mass screening procedures to assess their precise CPP activity has increased.

Consortium members at the École normale supérieure in Paris focused on the development of screening protocols to evaluate the most efficient CPPs for intracellular

protein delivery. In order to achieve the required level of quantitative assessment the team of scientists used two approaches, one *in vitro* and the other *in vivo*, as the basis for the tests.

In an engineered stable cell line, the enzyme Cre recombinase was added exogenously and used as the cargo with the CPP under scrutiny as the vector. The intracellular activity of the Cre recombinase was then evaluated accurately as it brings about the expression of a reporter protein, beta-galactosidase.

The other strand to the research yielded a more physiologically relevant setup using explanted mouse embryo brain culture. The actual cellular tropism of a range of Cre-CPP fusion proteins could therefore be assessed.

The researchers expected to be able to improve on the screening procedure by small scale production of the recombinant proteins. The development of a vast collection of validated highly specific cell delivery systems holds huge potential in the field of gene therapy.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

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Accelerated genetic improvement for the sea bass

The European sea bass is reared extensively in Mediterranean aquaculture. Researchers have compiled an extensive DNA sequence library and genetic maps as tools for the genetic improvement of the species.

Production of sea bass has increased steadily in the last two decades but attention to breeding of the species had been neglected. To reverse this trend, the Bassmap project coordinated a genomic study of the sea bass on a huge scale. Experts from the fields of breeding, genetics and bioinformatics were brought together to apply the principles long practised in agriculture to the developing aquaculture industry.

To supply the information for mapping and sequences for libraries, a breeding programme for a test panel of parents and their progeny from reference families was devised. Throughout the project, teamwork and cooperation were fostered to speed up the acquisition of information and genetic material.

To improve knowledge of inheritance, different mapping approaches were implemented. The resulting synergy from the various techniques was then used to track selected traits in the breeding strategies and to harvest sequences for the genetic libraries under construction. Synteny and medium density linkage maps were produced using microsatellite markers and amplified fragment length polymorphisms.

Collaboration came to the fore in the construction of the libraries and databases. A bacterial artificial chromosome (BAC) library consisting of 69 000 clones was prepared and is available for microarrays and clones. This comprehensive library will be able to support future mapping and comparative genomic research.

Applications for this research are very wide-ranging. The use of libraries and maps as tools can help steer the evolution of sea bass populations for more effective management of stocks and higher productivity. Overall, it forms the basis for accelerated development of expertise in this socially and economically important sector.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

[> search > offers > 5154](http://cordis.europa.eu/marketplace)



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Temperature tolerance impacts sense of space in cod

An in-depth assessment was conducted which covered the impact that environmental factors such as temperature range have on the spatial distribution of cod.

The primary goal of the Codyssey project was to assess the value of previous management methods for protecting cod stocks. In order to achieve this goal, a better understanding of the horizontal and vertical movements of cod was necessary. Additionally, environmental impacts needed to be considered so that improvements could be made in terms of predicting individual movements and seasonal distribution of cod stocks.

In light of this, an assessment was conducted to measure the influence of environmental characteristics on cod spatial dynamics. Results indicated that individual cod are adaptable to temperature changes. Nevertheless they react in a manner which lowers thermal stress, making them incapable of enduring sudden shifts in temperature. The findings were important in comprehending cod biology since they imply that wild cod has a significantly higher thermal tolerance than was considered in laboratory studies.

A broad assessment of thermal and anoxic tolerance of cod as well as the evaluation of their habitats has proven to be a clear indicator that cod can adapt to a wider range of environmental conditions than what was initially believed. This ability can be useful in the case of a human-induced environmental shift creating the possibility of stock recovery, provided fishing mortality is controlled and the entry of young cod into populations is maintained at past levels.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

[> search > offers > 4938](http://cordis.europa.eu/marketplace)

See also page 27 (Insights into the chaotic patterns of cod movements)

Improving accuracy in cod stock management

The success of stock management in protecting cod stocks hinges on the reliability of the methodology it uses. European researchers assessed the use of the model of virtual population assessment and its hypotheses and found them to be too limited, various recommendations ensued.

The Codyssey project dealt with designing and implementing a method for predicting individual movements and seasonal distribution of cod stocks in European waters. This was done in order to improve upon existing understanding of horizontal and vertical movements of cod and how environmental factors affect them. The ultimate aim was to use these results in order to be able to assess existing protection measures applied to cod stocks and in so doing help fisheries to become more sustainable.

This part of the project, which was led by researchers at the Centre for the Environ-

ment, Fisheries and Aquaculture Science, Lowestoft in the United Kingdom. It concerned itself with evaluating hypotheses which form the basis for stock management procedures.

Virtual population assessment methodology is widely used to assess and manage cod stocks. The researchers argued that this method, when unmodified does not go far enough in its evaluation. Stock hypotheses and model assumptions were reviewed in each ecosystem and tested against the observations made in the Codyssey project.

Their results showed that the catchability of cod critically depends upon the type of ecosystem, the season and the migratory strategy in place. These factors, the scientists argued, have significant consequences for the relative mortality of different stock components.

The researchers recommended that stock assessments take more account of population movements and their consequences on abundance, sub-population identity and mixing.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support; venture capital/spin-off funding.

[> search > offers > 4796](http://cordis.europa.eu/marketplace)

Abnormalities in larval rearing of Atlantic halibut

*The Atlantic halibut (*Hippoglossus hippoglossus*) is highly prized both for its great size and for its tasty white flesh; however wild stocks are under pressure. As a result, the European aquaculture industry has sought to commercially farm the species although the occurrence of deformities during larval rearing has become a cause for concern.*

The problem of abnormalities is not limited to Atlantic halibut, which are used as a model species to answer key questions regarding metamorphosis in cultured marine flatfish. The AARDE consortium used both normal and abnormal larvae to identify suitable markers for characterising the successful progress of metamorphosis.

Scientists examined stages five to eight in the larvae's development, which were then correlated with age, size and myotome height. A linear relationship was found between the growth stage and both myotome height and standard

length. The use of these markers during metamorphosis, especially myotome height, helped standardise sampling and analysis. By stage eight the development of the juvenile halibut appeared fixed. Abnormal, arrested or delayed metamorphosis were identified through the incorrect position of the anterior fin, incomplete eye migration, a malformed head and abnormal pigmentation.

Normal and abnormal fish, ranging from the least to the most developed stages, were analysed in order to establish the events involved in eye migration. Sections of the head of each speci-

men were carefully examined to identify morphological landmarks. Normal and abnormal larvae were examined for osteoclast activity.

Osteoclasts were identified using tartrate-resistant acid phosphatase (TRAP). Sample sections were stained and TRAP activity measured using stereology, which enabled three-dimensional information to be gained from a two-dimensional image. Cell activity in the neurocranium was determined through immunocytochemistry, by using anti-proliferating cell nuclear antigen (anti-PCNA). The anti-PCNA was used on sample sections adjacent to those used for analysing osteoclastic activity. Results indicated that osteoclast activity was controlled by tissue to tissue communication from the eye.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

[> search > offers > 5164](http://cordis.europa.eu/marketplace)

Hope for winter wheat blight eradication

An artificial inoculation method for winter wheat was tested in the hope of finding solutions for a common grain attacking disease brought on by a residue borne fungus.

Fusarium head blight (FHB) is a disease which commonly attacks wheat crops contaminating them with dangerous mycotoxins which are detrimental to human and animal health. Diseased kernels are shrivelled and lower in weight. Consequently this also results in excessive yield loss for farmers and economic loss for the cereal industry.

In an effort to alleviate the problem, the Fucomyr project developed new selection methods. These included molecular markers for resistance genes and in vitro selection strategies for resistant germplasm. Over 100 varieties of winter wheat

were used to test an artificial inoculation method which was done by spraying directly on the heads of the plant during anthesis (flowering period).

Assessments of the applications were recorded and yearly scores were calculated in order for data from years and locations to be compared. The obtained information is available for interested breeders and breeding companies so that new genotypes resistant to FHB can be selected. As a result, these efforts can help support sustainable cereal production and competitively boost the cereal industry.



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Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

[> search > offers > 5163](http://cordis.europa.eu/marketplace)

Understanding information uptake for organic farming

The adoption of organic farming has been somewhat slow in certain regions and an EU-funded research and development project IDARI, has investigated means to accelerate and encourage its wider acceptance.

The approach to this issue has been comprehensive, looking at both the factors hindering uptake, and means in which implementation can be best encouraged. By educating farmers in the advantages of organic agriculture and through innovation management, the project hopes to encourage a bottom-up approach to the broader acceptance of organic farming. More importantly, IDARI also looked at the factors responsible for its

slow accession, and means by which these factors could be addressed.

In part, economic factors such as the lack of market development or the implementation of delivery support infrastructure have been largely absent. Rural development policy frameworks, it was found, remain the most distinctive manner in which to develop successful market potential. Embedding a

strong active policy framework that promotes integrated rural development would therefore, prove to be highly advantageous.

Despite the rising demand for organic products in western Europe, which could serve as a pull factor in Hungary, only large farms responded. The study also revealed that without a broader vision for an integrated implementation, future diffusion will remain on the agri-environmental level and will fail to activate all the various stakeholders involved.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: information exchange/training.

[> search > offers > 4755](http://cordis.europa.eu/marketplace)

Healthier cheese makes for a healthier heart

It has long been known that our diet directly impacts upon our health. Researchers at an Italian university propose increasing the content of a particular fatty acid in cheese in order to help fight heart and other disease.

The EU has supported extensive research aimed at improving the health and well-being of Europe's citizens. For example,



everyday foods can be enhanced to provide specific health benefits. These so-called functional foods are produced by boosting the content of specific ingredients or by incorporating supplements.

The Biocla project investigated the potential of conjugated linoleic acid (CLA), a fatty acid common in many dairy products that exhibits significant anticarcinogenic and antiatherogenic properties. Scientists with the Università degli Studi di Cagliari (UCDBS), a Biocla participant from Italy, focused their attention on a specific isomer of CLA: cis-9, trans-11 (c9,t11) CLA.

The question they wanted to answer was whether raising the c9,t11 CLA content of cheese would result in increased levels

of c9,t11 CLA and its metabolites in the bloodstream following consumption. They tested their hypothesis by quadrupling the naturally occurring levels of c9,t11 CLA in cheese made from cow's milk and feeding 50 g servings to a test group on a daily basis.

Subsequent blood tests revealed significantly elevated levels of c9,t11 CLA and its metabolites. Further to its analysis of the data, UCDBS recommends a two percent c9,t11 CLA content in cow's cheese to achieve the desired effect. It is hoped that consumption of this cheese could contribute to reducing the incidence of cardiovascular events as well as certain cancers in the general population.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

[> search > offers > 5123](http://cordis.europa.eu/marketplace)

Enriched milk fights diet related diseases

Scientists at the Scottish Agricultural College supported by the EU conducted demonstration trials that would allow dairy farmers to produce milk with improved fatty acid content, which has been proved to contain several health promoting attributes.

The scientists carried out tests in order to ascertain how the diets and management of dairy cows should be formulated in order to improve milk fat content. Various techniques were found to result in healthier milk rich in polyunsaturated fatty acids. The team explored various methods, such as modifying pasture management, forage conservation systems and the use of particular feed supplements. Each of these systems was tested extensively, in one case for a continuous period of two years.

This was part of the EU-funded Biocla project, which tested the health promoting attributes of fatty acids found in milk, particularly conjugated linoleic acid (CLA). The researchers conducted human nutrition studies on volunteers and found there to be solid grounds for the development of dairy-based functional foods enriched in CLA.

This part of the study was based on a detailed understanding of the biochemical and physiological mechanisms underlying changes in the bovine milk. The improved milk fat was

characterised by having a higher content of omega-3 fatty acids and cis-9, trans-11 (c9,t11) CLA and a lower content of saturated fatty acids. The scientists were able to identify diets or feed ingredients that alter lipid metabolism in the rumen of the animal and so enhance the amounts of trans-11 C18:1 for endogenous conversion to c9,t11 CLA.

This research elucidated the optimum strategies for delivering CLA enriched bovine milk. It also emphasised the need for tailoring each of the strategies according to the local dairy system.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: information exchange/training.

[> search > offers > 5151](http://cordis.europa.eu/marketplace)

Selecting the ideal cut of meat

Breeding for increased meat yield has been highly successful but, by comparison, selection for meat quality has largely been ignored up until the last decade. Accordingly, researchers from an EU-funded project have endeavoured to improve meat quality using genetic technology and breeding programmes.

The discerning consumer demands not only value for money but also the best possible meat quality. Previous breeding initiatives have mainly focused on yield. Much of the variation in quality observed on the supermarket shelf is the result of environmental factors despite the fact that meat quality has a substantial genetic basis.

The physical factors that determine meat quality include fatty acid content, fat distribution and muscle fibre type. The Gemqual project aimed to identify the genetic component of traits involved in a prime joint of beef. Partners also aimed to identify the contribution of genes and quantitative trait loci (QTL) using single nucleotide polymorphisms (SNPs) identified as markers.

Project partners at the Roslin Institute in Scotland identified candidate genes that were thought to be involved in muscle development or composition. Sources of information used to compile the list varied from genomic studies to muscle science and cell biology.

The numbers of genes isolated give an indication of the success of this research. In total, more than 500 genes with a potential impact on meat quality were identified. Of these, it was possible to create primers numbering the days in the year — 365. This then facilitated quantitative analysis as regards the expression of the genes and a search for polymorphisms.

Altogether, over 700 SNPs were identified from 208 key genes. The number of multiple alleles per gene varied greatly. Although around half the genes had no variants at all, there were as many as 27 for at least one of the genes.

Applications for the results of this study are



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far-reaching. The most obvious is to use the SNPs to investigate the role of genes in meat quality traits thereby facilitating breeding programmes for better meat. The markers can also be used to track beef products through the food chain. The team of scientists planned to make the markers publicly available for related research initiatives.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

[> search > offers > 5124](http://cordis.europa.eu/marketplace)

Diversity database helps conserve rare pig breeds

An extensive pig diversity database of European and Chinese breeds has been set up. This provides comprehensive data about genetic variation within and between the breeds.

Preservation of genetic resources is high on the agenda for ecologists and geneticists alike. The thrust for biodiversity is not solely confined to academic circles however. For example, the conservation of rare animal breeds has gained strength through the activity of traditional meat marketing companies. Committed to organising the promotion of the highest quality meat from pedigree British traditional breeds, they are helping to maintain rare genotypes.

Members of the EU-funded project Pigbiodiv2 obtained genetic resources from both Chinese and European pig breeds for comparison. Indigenous Chinese breeds are recognised as an invaluable component of the world's pig genetic resources and so provided a useful barometer of diversity in European stocks.

Maximising the resources collected during the project, consortium members based at the Roslin Institute in Scotland compiled a European pig diversity database. Large White and Landrace, accounting for some 60 % of the total sow herd in Europe, were included amongst rarer breeds. The European wild boar, although not endangered, is represented as the origin of the domestic pig.

The compilation of the library involved the latest genomic technologies. The core of the database consists of microsatellite markers, invaluable for studies of genetic variation. Through amplification using the polymerase chain reaction and high-resolution polyacrylamide gel electrophoresis, the variation in the number of repeats within the microsatellites was determined. Pooled allele frequencies for microsatellite markers and over 1 300 single nucleotide polymorphisms are also available through the database.

This database will help to conserve rarer breeds under particular threat from disease because of small population numbers. Large scale producers stand to benefit with improved meat yields and flavour. At the other end of the scale are cottage industries such as Parma ham producers that depend on certain genotypes. The discerning customer can not only demand tasty meat but can help to power the academic drive for conservation.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: information exchange/training.

[> search > offers > 5133](http://cordis.europa.eu/marketplace)

Good goat diet means healthier milk

Goat's milk has a reputation for being suitable for consumers with an allergy to cow's milk and for making soft cheese like feta. Now, scientists have researched into ways to increase levels of conjugated linoleic acid (CLA) in goat dairy products to produce a highly functional food.

The health benefits of CLA are set to revolutionise the dairy industry's image. As a natural source of these unsaturated fatty



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acids, milk products can now claim to have anti-oxidant and anti-cancer properties with potential for keeping down weight and regulating blood sugars.

Under the umbrella of the EU-funded Biocla project, researchers at the Institut national de la recherche agronomique (INRA) in Saint-Genès-Champanelle investigated how to increase CLAs specifically in goat's milk. Trials were also conducted on the production of milk high in CLA fit to produce cheese and the sensory properties of the cheese.

Three feeding experiments were conducted on different groups of goats during which 16 different diet strategies were assessed. Variables tested for their ability to affect the CLA content of milk included forage, presence of concentrates, vitamin E and linseed oil supplementation.

The response of goats to the feeding regimes was compared with that of cows from other studies. It has been shown in previous trials, for example, that cattle show an unstable CLA response to the effects of forage and or concentrate combined with oils from the sunflower and linseed.

Overall, the goat showed a sustainable and repeatable response to dietary factors. The combination most likely to yield high CLA milk was high forage supplemented with vegetable oil rich in polyunsaturated fatty acids and vitamin E. The milk was also suitable for cheesemaking.

Bearing in mind that goats feed on some of the most marginal land in Europe, the data from this study is good news for rural farmers. Sustainable development of marginal farming land would therefore seem possible especially with the prospect of producing functional food for an expanding market.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

[> search > offers > 5111](http://cordis.europa.eu/marketplace)

Saving Europe's bumblebees from microsporidia

Research performed under the aegis of the Fifth Framework Programme (FP5) attempted to establish genetic markers to facilitate differentiation of species of microsporidia that attack bumblebees.

The bumblebee (*Bombus*) plays a vital role in the pollination of a number of crops and is therefore essential for the success of Europe's agricultural industry. Unfortunately, its health can be compromised when infected by microsporidia, yet little is known about these microscopic parasites.

The objective of the 'Pollinator parasites' project was to fill in the gaps in the current knowledge of microsporidia. One par-

ticipant, the Queen's University of Belfast (QUB) in the United Kingdom, used genetic techniques to investigate microsporidia collected from several different species of bumblebee during the project.

Genetic sequencing of ribosomal ribonucleic acid (rRNA) led to the identification of nearly 60 variable sites from both the small subunit (SSU) and large subunit (LSU), most of which were single nucleotide poly-

morphisms (SNPs). QUB observed a high degree of similarity between the sequences.

Analysis of the internal transcribed spacer (ITS) region using polyacrylamide gel electrophoresis (PAGE) helped improve resolution. However, the discovery of genetic variants obtained from the same bumblebee host further called into question the value of this approach to characterising microsporidia as well as other unicellular organisms. The QUB researchers published their findings in a relevant scientific journal.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

[> search > offers > 5162](http://cordis.europa.eu/marketplace)

Model predicts toxicity of pesticides to honey bees

*Researchers produced an advanced computer model for predicting acute contact toxicity in European honey bees (*Apis mellifera*). The model enables animal experimentation to be reduced by facilitating research on new pesticide formulations.*

Quantitative structure-activity relationship (QSAR) models have played an important role in minimising the number of animals used in toxicity tests. Their use follows the adoption of the new European Commission Regulation on chemicals and their safe use, the system for registration, evaluation and authorisation of chemicals (REACH).

Researchers from the Demetra project developed a combined QSAR model to predict acute contact toxicity in honey bees. This has been built by the combination of two individual QSAR models: a partial least squares and an artificial neural network model. The hybrid model has been implemented into a Java applet, which can be run

as a standalone version or from a web server. The only input required was a description of the molecular properties of the new pesticide being studied.

The combined QSAR model developed by the Demetra consortium reflects the EU's desire to use such models as a viable alternative to animal testing. The aim of the project was to develop a tool that could be used for risk assessment in accordance with EU Directive 91/414. The model was intended to be used by regulatory bodies, non-governmental organisations (NGOs),

continued on page 15

Improved ELISA for coeliac disease patients

The accurate detection of glutenins and gliadins for patients with coeliac disease is a crucial part of management of the condition. Researchers have developed new ELISA-based assays to detect these proteins at very low levels.

Coeliac disease occurs when the two main components of the gluten protein, glutenins and gliadins, cause the development of an auto-immune response in the small intestine. Symptoms include chronic diarrhoea with resultant failure to thrive in young children and deficiency diseases in adults such as anaemia and osteoporosis.

The only effective treatment is the avoidance of the protein culprits in the diet. The EU-funded project CD-CHEF aimed therefore to develop novel means of assay, not only for gliadin, but in the light of recent research, high molecular weight (HMW) glutenins. Project partners at the Universitat Rovira i Virgili in Spain refined the

enzyme-linked immuno-absorbent assay (ELISA) test. The ELISA is based on the detection of an antibody or antigen with the complementary protein. This is then linked to an enzyme that prompts the detection response.

For glutenins, the team isolated HMW and recombinant glutenins as the coating antigen. For the gliadin assay, they developed monoclonal antibodies and alpha gliadin 31-45. The assays are both sensitive to concentrations below one part per billion and have been validated using spiked samples. The gliadin ELISA is capable of detection in wheat, rye, barley and oat with no cross-reactivity to rice and maize.

These adaptations to the ELISA test represent a significant improvement in accuracy. Previously, to estimate the glutenin content, extrapolation of the gliadin concentration by doubling proved inaccurate. Moreover, improvements have also been made for the detection of prolamins in glucose syrup and beer using peptide-tryptic digests.

Commercial exploitation of the ELISA tests was planned and dissemination of information regarding the assay has been achieved at all levels including the website at <http://www.etseq.urv.es/CDCHEF>

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: licence agreement; marketing agreement; available for consultancy.

<http://cordis.europa.eu/marketplace > search > offers > 4781>

Micromodule for detecting coeliac disease toxic gluten

Scientists produced and validated a device for metering, diluting and mixing reagents for the detection of coeliac disease (CD) toxic gluten.

Coeliac disease causes genetically predisposed individuals to develop a small intestinal inflammation following exposure to dietary gluten, a protein found in wheat. Researchers from the CD-CHEF project developed a disposable device which extracted and accurately measured CD-toxic gluten. The team used biosensors to carry out the quantitative determination of gluten concentration in samples of food.

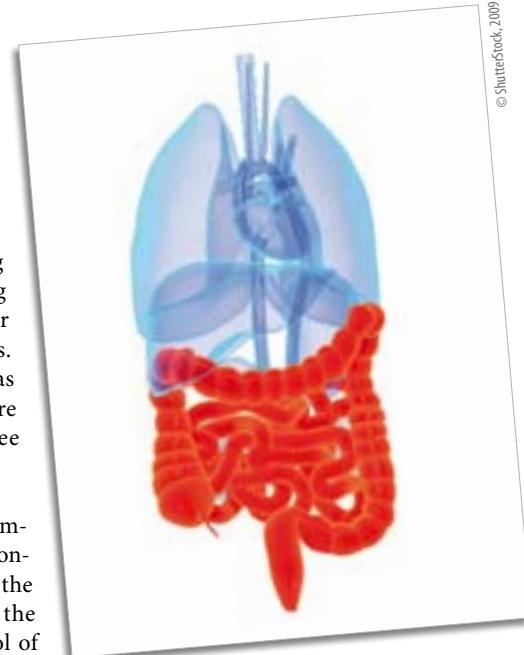
A dilution series was established with the sample being mixed with immobilised antibodies in the detection module. All the reagents used in the assay were stored, metered and distributed to the detection zone. At the end a signal was produced which was detected by optical or electrochemical detectors partially integrated into the chip. A dilution series was needed because the gluten concentration range can cover several orders of magnitude.

The sample was stored in the metering loop and a premeasured amount of dilu-

tion buffer was added before being passed to a mixing chip. Long winding channels were provided for complete mixing of the two fluids. The mixed and diluted sample was returned to the dilution chip where the procedure was repeated three more times.

Reagents were supplied using a combination of three chips. One chip controlled the stored liquids and was the interface to external valves and the syringe pump which aided control of pressure and fluid flow. The reagents did not use the same channels in order to avoid contamination due to molecules sticking to the channel walls.

The most crucial step was the delivery of the second antibody. If it were to bind to the channel wall it could react with any subsequent substrate and affect the results. This possible source of error was reduced



through surface modification resulting in a more hydrophilic surface.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support; licence agreement; marketing agreement; manufacturing agreement.

<http://cordis.europa.eu/marketplace > search > offers > 4821>

continued from page 14 '**Model predicts toxicity of pesticides to honey bees'**

universities and research institutes. Companies working in the area of plant protection products would also benefit.

Use of the combined QSAR model can reduce the number of organisms exposed to untested compounds. In addition,

a much larger number of compounds could be tested. It provides a cheaper and quicker means to assess the toxicity of new compounds than performing experiments on live animals. This meant that the environmental risk posed by new pesticides and chemicals could be assessed much

more easily, thereby facilitating research into new pesticides.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace > search > offers > 5132>

Interference with protein-protein interactions

As part of an initiative to develop new therapies for cancer, researchers developed and patented an assay for screening drugs which interfere with protein-protein interactions in live cells.

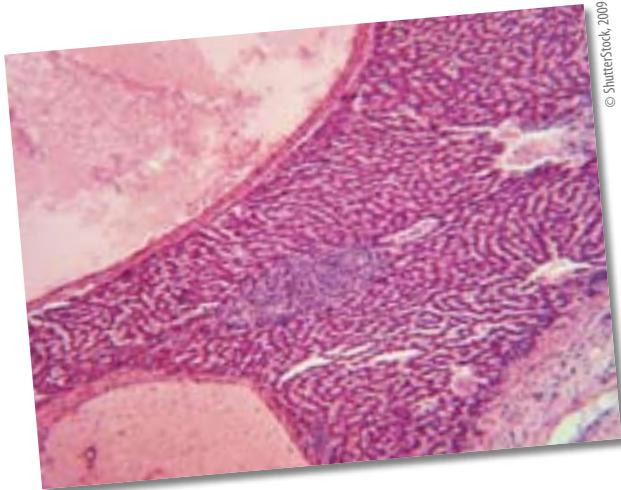
A consortium was formed which comprised some of Europe's leading research groups in the field of signal transduction pathways, structural biology and bioinformatics. The group took a multidisciplinary approach to identifying possible new pathways involved in cancer and conducted screening for potential new anti-cancer compounds. One of the aims of the 'Targets for cancer

T' project was to identify small candidate molecules, typically peptides. Researchers focussed on those molecules which possessed the desired inhibitory function, such as that found in some kinases or in particular protein-protein interactions.

The interaction of activated Ras protein with Raf initiates signalling cascades that lead

to a significant percentage of human tumours. An assay was therefore developed based on the immobilised protein GST-Ras G12V and the Ras binding domain of Raf kinase, which was labelled with Alexa dye.

Furthermore, the assay proved suitable for the potential identification of inducers of Ras GTPase activity, as well as the detection of altered inter-



action between Ras and Raf compounds. Using the assay, researchers from the Max Planck Institute, Dortmund, in collaboration with the commercial partner Evotec OAI AG, screened a library containing 60 000 compounds.

The successful collaboration between the Max Planck Institute and Evotec OAI AG was maintained. The two project partners used the assay to screen more than 70 000 compounds for their ability to inhibit Ras/Raf interaction or to induce GTPase activity of Ras G12V. The work resulted in a patent, which can identify reversible protein-protein interactions between GTPase negative forms of GTP-binding proteins, and their effector's proteins. The system can also pinpoint those chemical compounds which inhibit the above interactions in the living cell and can detect the rescue of blocked GTPase activity. One considerable advantage is that the assay can be used with any of the protein-protein interactions that possess medium or high affinity.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: information exchange/training.

[> search > offers > 5134](http://cordis.europa.eu/marketplace)

The crucial control of telomere maintenance

The telomere is a protective region of repetitive DNA at the very tip of chromosome which confers a protective role on the genetic material during cell division. The molecular basis for the maintenance of these vital structures has been investigated by a team from the EU-funded project Telosens.

As highly repetitive stretches of DNA, telomeres do not code for proteins but they serve as protective caps for the functional DNA at the ends of chromosomes during cell division. Successive cell replication can shorten telomeres with the result that genes may be lost or the now exposed chromosome end may fuse together. Either way, the shortening or loss of telomeres is a threat to cell integrity and may contribute to cell ageing or tumourigenesis.

At the Spanish National Cancer Centre, many aspects of the telomere have been the focus of productive research. Under the Telosens project, telomere maintenance at the genomic and proteomic level was specifically investigated. Epigenetic mechanisms were investigated that are heritable and may change during their morphogenesis.

Previous research by the group of scientists had revealed that there was indeed some sort of epigenetic mechanism involved in the maintenance of telomere length and function. Throughout the research, a link

between methyl transferases, the SUV420 enzymes and retinoblastoma family of proteins has been implicated.

The recent investigations in the Telosens project have pointed to a link between these molecular components and massive lengthening and increased telomeric recombination. The trigger for this phenomenon is a marked decrease in methylation of the subtelomeric regions. To add to the strength of the theory,

decrease in methylation was also associated with alternative lengthening of telomeres (ALT) associated PML bodies (APBs). These are associated with telomere extension.

To sum up, repression of methylation was shown to suppress telomere recombination which in turn will maintain telomere integrity. Telomere maintenance plays a role in many diseases including some cancers and other pathologies where radiosensitivity may play a part. This research will no doubt aid the understanding of radiosensitivity and form the basis for therapies of radiation-linked pathologies.

Funded under the FP5 programme EAECTP C (Euratom research and training programme in the field of nuclear energy).

Collaboration sought: further research or development support; information exchange/training; private-public partnership.

[> search > offers > 4776](http://cordis.europa.eu/marketplace)



Innovative sensor to aid coeliac disease patients

A novel sensor developed in Italy aims to improve the quality of life of coeliac disease patients by helping them avoid consumption of foods that contain potentially harmful levels of gluten.

Currently, the only known therapy for coeliac disease is a gluten-free diet. Unfortunately, a large number of raw foodstuffs as well as prepared foods contain coeliac disease toxic gluten (CD-toxic gluten).

Research funded by FP5 sought to develop advanced sensors capable of detecting minute amounts of CD-toxic gluten in food. During the project, entitled CD-CHEF, specific nucleotides known as aptamers were

isolated for the determination of the presence of gliadin, a protein essential in the production of gluten.

Technobiochip, a CD-CHEF participant with considerable expertise in sensor development, exploited these aptamers to create a sensor able to detect gliadin down to part per million concentrations. The so-called aptasensor is based on resonant mass transduction in combination with a quartz crys-

tal balance. It was designed for use in the laboratory environment, where it can be reused.

Technobiochip has performed a patent search and is seeking partners for the commercial exploitation of the technology, which it hopes to eventually deploy in the field.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: licence agreement; marketing agreement; available for consultancy.

[> search > offers > 5052](http://cordis.europa.eu/marketplace)

The key to quality care for seniors

In order to achieve optimum integrated care for Europe's senior citizens, key indicators were established based on an analysis of quality of life variables.

Senior citizens are in need of improved cost-effective quality care which meets their changing needs. In light of this, the Carekeys project has created and tested methods and performance indicators which assess how effective, efficient and qualitative the care of older persons actually is. This was managed by focusing particularly on connecting client preferences and quality of life objectives with professional and managerial objectives. It also meant formulating sound indicators and models.

The selected indicators correspond to the fundamental variables which are representative of quality of life domains as established by the World Health Organization (WHO) and the Physician Group

Management Society. A list of background and care-related variables which have the greatest impact on the quality of life of patients was also provided. The variables were categorised into two lists. One was for home care and the other for institutional care. Additionally certain adjustments were made to accommodate clients suffering from dementia.

It was hoped that the key variables, which can be computerised, could be used to develop



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standards for quality management as well as continued evaluation of long term care.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: available for consultancy.

[> search > offers > 5152](http://cordis.europa.eu/marketplace)

The mirror of our actions

Studies conducted by a group of leading neuroscientists have shed light in the understanding of the cognitive functions of action imitation and furthermore, of understanding others' intentions.

Given the complex nature of humans, understanding the actions and intentions of others is often perplexing. The key to interpreting the intentions of others' actions as well as the imitation of actions lies within the realm of neuroscience, and more specifically within what is known as the mirror neuron system.

The mirror system is a recently discovered neural system which can be considered one of the most significant findings of neuron science in the last decade. Mirror neurons are cells that are active when a specific gesture is executed as well as when it is seen or heard. During the observation process,

these neurons 'mirror' the behaviour of another, as though the observer were doing the action.

The Mirror project studied the mirror system at the anatomical, electrophysiological and functional levels in an effort to evaluate the role it plays in understanding fundamental cognitive functions. The basic mechanisms of this system were investigated in humans as well as in monkeys with the use of similar stimuli. For the higher functions in humans, functional magnetic resonance imaging (fMRI) was used. This was an innovative technique in the case of monkeys.

While monkeys were performing motor acts and also when they observed similar acts being performed, inferior parietal lobe (IPL) neurons were studied. IPL is a region of the brain concerned with multiple aspects of sensory processing and sensorimotor integration.

Results showed that most IPL neurons responded in a different manner when the same observed act (i.e. grasping) was part of a specific action (i.e. eating). Furthermore, the neurons fired while observing the act, indicating that they permit the observer to comprehend the other's intentions.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

[> search > offers > 5037](http://cordis.europa.eu/marketplace)

The intention to leave nursing analysed

High turnover of nursing staff at many hospitals in the EU prompted a comprehensive survey to find out exactly why European nurses are so prone to premature departure from their chosen career.

As the population of Europe ages, the chronic shortage of nursing staff in most European countries is set to worsen. In response to this, the EU-funded project 'Next nurses' exit study', as the name suggests, surveyed the reasons as to why the profession loses so many of its workforce. The overall aim was to provide a platform to encourage the sustainable working ability of nurses throughout Europe.

In Belgium, a team of researchers at the Université catholique de Louvain investigated almost 7 000 nursing staff members in 37 institutions. Filling health care vacancies has proved problematic despite the fact that in 2000, for example, there was one nurse for every 58 members of the Belgian public. Low economic activity rates and a high percentage of part-time staff are the main reasons for recruitment difficulties.

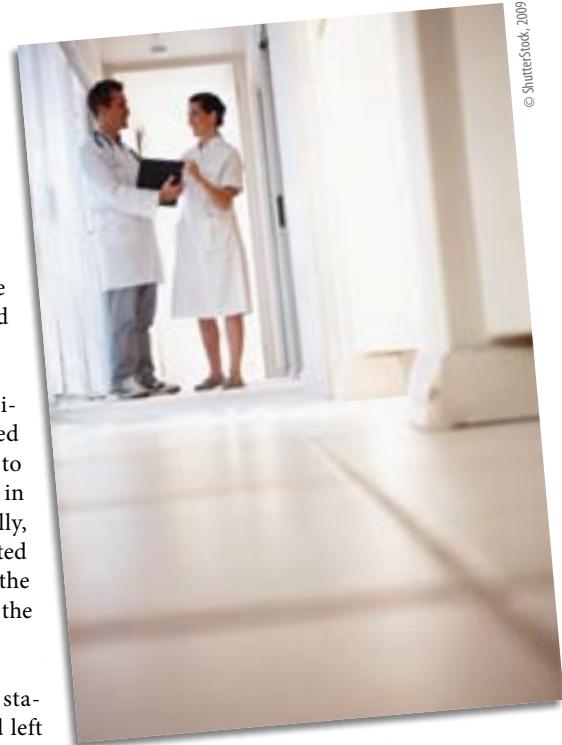
Survey questionnaires were sent to nurses who were still in the profession and a sample who had left. On analysis, particular relevance was placed on the 'intent to leave' question. Those thinking of quitting nurs-

ing several times a month were compared with those who had this idea less often or never.

Gender, work setting and position in the hierarchy all affected levels of satisfaction, deemed to be the most important factor in premature departure. Ironically, training was negatively correlated with satisfaction, especially if the workplace prevented or limited the use of newly acquired skills.

Analysis of the employment status within the nurses who had left prematurely revealed some interesting statistics. Almost 90 % were still within the nursing sector at the same professional level and the remainder were in the social or health sector.

The team made recommendations to stem an unacceptably high turnover, in some workplaces as high as almost 23 %, and to turn around the low economic activity rate. Provision of rewards and incentives, accept-



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able staffing levels and an autonomous and dynamic team setting were put forward as moves to make the profession a more attractive career.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

[> search > offers > 5147](http://cordis.europa.eu/marketplace)

Uncovering poverty risk through policy

The risk factors leading to socio-economic inequality have been studied to reveal the role of policy as a means to overcome this societal occurrence.

The spread of socio-economic inequality can stem from various factors, many of which intersect with one another. These may include family of origin as well as community and society itself. The Citizens

programme of the Sixth Framework Programme (FP6) has identified the challenges society faces as a result of intergenerational inheritance of inequalities (II of I).

One way in which the influence of II of I could be diminished is through social policy. Therefore, the Profit project sought institutions and related bodies with the capacity to reinforce the factors of social mobility. The correlation between policy and practice at both the national and local level with

an emphasis placed on education was the primary target area.

Research regarding the risk of II of I and the role that policy plays was conducted in eight European medium-sized towns. The respondents were young adults between the ages of 25 and 29. In spite of the intergenerational mobility of this age group, results showed that those who came from a low-economic family are likely to remain in this status. In parallel, over one third of the respondents from a high-economic family status have kept that status as young adults.

Essentially, it is very rare for this age group to change their economic class regardless of their starting point. Risk factor research further indicated that the likelihood of remaining at a low economic status is more likely than becoming poor when originally coming from a high economic status.

Funded under the FP6 thematic area 'Citizens and governance in a knowledge-based society'.

Collaboration sought: information exchange/training.

[> search > offers > 4504](http://cordis.europa.eu/marketplace)



Studying methane seeps in northern waters

A European initiative was established to study the presence of methane in selected ocean margin sediments. Methane is an important greenhouse gas and its production and sources in the environment need to be clearly understood.

The aim of the Metrol project was to identify sites of methane fluxes in northern waters. Project partner Statoil ASA from Norway used their expertise in oil exploration to record methane seeps. Researchers employed a hull-mounted single beam echo sounder to detect methane emanating from the seafloor in the areas of Tommeliten and Gullfaks in the North Sea. A remotely operated vehicle (ROV) was then used to visually record methane bubbling up from macroseeps identified within these areas.

Methane emitted by microseeps could not be visually recorded. However, its presence was indicated by bacterial mats which were documented by the ROV. Microseeps were located at Tommeliten and Gullfaks as well as at Nyegga in the Norwegian Sea. The Metrol study showed that both micro- and macroseeps were self-sealing. This process was facilitated by the formation of bacterial mats and carbonate.

At Nyegga the ROV revealed for the first time the existence of hydrate pingoes within the tundra-like landscape of the seafloor. This environment was believed to be created by the formation and breakdown of gas hydrates originating from below the seafloor.

Hydrate pingoes are mounds up to one metre high and are covered with sediment and a carpet of tubeworms. These mounds also feature corrosion pits and are partly covered with bacterial mats. The mats are used as a source of nutrients by larger organisms such as hermit crabs.

The results from the Metrol project can help the oil industry and other users of the seafloor to improve field development strategy and design. It can also facilitate the construction of pipelines and reduce the environmental impact of drilling. New insights into



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natural chemical environments and their impact on biology were also achieved through the study.

Funded under the FP5 programme EESD (Energy, environment and sustainable development).

Collaboration sought: further research or development support.

[> search > offers > 5125](http://cordis.europa.eu/marketplace)

Modelling combustion processes in a diesel engine

An alternative way to achieve the drastic cuts in exhaust emissions from diesel engines prescribed in the short and medium term by the legislators has been proposed by the Minnox project. Based on detailed numerical studies of the thermal imprint of turbulence on fuel combustion, advanced models have been developed to account for the important physical effects occurring in the combustion chamber.

Diesel engines provide important fuel economy and durability for large heavy-duty trucks, buses, and non-road equipment. The reduction of oxides of nitrogen (NO_x) and fine particulate matter emitted with the lean diesel exhaust remains, however, a technological challenge. Engineers are faced with a multi-parameter optimisation problem, where fuel injected at high pressure into the combustion chamber helps reduce the emission of soot, but results in higher levels of nitrogen oxides.

Numerical tools with predictive capabilities have been developed during the Minnox

project to provide the means essential for balancing fuel consumption and emission formation. Researchers at laboratories of Volvo Technology Corporation worked towards a more realistic modelling of wall-bounded turbulent flows. This is a necessary prerequisite for the accurate prediction of wall friction and heat transfer, as well as for providing reliable boundary conditions for components' thermal analysis.

Sub-models for each flow and combustion process within the engine's combustion chamber were first validated with the use of the in-house computational fluid dynamics

(CFD) flow solver, Mermaid. Covering the effects of heat transfer to engines' pistons as well as exhaust gas recirculation, these were proven to be accurate over a wide range of engine operating conditions. They have also lent themselves to improvements that could ultimately lead to predictions on the build-up of sludge and carbon deposits around pistons as the engine's service life is prolonged.

Moreover, the possibility of a CFD solver working independently was explored, but also well-defined interfaces to commercially available CFD flow solvers, such as the widely used STAR-CD code, were developed. At the same time, the efficiency and robustness demanded by engineers when performing CFD calculations of flow and combustion processes were kept in mind.

Funded under the FP5 programme EESD (Energy, environment and sustainable development).

Collaboration sought: further research or development support.

[> search > offers > 5109](http://cordis.europa.eu/marketplace)

On the road to more efficient solar cells

The production of silicon-based solar cells is a major step towards reducing carbon dioxide (CO_2) emissions from fossil fuels and securing European energy independence. As part of this initiative, the Topsicle project developed a low-cost industrial process for the manufacture of highly efficient multicrystalline silicon (mc-Si) cells and modules.

Members of the Topsicle research team drew up a road map to facilitate the industrial scale production of 20 % efficient mc-Si photovoltaic (PV) modules. The road map outlined two different cell concepts, the screen-printed cell and the buried contact cell.

Project partners from the University of Konstanz in Germany carried out a detailed loss analysis and comparison of 17.6 % and 18.1 % mc-Si efficiency cells. The cells' efficiency potential was evaluated through the use of PC1D modelling with the aim of achieving large area mc-Si 20 % solar cells in the future.

Loss analysis for the 18.1 % solar cell indicated that significant improvements could be realised by replacing the full area aluminium back surface field with a local rear contacting scheme.

This change ensured a low back surface recombination velocity and high optical reflectivity for the rear surface. An additional thin thermal silicon oxide layer was placed beneath the silicon nitride antireflection coating in order to reduce the front surface recombination velocity. A key parameter in determining the performance of a solar cell is the fill factor. The addition of the

silicon oxide layer resulted in a fill factor of 77 % for the 18.1 % cell. A fill factor of 78 % had previously been achieved using a similar plating process and a factor of 79 % may be considered realistic in the near future.

A further improvement towards high efficiency can be made through the use of zero-shading loss cell design. This technique is based on the angled buried contact concept. The successful application of all the improvements prescribed by the roadmap could result in a current density of 39.6 mA/cm^2 and an open circuit voltage of 642.9 mV. This would enable a 20.1 % efficient mc-Si solar cell to be developed.

Funded under the FP5 programme EESD (Energy, environment and sustainable development).

Collaboration sought: further research or development support.

[> search > offers > 5112](http://cordis.europa.eu/marketplace)

Recommendations for the cultivation of energy crops

An extensive investigation of energy crops culminated in several key recommendations to limit the environmental impact of their cultivation.

The European Commission has set a goal of increasing the share of biofuels in its energy portfolio, but not at the expense of the environment, food prices or other potential snags. The EU supported research aiming to identify the most viable energy crops from this perspective.

The Institut für Umweltstudien — Weibel & Ness GmbH (IUS) in Germany participated in the project, which was entitled 'Bio-energy chains'. Their approach involved performing an environmental impact assessment (EIA) addressing the entire lifecycle of each type of biofuel. They discovered that the management of the crop, including chemical application, equipment usage and scheduling of the harvest, was almost as important as the crop itself.

The IUS scientists made a number of suggestions following their analysis of the different crops. For example, forests, wetlands and other valuable ecosystems should not be sacrificed for energy crop cultivation, rather idle agricultural or pastoral lands should be used. In addition, combining different kinds of energy crops helps promote biodiversity while enriching the landscape for local fauna.

In fact, careful planning of plantings can actually add environmental value, for instance in the form of erosion control or wastewater recycling. Targeted plantings can also be used to provide linkages between natural habitats or to break up agricultural monocultures. Ultimately, the IUS researchers con-

cluded that the choice of crop and location for cultivation must be integrated into an overall strategy addressing sustainable agriculture, forest management and regional development.

Funded under the FP5 programme EESD (Energy, environment and sustainable development).

Collaboration sought: information exchange/training.

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Baseline for economic model of low carbon technology

An economic model was developed by European researchers to give a better insight into how changes involving non-carbon emitting technologies will affect production and growth.

The Nemesis/ETC economic model, developed by the project with the same name, was used as a basis for depicting national and sectoral trends in 15 EU Member States, and Norway, between 2005 and 2030. The model highlighted major challenges that will face

European decision-makers over the next 25 years. The baseline scenario indicated that the greatest source of growth will be through foreign trade as growth within the EU area is not expected to exceed 2 % for the whole period. However, weak internal

demand in Europe will be compensated by high growth in the fast-growing economies of Brazil, China, India and Russia.

The key to attracting foreign trade will be the ability of European countries to create niche markets for their products. This can be achieved through increasing scientific and technological research and development, particularly in the area of environmentally friendly energy production. The baseline scenario developed by the Nemesis/ETC

continued on page 21

Investigating the fatigue response of wind turbine blades

New knowledge acquired during the 'Optimat blades' project has enabled more accurate prediction of the lifetime of rotor blades used in wind turbines.

One of the challenges wind turbines pose from an engineering point of view is dealing with the variable load to which the rotor blades are exposed. This can negatively impact performance and may even lead to premature failure. Such shortcomings hamper the adoption of wind turbines for power production, especially in offshore installations that are not easily accessible.

In order to optimise exploitation of available wind energy, the organisations involved in the 'Optimat blades' research project sought to address these problems by improving structural predictive methods for blade design. A series of experiments with different blade prototypes was carried out by various partners throughout Europe.

Both unidirectional (UD) and multidirectional (MD) laminate constructions were subjected to stresses at predefined intervals during their useful lifetime. The Optimat engineers varied the magnitude of the cyclic loads as well as the ratio between the minimum and maximum stress, known as the R-ratio, in order to simulate real-world conditions.

Over 700 tests were performed and the results were stored in the 'Optimat blades' database. Analysis of the data provided valuable feedback regarding the maximum load that could be sustained without causing breakage throughout the


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rotor blade's lifetime, defined as its residual strength. In addition, information regarding load sequence proved instrumental for improving models of strength degradation that previously relied solely on Miner's rule.

Funded under the FP5 programme EESD (Energy, environment and sustainable development).

Collaboration sought: further research or development support.

[> search > offers > 5119](http://cordis.europa.eu/marketplace)

Making negative ion beams of superior quality possible

Modern accelerator complexes, such as those at the European Organisation for Nuclear Research (CERN), started off as proton laboratories, but gradually included negative hydrogen ions in their panoply of particles. Nonetheless, existing negative ion sources are not able to fulfil their requirements for high-quality particle beams.

Eventually, new techniques, which are under development, will ensure the lowest possible emittance for particle beams produced when negative hydrogen ions are accelerated and subjected to magnetic compression. In response to the technical challenge posed by the next generation of high-power proton accelerators, FP5 funded, in part, the HP NIS project.

Several teams from European laboratories offered their experience and expertise to develop negative hydrogen ion sources with a reliability that had not as yet been reached. Researchers at Frankfurt University in Germany provided a suite of diagnostic instruments for detailed measurements of the ion beam properties. This meant applying non-destructive techniques that allow

online measurements while the accelerator is operational.

Negative hydrogen ions offer the opportunity of non-destructive beam diagnostics based on the effect of photo detachment. Through the interaction of negative hydrogen ions and laser light with a wavelength between 600 and 1 100 nm, the additional electron can be detached and a small number of neutral atoms is produced. An additional magnetic field can then be used to separate the detached electrons and neutral atoms from ions.

Moreover, the number and distribution of either the detached electrons or the neutral atoms produced can be analysed while the ion beam is still in use. Different detector

systems with spatial resolution were designed to investigate the full three-dimensional density distribution of the neutralised atoms. As neither the laser photons nor the detached electrons transfer significant momentum to the neutralised atoms, their distribution would be the same as the distribution of the primary ion beam.

A time-of-flight (TOF) scintillator used the detached electrons to deliver the transversal and longitudinal density distribution of the primary ion beam. A second scintillator with spatial resolution detected, together with a charge-coupled device (CCD) camera the neutralised atoms to estimate transverse emittance. Diagnostic experiments conducted at the laboratories of the Frankfurt University revealed the advantages of beam diagnostics that have no mechanical parts intercepting the ion beam over conventional beam diagnostics.

Funded under the FP5 programme 'Human potential' (Improving the human research potential and the socioeconomic knowledge base).

Collaboration sought: further research or development support.

[> search > offers > 5130](http://cordis.europa.eu/marketplace)

continued from page 20 'Baseline for economic model of low carbon technology'

project also showed a decline in population and the labour supply. A shortage of skilled workers could prove critical to the European economy. The EU must also face the challenge of an aging population, whereby in 2030 there will only be two working people for every person over 65 years of age.

The purpose of the Nemesis/ETC economic model was to develop scenarios and strategies for the supply and demand of energy technologies for combating global warming. The model's baseline scenario allowed a clearer understanding of the relationship between economic, energy and envi-

onmental policy, thereby helping to draft future European policy.

Funded under the FP5 programme EESD (Energy, environment and sustainable development).

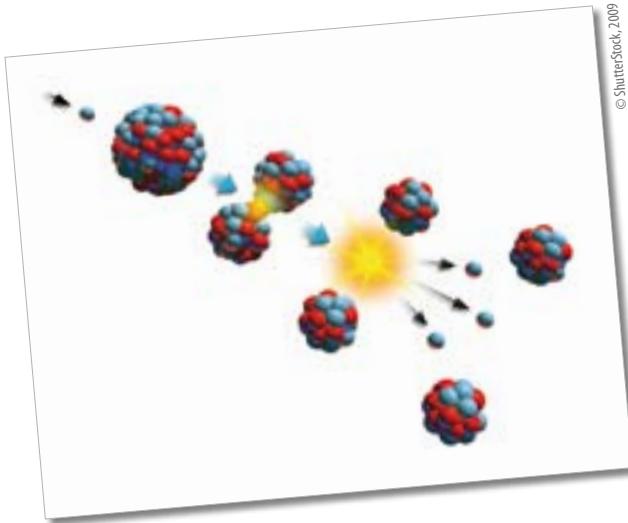
Collaboration sought: further research or development support.

[> search > offers > 5115](http://cordis.europa.eu/marketplace)

Online simulations of radioactive ion beams

Due to the numerous possible types of atoms diffusing out of solid materials, design of an optimum source for radioactive ion beams can be a real challenge. The Targisol project has developed the tools needed to study all those variables governing the release of radioisotopes and facilitate the design of future radioactive ion beam facilities.

The current chart of nuclei includes around 3 000 nuclides, distributed as stable and spontaneously splitting isotopes. An equal number of exotic nuclei belong to the so-called *terra incognita*, the vast unknown region of the nuclear chart where many unexpected structures have recently been discovered.



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Exotic nuclei synthesised in the laboratory allow for the variations within the tightly bound nuclear systems of proton and neutrons that are needed to uncover the true nature of the subatomic structures. The exploration of these unstable nuclei that cannot survive on Earth has been significantly assisted by the use of radioactive ion beams.

With the isotope separator on line (ISOL) method very intense beams of trillions of radioactive ions per second are obtained. Once they are released from the target which is heated to several thousand degrees, radioactive atoms are ionised and purified before being sent to individual experimental facilities.

The release efficiency depends on the diffusion of nuclides in the target, effusion to the ioniser cavity and absorption/desorption processes at each surface collision, to name a few factors. Simulations of all these processes allow the study and subsequently, optimisation of the geometry and composition of the target and ion source system.

The isotope release simulator (IRES) is an online configuration tool, developed by the Targisol project to allow scientists to follow the path of nuclides from the target to the ion source. A web interface provides remote access to a Monte Carlo program, the radioactive ion beam optimizer (RIBO) that simulates targets made of powders or fibres with variable geometries stored in a database.

The database also includes diffusion parameters and absorption enthalpies to be selected for the specific choice of target material. RIBO runs online from a server at http://www.targisol.csic.es/intro_ires.html. The results of simulations are sent to the user by e-mail.

Funded under the FP5 programme 'Human potential' (Improving the human research potential and the socioeconomic knowledge base).

Collaboration sought: further research or development support.

[> search > offers > 5131](http://cordis.europa.eu/marketplace)

Embedding optical sensors in fuel tanks

A new sensor, designed and tested by Dutch engineers, could be instrumental in helping to make fuel tanks safer.

Hydrogen and other alternative fuels offer a number of advantages, namely in relation to their environmental impact, by comparison with conventional fuels. However, the issue of safety remains a significant deterrent to the adoption of these fuels and these benefits have yet to be realised.

With current technology, fuel tanks must first be removed from the vehicle in order to be inspected, which is a costly, time-consuming process. The EU funded a research and development (R & D) project entitled ZEM, the aim of which was to streamline the inspection process through the use of optical sensors.

The key was to incorporate an optical sensor into the tank itself, allowing continuous monitoring. The challenge was to develop a sensor that could be easily integrated and produced reliably at low cost without sacri-

ficing durability. The solution, conceived by engineers with Airborne Development B.V. in the Netherlands, was a polyamide optical sensor embedded in a glass fibre — epoxy prepeg tape.

Compared to other options, the new prototype offers a distinct advantage with respect to bonding compatibility with high-pressure tanks constructed from composites. It can also be cured together with the tank, ensuring the best possible connection and thus measurement accuracy. The sensor is well suited for use in marine, transport and aerospace applications.



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Future development efforts will be devoted to facilitating mass production to increase the cost competitiveness of this solution.

Funded under the FP5 programme Growth (Competitive and sustainable growth).

Collaboration sought: information exchange/training.

[> search > offers > 5157](http://cordis.europa.eu/marketplace)

Eco-engineering accelerates soil detoxification

Strategies to minimise the levels of herbicides like atrazine in soils include the application of alternative farming practices. However, for cases of already polluted soils, researchers have investigated the genetic potential of resident microbes to reduce contamination.

Herbicides such as atrazine and 2,4-dichlorophenoxyacetic acid (2,4-D) have been under the ecological spotlight for many decades now. Despite concern about effects on wildlife, in particular amphibians, concentrations of these chemicals in soils and consequently ground and surface water remain unacceptably high in certain countries.

Ironically, the breakdown of these organo-chlorine herbicides can be achieved by using the natural resources of the very soil that is polluted. Activity of resident microbial populations can be harnessed to convert these recalcitrant pesticides thus reducing the toxicity levels of the soil and the runoff ground water.

It has been shown that the catabolic potential of soil microbial communities can depend on many factors. Among these are the farming history of the land, the soil characteristics and the relationship between plants and associated populations of micro-

organisms. The potential complexity of the situation opens the way to an interdisciplinary approach.

The synergy of disciplines known as eco-engineering was therefore taken up by the EU-funded project Access. The overall objective was to build a knowledge base for the rational treatment of polluted sites, an area not tackled before. As part of this initiative, project partners at the German Research Centre for Biotechnology (GBF) focused on the development of methods to fingerprint the microbial genes involved in herbicide degradation.

Primers were developed to amplify two types of gene involved in 2,4-D breakdown. The team evaluated methods based on the objective to achieve the production of fragments only for the target genes. Subsequent separation of fragment mixtures allowed the successful differentiation between highly similar gene sequences.

In order to determine the effects of different conditions on bacterial population structures, DNA from the whole soil microbial community was taken and profiled using terminal restriction fragment length polymorphism (TRFLP). The members of the populations were also classified phylogenetically with the help of public databases.

Data collected from this piece of research can be used as a tool to optimise conditions for the biodegradation of organochlorine herbicides. These can then be incorporated into the actual design of farming practices to reduce soil pollution.

Funded under the FP5 programme 'INCO 2'
(Confirming the international role of Community research).

Collaboration sought: further research or development support; available for consultancy.

<http://cordis.europa.eu/marketplace > search > offers > 5061>



Forecasting landslides with micro-seismic methods

New monitoring techniques developed by members of the Hungarian Academy of Sciences could help prevent the loss of human life to landslides.

The EU set aside significant funding for researching natural disasters such as landslides. The OASYS research consortium was granted over EUR 1 million to establish a fruitful collaboration between the numerous scientific disciplines involved in the study of landslides.

Scientists with the Geodetic and Geophysical Research Institute (GGRI) of the Hungarian Academy of Sciences participated in OASYS. Their investigation focussed on loess walls, aeolian deposits that are highly susceptible to landslides.

GGRI's objective was to develop new observational techniques to complement cur-

rent methods such as geodetic deformation monitoring. They searched for signals that could possibly be exploited to forecast pending landslides. More specifically, they experimented with micro-seismic methods to monitor vibrations in the loess walls.

The GGRI researchers discovered that they could detect very small scale deformations in the loess that were missed by other methods. Analysis of the data in real time provided insight into key geotechnical features of the deposit. Consequently, GGRI is

proceeding with the incorporation of this technology into the OASYS early warning system for landslides.

Funded under the FP5 programme EESD
(Energy, environment and sustainable development).

Collaboration sought: further research or development support; information exchange/training; available for consultancy.

<http://cordis.europa.eu/marketplace > search > offers > 5108>



Review of excavated disturbed zones around nuclear waste sites

Scientists must be able to predict the effects of long-term perturbations to the surrounding rock following the building and operation of a nuclear waste repository. This information is essential for ensuring maximum protection to future generations from soil contamination and the release of radionuclides to the environment.

Waste produced through the generation of nuclear power can remain hazardous for thousands of years. The most favoured management solution is underground storage in deep clay formations. A performance assessment was carried out by the Selfrac project into the long-term fate of radioactive waste residing within geological repositories.

The assessment involved an evaluation of the excavation disturbed zone (EDZ), changes to which may result in increased permeability due to a proliferation of cracks in the surrounding rock. However, permeability can be reduced over time due to the self-healing properties of the clays. The aim of the Selfrac consortium was to investigate and quantify this process in two different geological formations. These were the Opalinus clay of Mont Terri in Switzerland and the Boom clay in northern Belgium.

The presence of the EDZ may result in changes to the mechanical characteristics of

the rock adjacent to the underground tunnels. Following the closure of the disposal tunnels the system becomes saturated with water. This can cause the backfill material, made up of the hardened clay (bentonite), to swell and speed up the sealing process of the fractures.

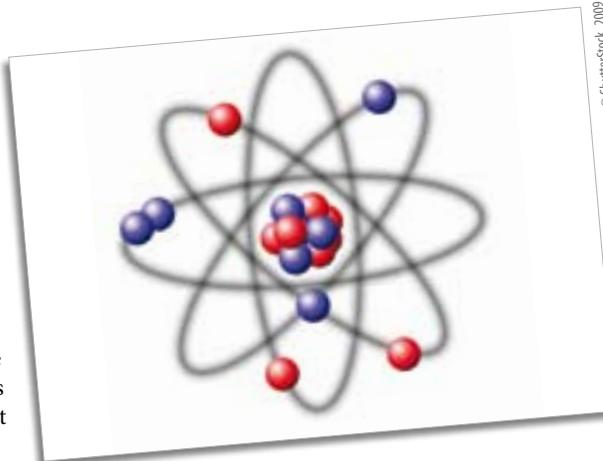
Saturation can also lead to an increase in stress because of the thermal expansion of solids and flowing water, and a reduction in strength. This process may result in a further increase in the size of EDZ. However, heating may also facilitate creep rates in the host rock, accelerating the closure of open fractures and decreasing the impact of the EDZ.

Results indicated that the EDZ had little impact on the release of radionuclides. The EDZ may be an area of relatively high permeability for a time, but a more detailed evaluation is required to determine whether it can transport pollutants to the environment. The question whether a zone of high permeability surrounded by an area of low permeability in the EDZ is sufficient to alleviate the negative impact to the waste repository remains open.

Funded under the FP5 programme EAECTP C (Euratom research and training programme in the field of nuclear energy).

Collaboration sought: further research or development support.

[> search > offers > 5044](http://cordis.europa.eu/marketplace)



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Making the most of silage production

For the farmer, winter fodder is of prime importance for livestock production in upland areas. Management procedures to optimise feed quality produced from ryegrass with a high content of water-soluble carbohydrates have been investigated.

Providing forage in marginal upland areas of Europe such as the Alps and the mountainous areas of Scotland takes a great deal of management. The altitude is too high to cultivate high-energy forage crops like maize.



Consequently, the farmer is reliant on other crops, particularly ryegrasses, that are resistant to the rigours of the cold wet climate.

The Sweetgrass project aimed to make things easier for the livestock farming fraternity in less favoured areas by improving existing ryegrass varieties. High levels of water-soluble carbohydrates (WSC) in ryegrass breeding would, they reasoned, improve livestock rearing from two perspectives. Firstly, the use of high WSC grasses reduces the nitrogen output in faeces and urine and secondly, tends to produce better quality silage.

Project partners at the Institute of Grassland and Environmental Research in Wales researched into the most effective management strategies for silage production. The high WSC variety AberDart was used in trials to pinpoint the most effective methods, including measures to maintain the high WSC levels. With high sugar levels, lactic acid production is encouraged that in turn lowers the pH. Acidic conditions

conserve nutrients and inhibit other microbial growth. This avoids silage spoilage that can have a very negative effect on livestock production.

The agricultural scientists found that the most successful way to produce high-quality silage was by rapid wilting, possible in dry sunny conditions, to encourage an elevated WSC content. However, taking into account the typical weather in upland areas, a rain-free period after harvest may not occur. In this case, addition of acid-based chemicals to discourage growth of anaerobic bacteria like clostridia and the use of a variety with relatively high WSC content is recommended.

The Welsh scientists have outlined validated methods for upland farmers to successfully manage silage production from high WSC ryegrasses. Conservation, animal welfare and production levels from marginal land may all benefit from the results of this research.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

[> search > offers > 5159](http://cordis.europa.eu/marketplace)

Organic food marketing guidelines

The production of organic food has been identified as an important driver for sustainable development in some of Europe's most disadvantaged regions. The Omiard project developed guidelines for the successful marketing of organic produce as part of an initiative funded by the EU.

An increase in the production and consumption of organically farmed food can boost the economies of the less-developed, peripheral areas of Europe. It can also help protect the regions' rural cultural heritage. The Omiard project supported organic agriculture by delivering greater choice and better quality of food products. This was achieved as a result of improved marketing of organic produce through collaborative initiatives.

Research was carried out into organic markets and initiatives by producers and other relevant groups. These included marketing boards, non-governmental organisations

(NGOs) and local authorities. The Omiard team drew up a series of guidelines and examples of best practice which was applied as a framework for training. This practical guide enabled producers and their supporters to develop marketing initiatives for organic food. The main challenges facing organic marketing initiatives (OMIs) were described in the manual, as well as key factors required for successful management.

The guide highlighted the different priorities OMIs faced during the different stages of their development. It also explained the different roles and activities of key person-

nel and stressed the importance of strategic planning and the need for clear objectives. The importance of networks, brands, good market research and other factors was also emphasised.

The guidelines provided by the Omiard project underlined the importance of OMIs in regional development, detailing consumer trends and the development of the market for organic food. The role of EU policies in aiding rural areas and support for OMIs was also discussed, including changes to regulatory structures. A valuable source of information and experience was provided in the form of detailed case studies.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: information exchange/training.

[> search > offers > 5122](http://cordis.europa.eu/marketplace)

Insight into the organic food industry in Europe

An extensive investigation of organic food production and consumption in Europe has highlighted important disparities between countries as well as opportunities for growth.

An increasing number of consumers are turning to organic food products as concerns regarding food safety and the environmental impact of food production continue to rise. Seeking to inform both consumers and producers, the scientists involved in the Omiard project undertook a comprehensive study of the organic food industry in Europe.

Surveys were conducted in all EU Member States as well as Norway and Switzerland. Researchers with the University of Kassel in Germany, an Omiard participant, analysed the results. The full range of organic food products was covered, from meat and dairy to fruit and vegetables as well as cereals and even wine.

The data revealed a small yet growing market share for organic foods. Considerable variation was observed between countries, with consumption ranging from as little as 0.1 % to as much as 3.7 %.

The balance between imports and exports was also examined. It was determined that the EU was a net exporter of organic olives, wine and milk, but had to import fruits, vegetables, cereals and several types of meat in order to meet demand. This type of information could be valuable to existing organic farmers as well as conventional farmers looking to convert to organic methods.

With respect to prices, the team at the University of Kassel discovered that the

additional amount paid by consumers for organic goods varied significantly depending on the product. Furthermore, prices for the same item were not consistent across Europe. The distribution channel played an important role in this effect as reduced transportation costs helped larger chains offer lower prices than specialised organic food stores.

The results of the study will also be made available to agricultural policy-makers in an effort to promote the adoption of measures to strengthen Europe's position in the burgeoning organic food industry.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

[> search > offers > 5140](http://cordis.europa.eu/marketplace)

Europe's future organic market

A scenario analysis was created by partners in the EU-funded project Omiard in order to examine the future development and potential of the organic market in Europe.

In the hope of eventually improving the potential of organic farming to result in positive social and environmental effects, organic marketing initiatives (OMIs) were examined. More specifically, the development of successful marketing strategies, OMIs' interactions with the community and consumer demand evolutions were investigated.

Scenario analysis was used in order to identify the underlying factors, current trends

and uncertainties of the market within a certain time span as well as to test strategic business options. This covered several key issues. Some of them include trade liberalisation, regulation, certification standards and attitudes toward products of regional origin.

It was found that differentiating food products according to region was useful and furthermore that liberalising world markets

could be beneficial. This can in part be due to the expansion of the EU along with food scares and growing concerns about food safety. Organic food could thus become the preferred option in response to such consumer concerns. Wider dissemination such as media coverage and advertising as well as better labelling of organic products is needed.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

[> search > offers > 5149](http://cordis.europa.eu/marketplace)

Propagating salt tolerant poplar trees

*Plant scientists selected and cloned genotypes of the white poplar (*Populus alba*) that were tolerant to drought conditions and high levels of salinity. This was part of a wider project for identifying the most suitable tree species and genotypes for growing under arid conditions.*

Global warming and climate change could result in increased desertification and soil erosion due to changes in rainfall patterns. This would have a serious impact on European agriculture as well as natural ecosystems and the species they contain. The Establish project addressed the issue of reforesting land suffering from drought, erosion and saline soils.

Researchers selected tree species that could tolerate such adverse conditions in order to recreate a more favourable micro-

climate and stabilise soil erosion. The trees would then be used for the commercial production of wood. Plant scientists used morphological, physiological and molecular markers to identify *P. alba* as the most suitable tree for this role. A team of researchers from Tuscia University, Italy, carried out the selection and cloning of salt tolerant *P. alba* genotypes. The group selected three genotypes that grew in different parts of Italy where they were subject to different levels of drought and soil salinity.

Scientists developed a methodology for producing large numbers of progeny plants using tissue from leaf nodes, the point where the leaf is attached to the stem. This micro-propagation technique placed cells from the node tissue in a cell culture medium. Rooting was induced by immersion in indole-3-butryric acid (IBA) solution, a plant rooting hormone. Use of this method facilitated the exchange of genotypes with desired properties between research institutes. The new tools produced by the Establish project can be applied to both conventional and biotechnological breeding strategies.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

[> search > offers > 5161](http://cordis.europa.eu/marketplace)

Analysing the role of enterprise in tourism

Surveys were conducted on enterprises in rural areas in Europe resulting in country reports which identify established views and practices regarding integrated tourism.

Europe's rural regions exhibit potential for advancements in integrated tourism. The Sprite project has sought to examine this aspect in depth in order to develop the correlation between tourism and local and regional resources, activities and products.

Within a vast study involving 12 rural regions across Europe, surveys were conducted on tourists, businesses, communities and institutions. In this effort, economic, social and cultural dimensions of integrated tourism were targeted in order to arrive at impacts and benefits.

In particular, 50 businesses and 20 resource controllers were surveyed from each area. Resource controllers were categorised as persons, groups or agencies owning or operating resources and infrastructure related to

tourism. Businesses were classified as those who profit from tourism. How businesses and resource controllers impact the development of integrated tourism was the main focus.

The theme-based surveys allowed for qualitative analysis of the fundamental processes as well as a means to pinpoint and assess trends and relationships. Individual country reports were drafted in order to highlight inter-regional comparisons and to offer extensive information on businesses and resource controllers. Furthermore, perceived notions of the

links between tourism and location as well as attitudes about and participation in the tourism industry were assessed in order to arrive at more effective tourism policies.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

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Satellites and snow in Scandinavia

Research supported by the EU has culminated in an operational methodology to derive snow water equivalent (SWE) from satellite data.

Snow's greatest impact often occurs when it melts. On the negative side, snowmelt can cause flooding, while on the positive side it can generate electricity in hydropower installations. In both cases, it helps to know how much water the snowpack contains, which is expressed as the SWE.

Observational data is not plentiful enough to enable mapping of SWE over large areas. For this reason, Norut IT in Norway and its

partners in the Envisnow project looked for a way to exploit data obtained from European remote-sensing satellites (ERS).

Scientists with the Norwegian Research Institute used scattering theory to establish a relationship between phase change and snow depth. Specifically, they applied a delta-K interferometric technique to synthetic aperture radar (SAR) data. The approach was validated for dry snow condi-

tions in both winter and summer. The result was a highly accurate estimate of SWE with spatial resolution in the order of 10 km.

The next phase of the research involves applying the new methodology to advanced SAR (ASAR) single look complex (SLC) data over northern Norway. Hydropower plant operators as well as flood and climate forecasters stand to benefit from these developments.

Funded under the FP5 programme EESD (Energy, environment and sustainable development).

Collaboration sought: information exchange/training.

[> search > offers > 5141](http://cordis.europa.eu/marketplace)

Getting ocean modellers on the same wavelength

A new protocol outlines a standardised procedure for performing modelling experiments examining fluxes of carbon between the oceans and the atmosphere.

The oceans play an important role in the storage and cycling of carbon. Thus, any attempts to model the impact of increasing carbon dioxide (CO_2) emissions on the Earth's climate must take the oceans into account. While a number of different ocean models exist, the results they produce often differ from one another.

The EU funded a major research project entitled NOCES, which brought together ocean modelling experts from across Europe. The project was coordinated by the Laboratoire des sciences du climat et l'environnement (LSCE) in France. One of their key contributions was the creation of an ocean modelling protocol.

The aim of the protocol was to standardise the way in which the different research groups ran their models when investigating inter-annual variability in CO_2 fluxes. For example, everyone was required to apply the same boundary conditions, namely reanalyse data from the National Centers

for Environmental Prediction (NCEP) for the period 1948 to 2001.

Another important component of the protocol was the inclusion of common model code addressing the carbon cycle. Finally, upon completion of the simulations, specific guidance was provided regarding how to format the model output in order

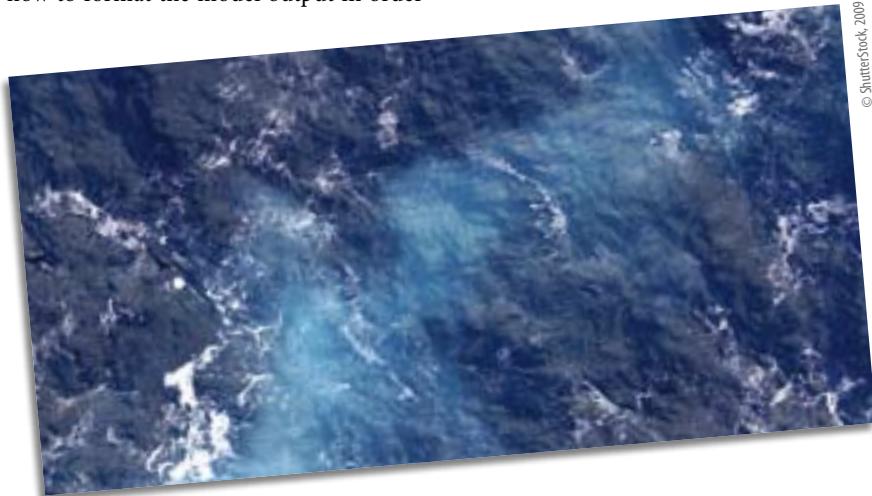
to facilitate inter-comparison between research institutes.

The protocol has been made available online at: <http://www.ipsl.jussieu.fr/projets/NOCES>. It is hoped that it may also be applied during future research projects addressing the topic of inter-annual and decadal variability.

Funded under the FP5 programme EESD (Energy, environment and sustainable development).

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace > search > offers > 5146>



Insights into the chaotic patterns of cod movements

Famous for their long-distance migrations, cod move up to several thousands of kilometres between their spawning and feeding grounds. Variations in their migration patterns have been described with the use of statistical methods to estimate the ability of fisheries and scientific survey gear to catch cod.

lations, the biological and environmental factors that actually affect fish movements could be identified. Vertical movements were suggested that reflect feeding and temperature preferences. These factors could then be integrated into forms that were representative of the whole population.

Among other parameters, the vertical distribution of cod was estimated by calculating the probability density function of the depth where cod spent considerable time according to records from the electronic tags. More specifically, the cumulative density function was calculated after the maximum depth over the 24-hour day was subtracted.

This method allows precise estimation of the probability of capturing cod at a specific location when the depth of the trawl net or trawl gear used in scientific surveys is known. While this information is of importance for describing the ability of commercial fisheries gear to catch cod fish, it can lead to a more advanced design for scientific survey gear.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace > search > offers > 5114>

See also page 10 (Temperature tolerance impacts sense of space in cod)



For four years scientists across Europe had been studying the behaviour of cod in the north-east Atlantic Ocean for the EU-funded Codossey project. The purpose of the project, led by the Centre for the Environment, Fisheries & Aquaculture Science (CEFAS), was to collect information on the movements of cod by using implanted electronic tags.

Over 3 000 tagged fish were released between 2002 and 2005 in the Barents Sea, the North Sea, the Baltic Sea and the Icelandic and Faroe Plateau. From those returned by fishermen, more than 130 000 days of data were collected that revealed when and where cod travel and how their movements relate to the ocean environment.

By studying individual fish rather than distinct cod popu-

Major advancements in jellyplankton management

A novel computer-based tool which can predict the lifecycle and occurrence of jellyplankton has been designed, bringing forth significant improvements in managing marine environment.

The over-abundance of jellyplankton poses serious problems for fisheries due to its toxic effect on fish. Furthermore it negatively affects aquaculture, coastal tourism and industrial development.

In light of this, the nine European partners of the Eurogel project conducted field-based experiments in order to pinpoint and analyse mass jellyplankton developments. In so doing, their ecological and socio-economical effects could be better understood. Included in the study was the examination of the functional biology of the spe-

cies particularly in regard to fish larvae and the role that biotic factors play on survival, growth and reproduction.

In order to predict occurrences of jellyplankton, a general purpose computer-based model known as Gelmod was designed. The model is able to simulate the transport of jellyplankton caused by winds and tides and is applicable to shallow water coastal regions. Furthermore any relevant environmental effects such as temperature and salinity on

jellyplankton can be incorporated into the model. Best of all, the model is capable of high temporal and spatial resolutions.

Funded under the FP5 programme EESD (Energy, environment and sustainable development).

Collaboration sought: further research or development support.

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Modelling carbon fluxes in the northern hemisphere

The results of a 100-year run of a terrestrial ecosystem model will shed light upon the complex interactions and feedbacks of the global carbon cycle during the previous century.

Data available to scientists indicates a rise in vegetation activity in the northern hemisphere over the course of the 20th century. While the fertilisation effect of elevated concentrations of carbon dioxide (CO_2) in the atmosphere is suspected to play an important role, it cannot fully explain the observed increase.

Extensive modelling work performed in the context of the Camels project has provided valuable insight into the carbon cycle that

may eventually help resolve this and other ecological conundrums. The simulations were carried out with a terrestrial ecosystem model (TEM) at the Centre national de la recherche scientifique (CNRS) in France.

The TEM, named 'Organizing carbon and hydrology in dynamic ecosystems' (Orchidee), was run for the period 1901–2002. Input data included atmospheric CO_2 concentrations as well as historical climate observations. The output consisted of esti-

mations of the following carbon fluxes: net primary production (NPP), heterotrophic respiration (HR) and net ecosystem production (NEP).

The CNRS scientists increased the temporal resolution of the flux data recorded between 1980 and 2002 to facilitate the study of phenological parameters, such as the length of the growing season. The resulting dataset constitutes an important deliverable of the Camels project that will assist investigations of significant trends in the uptake and release of carbon across the globe.

Funded under the FP5 programme EESD (Energy, environment and sustainable development).

Collaboration sought: information exchange/training.

[> search > offers > 5117](http://cordis.europa.eu/marketplace)

Breaking down inherited inequality with public policy

Policy matters in reshaping society so that it may result in a more positive and socially mobile population. This study examined eight EU Member States in order to get to grips with the factors which perpetuate inherited inequality through the generations.

Social mobility is an ideal that is held in high esteem in developed and modern societies. The transmission of inequalities and poverty across the generations is therefore a major setback to achieving this ideal. Social policy aims to reduce this 'inherent' inequality and make up for these types of differences. Across the EU, goals are set to help prevent inequalities from continuing to be transmitted. This is achieved by implementing a policy of mobilisation and in particular, by using education policy as a tool.

The Profit project studied a cross section of society in countries across Europe. It was designed to identify the challenges posed by the intergenerational inheritance of inequalities. It was assumed that the transmission of inequalities is a result of intersecting influences coming from family of origin, community and society. The study looked at different policies and practices, with special attention paid to education. Eight countries were analysed as part of this multidisciplinary comparative study. The countries

selected represented different social welfare regimes and different patterns of poverty and social problems.

The results showed that the economic standing of the country did not play a decisive role in the risk of inheritance of inequalities. This was found to be particularly true of the old EU Member States. Education, labour market and welfare policy were the factors seen to make a definite difference. Among affluent countries in the study, Finland and Germany were those which seemed to best protect citizens against poverty transmission. Italy was found to do this least well.

Funded under the FP6 thematic area 'Citizens and governance in a knowledge-based society'.

Collaboration sought: information exchange/training.

[> search > offers > 4539](http://cordis.europa.eu/marketplace)

The impression of presence

A novel visualisation technology has been developed allowing an observer the advantage of a virtual sense of presence in an environment which simulates actually being there.

The feeling of presence in a real scenario without actually being there was previously not possible, since conventional video recording was not able to capture a multilevel interpretation of presence. Furthermore, it is challenging to represent real places having man-made and/or organic objects in a virtual environment. However, the Benogo project has created novel camera technologies which permit a nearly photo realistic 3D real time visualisation of real places enabling a sense of presence for a moving observer.

This is possible due to a new technology known as image-based rendering (IBR) which does not require a reconstructed geometrical model of the scene. With the aid of both visual and auditory augmentation, a feeling of the real can be created along with objects that allow interaction. Therefore an intuitive physical dimension to the experience is possible and this is what makes the observer feel actually present.

With the human visual system being as complex as it is, emphasis was placed on improving the parameters that are easily detected by the visual system while ignoring the physical imperfections that are less likely to be detected. Consequently, quantitative psychophysical experiments were conducted on the simulation parameters which are crucial for the feeling of presence.

Images created through IBR were the focal point of this effort in addition to the two important parameters of luminance and contrast. Additionally, the sensitivity of the human visual system in the detection of distortions of stationary as well as

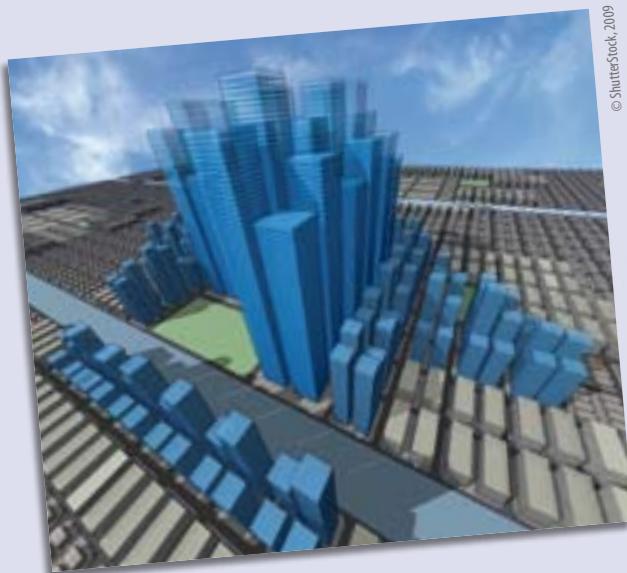
moving objects was examined. These results can offer a better understanding of how human imperfections in vision can be manipulated in the creation of virtual realities and in the overall subjective impression of presence.

Funded under the FP5 programme IST (User-friendly information society).

Collaboration sought: information exchange/training.

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Use of BioMoby in European plant genome database

The European plant genome database network (Planet) used the BioMoby web service to exchange and use biological data across the World Wide Web. The use of this technology represented an important solution to the challenge of data access and integration.

Agricultural and environmental research relies heavily on data concerning plant genomes. The Planet database was built on top of a genome database established for the

model organism *Arabidopsis*, the first plant to have its genome sequenced. The objectives of the Planet project were to collate genomic information into a comprehensive platform and to establish a network of European plant databases. The consortium also developed new methods of data exchange and database integration from widely distributed sources.

The Planet consortium implemented the BioMoby standard for web service technology, which can be used to provide data or computerised resources over the web. BioMoby is a biological web service interoperability initiative. Its long-term

objective is to provide a simple, accessible platform for the discovery, integration, representation and retrieval of biological data. Modern scientific research requires data resources such as genomic sequences, but the information is often hard to find with no common format and is scattered around the web. Therefore, a web service makes the tracking down of this information much easier as data no longer needs to be manually collected from multiple sources.

Planet was the first project to use BioMoby as an integration technology and its involvement greatly helped in the development of the web service. It is now a mature system which can be easily used by other groups. Several projects have followed Planet's example and now employ the BioMoby technology. This has led to hundreds of BioMoby web services providing access to all kinds of analytical tools and online databases, all of which are highly interoperable.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

[> search > offers > 5041](http://cordis.europa.eu/marketplace)

Tough times, complex systems — a modernisation story

Tough economic times call for tough measures to remain competitive. That goes for software modernisation as well. An EU-funded project has just released a prototype of a software engineering platform that could help companies save time, money and energy as they scramble to upgrade complex IT systems. The timing could not be better.

To compete globally in today's economic climate, IT and software systems need to be up to date and functioning perfectly. But for most organisations, it is not as simple as just replacing a desktop or buying in new off-the-shelf software.

Manufacturers, for example, run a host of complex systems — characterised by interconnected hardware, software, user interfaces, firmware, and business and production processes — controlling everything from supply and production to the temperature in the canteen. And the systems could well have been installed at different times by different suppliers and with a number of tailor-made adjustments along the way.

These 'legacy systems', as they are called, are IT nightmares and the reason so many organisations decide to just throw out the lot and start again, wherever possible. But times are much tougher nowadays.

IT budgets, like the rest of the company operations, are being slashed. The question management must now ask is, why invest in a totally new system when the basis for modernising the system is there? This is where European researchers in the Momocs project enter the picture.

'If you are going to modernise, of course you need to deal with legacy issues,' says Alessandra Bagnato of TXT e-solutions in Italy. 'Let's face it,' she says, 'in this current economic climate modernisation of complex systems is a very good way to remain competitive.'

The savings to be made through the modernisation of current systems are significant. Once upon a time, modernising a system

meant more trouble than it was worth; it was the ugly sister of IT development. But the current economic crisis has given new impetus to this field.

Yet with such complex systems and software, the problem is where to begin. If you change one component and don't have a proper overview of how it will impact other, potentially critical components, the results can be devastating.

Momocs' solutions are ideally suited to fast reengineering of the software portion of complex systems. The goal of the Momocs project was to make modernisation much easier, cheaper and faster than ever before. And allowing the end-user to concentrate on what to do rather than on how to do it is critical to this. Current approaches like the 'Rational unified process', 'Extreme programming', and Scrum are thought to be too generic and mostly designed for 'green field' projects.

The solution? Momocs has just finished developing what it calls an 'Extreme end-user-driven process' which is dedicated to software and systems engineering for modernisation, such as adding new functionality to an existing system. Tools that the project developed can model existing systems before the modernisation begins and keep track of the different models and their transformations in a dedicated knowledge base.

Two cases were developed — one for automation, another for telecom and computing infrastructure — to test the Momocs suite of tools.

Take, for example, automated baggage-handling systems when air traffic begins to spike. Most components might be coping well but the storehouse is overflowing. So, an upgrade is needed, but only to the storage capacity components. Momocs can isolate exactly what needs changing and so minimise disruption.

First, Momocs creates a model of the

'to-be-modernised system', which gives an overview of the existing architecture and business logic, and identifies the critical parts. It highlights components that can be reused and lays down some predefined transformation rules to expedite the change-over — all recorded in a special components library. The Momocs engineer goes through the 'what-if' scenarios, in view of constraints and customer requirements, and comes up with a fairly accurate cost estimate of the given modernisation project.

Handled more efficiently, modernisation of existing systems has a number of advantages — easier, cheaper, more transparent, better quality results — over wholesale upgrades or piecemeal changes using unsuitable tools and methods.

But perhaps the most important benefit comes in the wake of the modernisation, thanks to across-the-board improvements in company productivity. 'I was initially surprised at the amount of detail in the models we got from our industrial partner Siemens during the testing of the Momocs tool suite and methodology,' says Bagnato, the project coordinator. 'We are talking about very complex systems and yet the Momocs-generated models were able to pinpoint the different parts.'

Showing the different perspectives and relationships in the model means the engineer can select only the parts in need of modernising, notes Bagnato, such as all the electrical systems on the shop floor, or the switching systems in the warehouse.

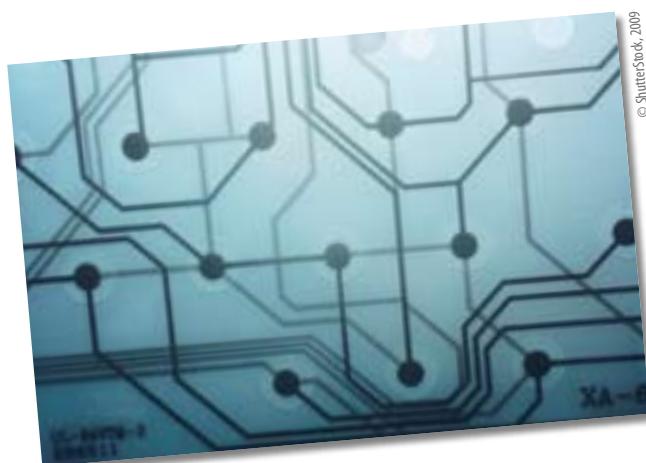
Perhaps the best thing about Momocs, though, is that the results will not sit in a trophy case somewhere in Italy or any of the four participating countries. A final beta of Momocs is already available on the project website and parts of its tool suite are to be published on the MoDisco website.

Now that the two-year Momocs project has ended, most of the nine partners from industry and academia are keen to continue research in the field to refine the tools. Their work in standards is also an ongoing process.

The Momocs' team has recently met with the leading Object Management Group (OMG) in the United States about gaining recognition of its 'Architecture driven modernisation' (ADM) approach, and its work on knowledge discovery meta-models (KDM) has also broken new ground.

Promoted through the ICT Results service.

<http://cordis.europa.eu/ictresults/index.cfm?section=news&tpl=article&ID=90550>



Novel video retrieval system

An innovative means of video exploration and use has led to the design of a video retrieval system. This is an algorithm which allows objects or scenes in a movie to be efficiently traced similar to the way Google finds web pages containing particular words.


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Unlike a collection of images, video has the advantage of offering uninterrupted scenes spanning time and space. In spite of this, information is completely embedded within raw data and is not organised in an efficient manner making it difficult to retrieve.

In light of this, the VIBES project ventured to turn video into a data type that is searchable by content and that can be annotated, hyperlinked and

edited just like text. The developed tools allow cut detection, indexing, synthesis and classification of scenes that are non-static and non-rigid.

Through the advantage of rapid browsing and retrieval, a video can be enhanced with hyperlinks that can link shots to an actor, type of action or scene. This enables more efficient video browsing. Additionally with 3D scene synthesis and human animation models, virtual reality environments can be created for particular shots. A demonstration may be viewed by clicking at: <http://www.robots.ox.ac.uk/~vgg/research/vgoogle>

Funded under the FP5 programme IST (User-friendly information society).

Collaboration sought: information exchange/training.

[> search > offers > 5128](http://cordis.europa.eu/marketplace)

development. Through the use of a virtual prototype, errors or ergonomic problems can be detected before they end up on the actual finished product. The objective was to arrive at a safer, better quality final product while reducing costs.

Funded under the FP5 programme Growth (Competitive and sustainable growth).

Collaboration sought: further research or development support.

[> search > offers > 5107](http://cordis.europa.eu/marketplace)

A global radio link service capacity indicator (RLSC) was proposed in order to indicate how often a typical service can be transported over a particular radio link. The RLSC assigns the number of radio bearers required for services such as ISDN, DSL and video.

Funded under the FP5 programme IST (User-friendly information society).

Collaboration sought: further research or development support.

[> search > offers > 5145](http://cordis.europa.eu/marketplace)


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Virtual testing of coated parts

A simulation tool was developed allowing virtual testing of coated parts used in the automotive and transport industry.

Flocking fibres traditionally used to coat steel parts have been known to emit hazardous dispersions into the air. In addition to this, they possess the disadvantages of being costly while at the same time being limited in terms of freedom of design.

The FFLIC project cooperated with an Italian company involved in creative engineering and

advanced design in the automotive and transportation fields to produce a virtual reality technology. A simulation tool was used to virtually test products such as an innovative fur-like coating developed during the project. This was managed without the need for creating physical 3D prototypes.

The simulation and testing was maintained throughout each phase of the product's

An indicator for improved signalling

A global indicator of the radio link service capacity has been designed in order to determine the service quality of radio bearers for a particular wireless telephone service.

Wireless communication systems have increased both in significance and in use over recent years. Many successful commercial services in this field provide speech and image transmission to the user. The FLOWS project was initiated with a quest for the future generation of wireless systems where convergence of wireless standards would lead to an enhancement of the quality of services relying heavily on Internet protocol (IP).

Through the participation of eight companies and research establishments from five European countries, the convergence of multiple wireless standards was studied in terms of benefits to the service provider. Multiple-input multiple-output (MIMO) antenna techniques were evaluated in order to implement this approach within a wire-

less terminal. This revealed that it was necessary to extend existing transmission, processing, system and network convergence techniques.

As part of this effort, common signalling of physical layer parameters was proposed. Signalling from both the physical and data link layers is necessary when the convergence manager requires information on the link capacity. The data link layer is comprised of the fundamental hardware transmission technologies of a network and it underlies transfer data between network entities. The physical layer offers an electrical, mechanical and procedural interface to the transmission medium.

Improving user experience in wireless telecommunications

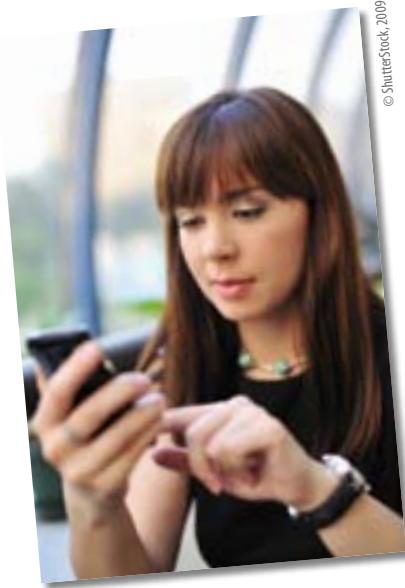
By targeting the basic need for voice conversation, wireless telecommunications have become a very important part of people's everyday life. Apart from satisfying this basic need in a way that was barely imaginable only a few decades ago, the telecommunications industry is further extending the range of offered services.

One vision for the future generation of multimedia telecommunications services is that of the convergence of standards, enabling seamless access to audio, video and data services. This multi-standard approach

for the provision of integrated telecommunications services was adopted within the FLOWS project as a means to offer a number of benefits both to users and service providers.

More specifically, significant improvements in the performance of wireless telecommunications systems can be achieved by transmitting both voice and non-voice signals over multiple channels between the transmitter and receiver. By exploiting a channel's diversity, fading of the signal due to interference from transmitters using the same channel is minimised.

Wideband code division multiple access (W-CDMA), the accepted technology for third generation cellular networks, exploits the multipath diversity inherent in terrestrial wireless channels. However, where there are a high number of active users of the same cell, loss of orthogonality between users' spreading codes leads to multiple access interference. The use of equalisation at the chip-level was proposed to restore



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the orthogonality lost whilst still exploiting the multipath diversity.

In addition, dedicated multiple-input multiple-output (MIMO) antenna techniques were developed by project partners at the University of York to provide an additional source of spatial diversity. Time-reversal space-time block coding (TR-STBC) techniques allowed for both spatial and multipath delay diversity gains to be achieved in highly-loaded cells.

Unlike space-time block codes (STBC) that assume frequency-flat fading channels, TR-STBC was designed for frequency-selective channels, and then combined with chip-level equalisation. The simplicity of this scheme's implementation, which requires just four linear transversal filters, was crucial for a realisable implementation in W-CDMA receivers.

During the FLOWS project, TR-SBTC was conclusively demonstrated to provide for significant gains in downlink throughput and to have a high degree of compatibility with existing standards, such as the universal mobile telecommunications system (UMTS).

Funded under the FP5 programme IST
(User-friendly information society).

Collaboration sought: further research or development support.

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New theory for epidemic spreading in networks

Further to a pioneering research effort, experts with Telenor ASA in Norway can assist with the development of targeted strategies to influence spreading in networks.

Network information systems (NIS) have become increasingly complex as they strive to support a growing number of users and devices as well as types of interactions. In an effort to instil robustness and reduce the risk of network failure, researchers involved in the EU-funded BISON project attempted to apply lessons learned from nature.

One of the BISON participants, Telenor ASA, investigated the spread of epidemics

in ecosystems and extrapolated the findings to social and computer networks. The key to their new theory was a fresh approach to network structure analysis, which was put to the test during BISON. In fact, Telenor ASA was able to demonstrate excellent agreement between predicted and actual spreading during simulation exercises.

The knowledge acquired by Telenor ASA during the project has provided valuable

insight into the process of spreading of epidemics. This led to the formation of specific recommendations to contain spreading, for example in the case of a computer virus. Alternatively, spreading can also be encouraged in situations where the population stands to gain, such as embracing a new product or service.

Funded under the FP5 programme IST
(User-friendly information society).

Collaboration sought: further research or development support.

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Two microwave resonators are better than one

By combining two microwave resonators, researchers with the United Kingdom's National Physical Laboratory (NPL) were able to measure minute temperature changes in the order of nanodegrees.

Telecommunications play an increasingly important role in modern society. The demands on the equipment are constantly evolving. The EU-funded RTD project entitled TUF aimed to develop advanced filters for the telecommunications industry.

The TUF project was coordinated by the NPL and included six other research institutes. One of the most important project deliverables was a bolometric detector capable of measuring extremely small amounts of radiation. It is based on two

microwave resonators that are coupled together.

One of the resonators is constructed from strontium titanate (SrTiO_3) and its resonant frequency is strongly dependent on temperature while the other provides a stable reference frequency. Careful selection of the shifted frequency provides detailed feedback about the inci-

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Rich musical pickings with easier access to archives

Digital sound archives offer enormously rich resources but accessing them is currently difficult, and often arbitrary. European researchers believe they have developed a solution, one that offers compelling new functions to digital sound archive access.



Digital sound archives offer enormously rich resources, but suffer from access problems. Sound material is often held separately from other materials and media. Worse, it can be very difficult to listen to or to browse the content, and there is no way to search it.

Existing solutions, which attempt to deal with these problems, tend to be library- or content-specific, of limited functionality, or difficult to use.

This is an issue that the EU-funded Easaier project sought to solve. Easaier stands for 'Enabling access to sound archives through integration, enrichment and retrieval', and the project achieved just that by developing innovative new methods for accessing sound archives.

The system functions are all combined within a single user-configurable interface that allows users to access archives in a variety of useful ways. For example, the system responds to the needs of amateurs and professionals by providing new ways to interact with, or retrieve, content through a simple web-client access point that works in any web browser, or from an advanced user access system developed in a stand-alone application.

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Metadata is used extensively in both applications, and can provide a wide range of information to users, including tempo, key and other technical and background information. To achieve this, Easaier created a music ontology for semantic metadata, which will have an impact well beyond the project's core aim.

But the system functions go further. 'Of course, nobody just wants to find a piece of music. They want to play around with it, too, so we developed a series of tools that allow users to manipulate the sounds in a wide variety of useful ways,' explains Joshua Reiss, coordinator of the Easaier project.

The Easaier system, for example, will allow students to slow down playback without altering the pitch. It will also allow them to separate specific instruments from a piece, and they can play back the piece an octave higher or lower, to hear how that affects it.

What's more, there are tools that can be used with speech, as well as a novel presentation of multimedia material, such as sound-source separation, equalisation and noise-reduction algorithms, and methods to synchronise video and audio streams in real time.

Easaier has generated a lot of interest among music archives. 'We have an agreement in principle with the British Library, we are currently working on how they want to implement the system for their archive,' explains Reiss.

The Irish Pipers Archive and the Irish Traditional Music Archive are also interested in the system and have been testing and evaluating it. But that is only the beginning. A lot of the tools and technologies used in Easaier are currently at work in national and European projects. 'They are being used for other projects and are receiving further development,' Reiss reveals.

Some of the partners are commercialising or licensing their work to other companies. NICE is incorporating speech tools it developed in Easaier into its call centre management software, and the Dublin Institute of Technology has licensed its source separation tools to Sony Music.

In all, almost 10 patents were taken out for various elements of the project, and Memnon, one of Europe's main players for audio archiving systems, has shown considerable interest in the project, while a start-up company in the United States, called Platinum Blue, has licensed technology developed in part within the project.

'We are interested in any other ways the system could be commercialised or adapted to other products, too,' notes Reiss. Whatever happens, it will mean music archiving, retrieval and manipulation will be made a lot easier.

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dent radiation which, crucially, does not depend on the volume of the resonator itself.

During TUF, the NPL scientists demonstrated that the instrument is sensitive to temperature fluctuations down to billionths

of a degree Kelvin (nK). The detector also acts as an insulator, which eliminates any possible electronic contribution and helps improve its resolution. Another advantage is that it is a non-contact method of measurement, making it suitable for a wide range of applications.

The NPL and its TUF partners are following up on these promising results.

Funded under the FP5 programme Growth (Competitive and sustainable growth).

Collaboration sought: further research or development support.

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Creating resilience for vehicular applications

European researchers have developed promising approaches to a long-neglected aspect of car-to-car and car-to-infrastructure communications: fault-tolerance and resilience. The technology is a vital component of emerging applications in such communication scenarios.

Automotive communications are a major element in the near future of vehicle technology, with applications ranging from variable road sign visualisation, to accident warnings and driver-support systems which automatically reduce speed in a hazardous situation. Ultimately, these systems could lead to much more automatic driving.

There are dozens of small, medium and large-scale EU-funded research projects aimed at safety on the road. Hidenets is another one, but it is looking at a unique aspect: 'We pretty much look at one aspect that has been neglected so far, mainly the reliability and dependability of applications running in these settings [...] [making] sure that they do work reliably and that they are also available in the scenario, when you need them,' explains the project's coordinator Hans-Peter Schwefel.

Most projects look at specific issues relating to application optimisation, or fundamental communication issues — all essential elements for enhanced road safety through automotive communications.

But resilience is another essential aspect. Automotive communication in traffic scenarios is a phenomenally complex and dynamic field, dealing with vast numbers of fast-moving vehicles, all tied together by transitory webs of communications that can fade in and out. And they deal with potentially catastrophic events, like a car crash, where communications become even more vital.

The question Hidenets sought to answer was how can applications based on communications continue to function when the communications themselves break down?

'This is a problem that you don't only solve on the communications layer. The approach in Hidenets is to say that we cannot solve it all just by communications enhancements, we need to do something on middleware with some functionality that makes sure that, even if the communication doesn't work properly, the application can react to it, reconfigure itself and adapt to the situation,' Aalborg University's Schwefel stresses.

It is an important problem. Aside from safety and reliability issues, user acceptance and adoption of automotive communications technologies will depend on their trustworthiness.

Take 'platooning', where cars drive in a line with the lead car driven by a human that passes control information like speed, braking, turning and indicating to following cars. The cars drive tightly together, to take advantage of the slipstream.

This is an extreme dependability scenario, and the cars following are driven by the in-car control system. Such a platooning application is currently envisaged mainly for trucks; it may still take quite some time until it is available for private vehicles. Nevertheless, it is a useful use-case scenario because it requires very fast and reliable communications and computations.



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All cars need to receive each piece of information and they need to receive it quickly and reliably — even when other nearby platooning cars are crowding the bandwidth with information zipping between them.

The issues here are timeliness and the detection of timing violations is crucial, so Hidenets developed the concept of a reliable and self-aware clock. Duration measurement is a concept that notes any slowing caused by the local network or sluggish computation and factors that impact on communications and the application behaviour.

The timely timing failure detector keeps track of the performance and can take fault-tolerance measures if required, for example alternative routing or a controlled braking instruction.

There are many other use cases, like assisted transportation, which looks at general driver assistance and collision avoidance. Or car crashes, where a distributed 'black box' can help provide context in the moments up to the crash, information that is time-stamped and passed on to infrastructure and other cars as they pass.

Hidenets developed dozens of elements addressing specific resilience needs, such as continuity of communication, continuity of data, back-up and alternative actions in the absence of communication.

The project developed lab-based proof-of-concept scenarios, both in scaled-down models using remote-control cars, and computer simulations mimicking the network traffic for a busy road. The demonstrators succeeded and validated the researchers' approach.

But the greatest contribution of the project was to develop a reference architecture and design methodology and related tools, so that researchers in the future can benefit from what Hidenets learned in their work. It is an impressive package.



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Staying informed on board

A new technology has been designed giving bus passengers in Rome access to information during transit.

Urban transport is not what it used to be. The Miracles project brought forth many changes toward innovation in this area. Some of these included a modal shift for inner-central and outer-central commuting and personalised and direct access to multi-modal traveller information.

As part of this endeavour, the MOBY-Innovative on board information technology was designed. Its goal was to offer bus passengers information as regards the mobility as well as the transport itself. For example, it can provide information on special/entertainment events, route changes, places of historical interest, news updated in real time and even horoscopes.

The system is made possible through a data centre where the basis of the information is arranged according to type and an on board system. The information sent to the data centre via general packet radio service (GPRS) and then to the vehicle is housed in a computer. It is then displayed through a liquid crystal display (LCD) video. The system is primarily used on buses in the old city centre of Rome and on tourist buses as well.



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Obtaining and managing temporal information

An innovative system has been created which can extract information and knowledge from a text and analyse it through a multitude of means.



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Current sources of information can be scientific, in the form of news feeds as well as technical and management reports and can be found in both internal and external sites. With so much information being distributed from various sources, organisations are faced with the challenge of managing knowledge in an effective manner. Essentially the ability to access, manage and analyse this wealth of information is vital for an organisation to be competitive.

In light of this, the Parmenides project set forth to create a systematic approach that can integrate all of the functions of information management including gathering, processing and analysis. The work was comprised of several object-

ives. One of these involved the prediction of events of interest from extracted temporal information.

As a result, the Cafetiere analysis system was designed. This system is capable of extracting information and knowledge by applying defined patterns which span several layers of analysis of a particular document. Moreover it is paired with an ontology management system and not only can it extract facts but also information regarding domain terms, entities and their correlation. The system is backed by an annotation browser and editor allowing for the validation of a collection of documents and the creation of training data.

Funded under the FP5 programme IST (User-friendly information society).

Collaboration sought: further research or development support.

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Even though the project is finished, some research problems remain to be solved. 'We developed promising approaches and demonstrators proved the concepts, but more work needs to be done, particularly in relation to standards,' warns Schwefel.

Standards are essential if fault-tolerance and resilience are to gain traction in the industry, though Schwefel sees some promise in the example from the telecoms industry.

'The telecoms industry only started to really talk about resilience and reliability in the early 1990s, but it was the late 1990s by the time they had developed standard

approaches to the problem. Before that they were proprietary,' he reveals.

One of the main fault-tolerance safeguards in the telecoms sector is a concept called cluster solutions, where multiple back-up nodes ensure communication is smoothly maintained even if an individual node breaks down. That is not an option for the highly dynamic traffic environment.

Nonetheless, Hidenets has made a promising start and Schwefel believes work on standards will begin to emerge as more in-car communications applications become active and the issue becomes more urgent.

In the meantime, the Hidenets consortium will discuss future potential projects and will continue their work through other research efforts. 'And the partners have developed strong relationships and will continue to cooperate on certain aspects of the problem,' Schwefel underlines.

Ultimately, though, Hidenets has put resilience on the car communications development roadmap.

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Transforming buses into mobile sensing platforms

Modern buses could be used as mobile sensing platforms, sending out live information that can be used to control traffic and detect road hazards, according to European researchers.

The research could help improve road safety, allowing traffic controllers, police and other services to access up-to-date information from any number of public buses already on the streets.

In a test, the researchers equipped city buses with environmental sensors and cameras, allowing the vehicles to become transmitters of measurements, warnings and live or recorded videos to anyone allowed to access the data.

Researchers with the Moryne project perfected a raft of technologies for mobile sensing, data acquisition, analyses and telecommunications that could be placed in public buses as a part of a larger effort to improve road safety and traffic management.

In tests, they embedded humidity and temperature sensors on buses. One pair of sensors checks the road surface while the other pair analyses the air. The sensors were selected and designed to resist to pollution. They were also designed to quickly acclimatise to the environment, as buses may have to go through tunnels, tiny dark roads, bridges and city parks over the course of a few minutes.

The data gathered by the sensors is processed on the bus, using a small but very powerful computer. The computer can then warn the bus driver if for example foggy or icy conditions are imminent.

The computer can also send alerts to a public transport control centre via a variety

of wireless connections, including mobile radio systems, WiFi or WiMAX networks, and UMTS (3G). The control centre can in turn warn nearby buses of dangerous conditions through the same wireless channels.

The system can also be set up to warn city traffic-monitoring centres of road conditions, making these mobile environmental sensors another way to collect information on top of an existing network.

Another innovation stemming from the project is the bus-mounted road-cam, a powerful video acquisition and processing device that can detect traffic conditions around a bus. The system can be used to spot unauthorised cars in a bus lane and inform the police.

The same video system can also be used to count the number of vehicles in adjoining lanes and measure their speed, helping to alert a city traffic-monitoring centre of road conditions on the ground, in real time.

'Most large cities, where this type of system would be deployed, already have very extensive camera systems, inductive loops and environmental sensors networks in place to analyse traffic and weather,' explains Patrice Simon, the project's coordinator. 'But city traffic monitoring authorities involved in the project have told us they consider the information provided by buses as a useful supplement.'

The project's achievements are not just about the services and sensing units the research-



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ers have incorporated into the system, but could also be realised in potential future applications of the technology.

'Our project worked on a large number of allied technologies, and perfected them to the point where they could be economically incorporated into bus design, but that is just the beginning of what these systems could do,' explains Simon.

For example, Moryne's work on video capture, transmission in real-time and simultaneous recording could help improve security for bus drivers and passengers. 'The devices are quite small but very powerful, and we could develop software that could analyse images to detect if a fight breaks out on the bus, for example, and automatically alert the police' Simon notes.

Work on that particular technology remains to be done, but the EU-funded Moryne project has demonstrated that it is feasible.

'All the public transport authorities we spoke to over the project showed a great and increasing interest for on-board security applications, but it was beyond the scope of the project,' says Simon. 'Still, we have made significant progress in realising this type of system, and the image and sound analysis software to detect aggression is the only major element currently missing.'

Simon notes that partners will apply for funding to perfect the on-bus security applications, the sensors and the telecommunication network that bus services are clamouring for.



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Up close and personal networks

The 'Magnet beyond' project developed a breakthrough platform to cope with a world where every individual owns up to 1 000 personal devices. But what will such a world look like?

The Wireless World Research Forum, an expert group, predicts that people could be using up to 1 000 personal devices — everything from sensors to satellite navigation — within the next decade. Now European researchers have developed a hardware and software platform that can cope with such a huge growth in personal technologies.

It is essentially a network of everything around you, a platform that will enable all sorts of current and emerging devices to communicate with each other through a personal network (PN) and associated personal area networks (PANs).

A PN links between smaller PANs that, in turn, connect to all the technology within reach, such as clothing, sensors, mobile phones, and so on. The PNs provide an overall network between PANs, which may be in reach or far away.

But what will the 'Magnet beyond' platform enable users to do in this not-so-distant PAN-future?

Focus on the user was a core element of the project. 'In "Magnet beyond", we looked at user needs, and then set out what the technical requirements were to fulfil those needs,' explains Liljana Gavrilovska, technical manager of the 'Magnet beyond' project.

In other words, the technology does the difficult work so users do not need to. It is a far cry from much of technology where people go through a painful learning curve before getting a gadget to work for them. Remember the dismal performance of video recorders.

The EU-funded 'Magnet beyond' project sought to provide compelling services delivered seamlessly to the user over self-managing and configuring technology. Essentially, the technology remains transparent, invisible to the user.

In one pilot test, for example, users go to a gym and their phone links in directly with the exercise machines. It automatically adds new information to the users exercise diary, and can offer guidance for new goals. Ultimately, it will be able to track a user's vital signs against performance and, if necessary, transmit information to a personal doctor.

In another scenario, called Icebreaker, researchers tested social and professional networking via a 'Magnet beyond' PN. In

this scenario, a reporter and a photographer attend a film festival separately. Accreditation is handled automatically, by connecting to the festival network. On arrival, all the data relevant to the festival is downloaded to the duo, along with a virtual press pass and festival programme.

The reporter does an interview and writes a story, then scans her contact book to see if there are any photographers covering the festival who can provide illustrations for her article. She finds the photographer and arranges to meet. At the meeting, the reporter and photographer's personal networks set up a federation, linking temporarily one network to the other.

The reporter's network sets up a secondary federation with her newsroom. The photos are transferred to the newsroom and cash is transferred to the photographer's account. Again, all these services are performed seamlessly.

These services were just a basic test of the 'Magnet beyond's potential. Ultimately, the technology developed by the project will enable potentially thousands of new and enhanced services, all seamlessly deployed.

Healthcare monitoring, for example, is a major application that could find immediate deployment. It allows doctors to keep track of recovering patients, or to monitor specific health indicators for high-risk individuals and elderly people.

The basic pilot tests were a success, gaining ready acceptance from the users, who thought the services were handy, really easy to use and that they would be willing to pay for similar services — a key issue for the future of the platform.

'Magnet beyond' has presented its prototypes and pilot demonstrations around the world, including several specialty events for ICT mobile technology.

Meanwhile, EU projects Oracle and WHERE use the hardware developed by 'Magnet beyond', and the consortium developed strong cooper-

ation within several EU project clusters like broadband air interfaces, beyond 3G system architectures, and others.

Elements of their work have been patented and are paving the way towards emerging standards, which will mean the project has an impact long into the future, after its work is finished.

'The project has been very active in the standards area, making contributions to all the significant bodies and fora,' notes Gavrilovska. 'Certainly, a lot of the technical advances, both in hardware and in software, will be taken up in some form by the different partners, but I would hope that, one day, the platform would be deployed as a whole, and I think there is a good chance that will happen.'

'Because the "Magnet beyond" platform responds to real problems as they exist now, and we designed everything to make sure that the technology, like the optimised air interfaces, could be easily and cost-effectively integrated into a wide range of devices, from phones to laptops to cars.'

The project is a landmark step in the development of PNs. It tackled the major obstacles to seamless technical set-up, and created many novel and innovative technologies in the process, both in hardware and software. It also opens a lot of opportunities to create new services.

'Magnet beyond' will usher in a new phase of the information age, where self-managing personal technology — capable of linking and working together to complete a common goal — will give rise to a 'network of everything around you'.

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'Triple space' offers web for web services

What the World Wide Web is to humans, the 'Triple space' could become for machines, say European researchers who have helped lay the foundations for this innovative integration of web services, semantic web and tuple space technologies.

As a new form of network-based, machine-machine communication, the roll out of 'Triple space' technology heralds a new era for the internet in which computers are able to publish and read information just as humans create and browse webpages.

By using semantic web technology to make information understandable by computers and expressing that knowledge as basic atomic units called tuples, the 'Triple space' enables web services to make use of true web communication instead of the email-like point-to-point exchange of messages common today. As such, it promises to provide faster, more efficient and more secure web services and distributed applications to a wide variety of sectors, from telecommunications and e-commerce to air traffic control and healthcare.

'Despite their name, web services today aren't very "webby"', says Elena Simperl, a senior researcher at the Semantic Technology Institute (STI) of the University of Innsbruck, Austria.

'The way they communicate is more like email in which messages are sent and received between machines rather than true asynchronous web communication in which information is published and becomes persistently available to be read at any time,' she explains.

STI coordinated the EU-funded Tripcom project, a pioneering initiative that has successfully proven the 'Triple space' concept and implemented the technology to make the World Wide Web for machines a reality.

'When we started our research in 2004 and 2005 it wasn't a very popular idea. But we have seen that the world has evolved in our direction as more and more software services have been put on the web and cloud computing has become the talk of the moment with companies, such as Google and Amazon, releasing cloud computing products and services,' adds Simperl.

Though similar in concept to cloud computing, in which computational resources are distributed and provided as a service over the internet, the 'Triple space' deals with data — offering a simple, scalable way for machines to share information asynchronously.

To create the 'Triple space', the Tripcom researchers worked on making web services

and the data they use understandable by computers, using semantic web technologies to communicate machine-readable knowledge rather than raw data. The team opted for the resource description framework or RDF format, which represents data and the semantics of data in triples of the form 'subject-property-object' in order to build statements of knowledge.

Information is then published in tuple spaces, shared virtual data-spaces designed for concurrent access by multiple processes and applications in which data units are generally expressed as tuples, a mathematical unit referring to an ordered list of finite length.

Just as multiple human web surfers can view webpages hosted on the same or different servers at any time, information stored in the 'Triple space' is persistently published — meaning it is always available for any application with access to read it or, if permitted, change it. In contrast, most current web services require the sender and receiver of data to have a same-time synchronous connection to each other, to agree on a data format, to know each other and share a common representation.

"Triple Space" is the same paradigm as the web where information is published, stored and read persistently but instead of being used by humans it is used by machines,' Simperl notes. And, just as humans can access the same webpage with different web browsers and different operating systems, computers are able to publish and read information in the 'Triple space' without format, process or technical constraints.

Within the 'Triple space', information can be robustly secured by restricting access to different tuple spaces, preventing the need, as is common practice with current web service systems, to manage each communication path individually.

'It is a bit like the directory structure in your PC, albeit with files and folders that overlap.'

Within that directory each virtual container of data can be given different levels of security depending on the user requirements,' says Simperl.

Data security is critical for many of the applications for which the Tripcom researchers envisage the 'Triple space' being used. For example, one case study carried out by the team outlines how the 'Triple space' could form the backbone of a European e-health information system, allowing medical professionals to obtain medical records stored in distributed hospital databases quickly, efficiently and securely.

Other potential uses of the 'Triple space' include facilitating enterprise application integration (EAI) systems for distributed businesses, supporting virtual marketplaces for e-commerce, and enabling mobile computing services — an application currently being investigated by Nokia on the back of the Tripcom project results. Project partner Telefónica, meanwhile, is incorporating elements of the technology into its Altamira real-time charging system for customers. Other companies have also expressed interest in other commercial uses for the technology, Simperl says.

The project partners currently have a version of the Tripcom kernel available for evaluation through Amazon web services and are collaborating in a follow-up project, SOA4All, that aims to use 'Triple space' technology to communicate billions of distributed web services.

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A third dimension for mobile phones

Three-dimensional (3D) viewing has not yet made it in a big way onto our television and cinema screens. According to European researchers, the story of 3D TV is set to be quite different with mobile devices, as the right standards and technology fall into place.



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Simulating the third dimension is something of a Holy Grail for cinema and television. The key advantage of 3D film over the conventional two dimensions is the illusion of depth and the sense of 'body' the viewer experiences — as if the action is leaping out of the screen rather than occurring within it.

Despite the images it evokes of high-tech wizardry, rudimentary 3D technologies have been around practically since the dawn of filmmaking. The first ever attempt came in 1890, when the British film pioneer William Friese-Greene invented a process in which two films were projected side by side on screen, and the viewer looked through a stereoscope to converge the two images.

We have come a long way since this bulky and impractical solution, yet 3D film and television is still some way from becoming an everyday reality, partly due to cost. But that looks set to change, and mobile devices — with simpler and hence cheaper 3D technology — could well lead the charge.

'The mobile market has always been much more dynamic and receptive to new technologies than the television market, as the whole idea of mobility is based on dynamism,' explains Atanas Gotchev, the scientific coordinator of the EU-funded Mobile3DTV project.

Gotchev also points out that the viewing conditions, and hence technical requirements, for mobile devices are not as exacting as they are for cinema, which targets a mass audience who expect a thrilling experience, and television, which needs to be of 'home entertainment' quality. 'In mobile 3D technology, the viewing mode is personal, the required display size is small and the user is

expected to adjust the display position for the best viewing experience,' he notes.

The story of 3D television for mobile phones has been one punctuated by stops and starts. As early as 2003, Sharp launched a 3D mobile phone in Japan and Korea's SK Telecom launched a 3D phone — from Samsung — in 2007, and Japan's Hitachi just launched one in 2009. But the big challenges have been the paucity of content and coming up with a profitable business model. Apple's iPhone also supports 3D television, but can currently only be viewed with special glasses.

Mobile3DTV is developing the core elements of the next generation of 3D television for mobile devices.

'One major challenge is choosing the optimal format for representing 3D video for mobile delivery,' Gotchev points out.

The format should be adopted ideally by all industrial players to avoid a 'formats war', he suggests. For that reason, the project decided to build its system around the EU standard known as digital video broadcasting — handheld (DVB-H).

'Another challenge is to ensure a comfortable and enjoyable 3D viewing experience,' adds Gotchev. Mobile3DTV is employing so-called auto-stereoscopic displays, which produce 3D images that do not require those awkward glasses to view them — which is good news for people who want to be incognito about their mobile viewing.

'Auto-stereoscopic displays use additional optical elements aligned on the surface of an LCD, to ensure that the observer sees different images with each eye,' explains Gotchev. 'As mobile devices are normally watched by a single observer, two independent views are sufficient for satisfactory 3D perception.'

The project has been working on specifications for how

mobile 3D content should be created, coded and transmitted over DVB-H in order to be visualised on a portable display with satisfactory quality for the user.

'We have access to probably the most advanced 3D portable display — one delivered by the Japanese giant NEC LCD,' says Gotchev.

Mobile3DTV has already demonstrated these technologies at a number of trade fairs. Content is, as it has long been, the major obstacle on the road to the widespread take-up of 3D mobile TV. 'A major market challenge is to convince content providers and operators to start producing and distributing 3D content,' observes Gotchev. 'With our project, we try to provide the necessary technical evidence of the technology's potential.'

And their efforts are paying off. Gotchev is quietly confident that the Mobile3DTV project can help prod the rollout of 3D television in the mobile market. Just one year ago, operators and providers did not really buy into the market benefits of producing and broadcasting stereo-video, largely because of the slow take-off of the mobile TV services in some European countries, he says. 'The situation now seems to be changing as the same players are looking for new opportunities, and 3D looks like just such an opportunity.'

In addition, the take-off of 3D for mobiles could accelerate the take-up of other 3D technologies. 'The rapidly-evolving mobile TV market could serve as a bandwagon for introducing 3D TV broadcast to the general public,' emphasises Gotchev.

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Visual time machine offers tourists a glimpse of the past

A ruined temple, ancient frescos and even a long-dead king have been brought to life by a 'visual time machine' developed by European researchers.

The Palace of Venaria near Turin, Italy, and Winchester Castle in the United Kingdom have already benefited from the technology, which combines augmented reality (AR) content with location awareness on mobile devices to give visitors to historic and cultural sites a deeper, richer and more enjoyable experience. Other places of interest are also set for a virtual renaissance in the near future with a commercial version of the system being developed to run on smart phones.

AR allows people to see and discover much more than they would normally be able to by overlaying information and images in real time on photos and video taken using a mobile device. Innovative software matches the image being viewed with suitable AR content stored on a central server.

'They can look at a historic site and, by taking a photo or viewing it through the camera on their mobile device, be able to access much more information about it,' explains Luke Speller, a senior researcher at BMT in the United Kingdom who oversaw development of the technology.

'They are even able to visualise, in real time, how it looked at different stages in history,' he adds. The AR system is one component of a comprehensive mobile information platform for tourists developed in the EU-funded iTacitus project, which also created location-based services and smart itinerary-generating software to help users get the most out of any trip.

Visitors to historic cities provide the iTacitus system with their personal preferences — a

love of opera or an interest in Roman history, for example — and the platform automatically suggests places to visit and informs them of events currently taking place. The smart itinerary application ensures that tourists get the most out of each day, dynamically helping them schedule visits and directing them between sites.

Once at their destination, be it an archaeological site, museum or famous city street, the AR component helps bring the cultural and historic significance to life by downloading suitable AR content from a central server.

At the Palace of Venaria, a Unesco World Heritage site, the iTacitus system allowed users to see how frescos on the walls of the Sale Diana once appeared and superimpose a long-gone temple in the colourful gardens to the pictures of the ruins on their mobile phone. In Winchester, the system showed visitors the court inside the castle's Great Hall and even offered an introduction by a virtual King Alfred.

'One of [our] key innovations is that we do not need markers in each location to tell the mobile device to show a certain image or pull up certain information. Instead, the video or photograph taken by the user is sent to a server and analysed by software that matches it with AR content in the database,' Speller says.

'Test users loved the concept of the system,' he adds. However, the project manager admits that they were less keen on the hardware initially chosen to conduct the tri-



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als. 'We used small portable computers, but people found them hard to see in daylight and too bulky to carry around. That hardware issue has been solved by the iPhone and similar smart phones, which were not as advanced as they are today when the project began three years ago,' Speller says.

With increasingly ubiquitous smart phone users in mind, the iTacitus project partners are now developing the software further with the aim of creating suitable AR and location-aware applications for the iPhone and for Google's Android mobile operating system.

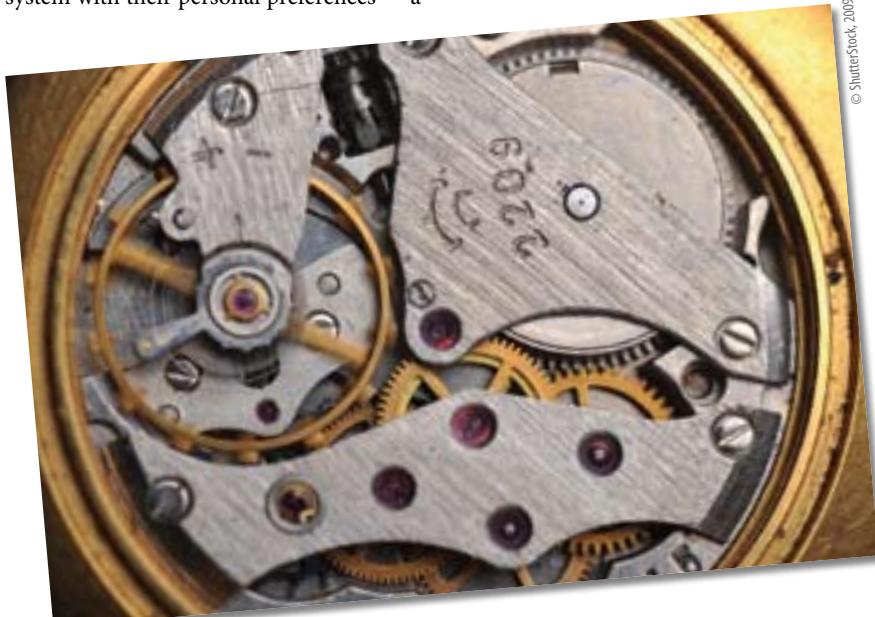
'Our aim is to make the application available for free and then charge users a fee for AR content for different locations... It would be a similar amount or even less than they would pay for a guidebook, but offering them a much richer experience,' explains Ben Hodgson, an administrative manager of the iTacitus project at BMT.

The project partners envisage AR content being generated by museums, historical sites and the tourist boards of historic cities and regions looking to promote themselves to visitors. That could be particularly beneficial for less well-known sites by encouraging tourists to get 'off the beaten track.' In addition, the researchers see possibilities for user-generated content to be incorporated into the system, further enriching visitor experiences.

'It's probable that, by giving visitors access to more information in a more interactive way and helping them find different events and places of interest more easily, they will spend more time and do more during their visit,' Speller says.

Promoted through the ICT Results service.

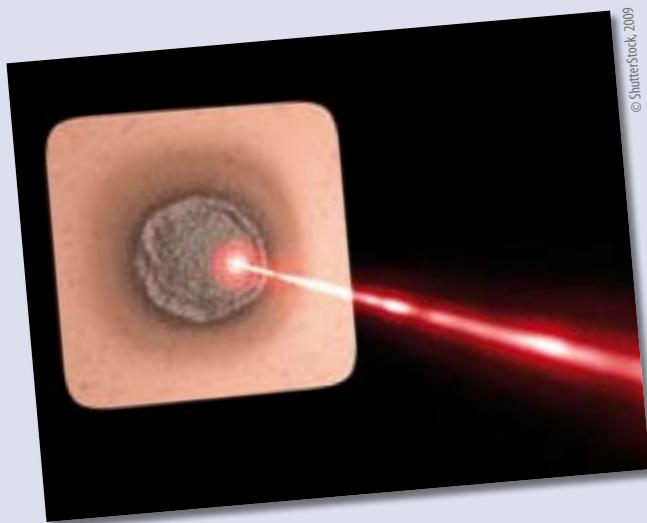
<http://cordis.europa.eu/ictresults/index.cfm?section=news&tpl=article&ID=90808>



Nanostructured materials shrink laser dimensions

Major advances in the use of self-assembled nanostructured materials for laser diodes have emerged from fundamental research. While gaining deeper insight into the underlying science, the Nanomat project partners have delivered a structure capable of lasing at 1.3 µm that could soon be ready for commercial exploitation.

The strong interest in self-assembled semiconductor quantum dots has been motivated by the possibility of exploiting their superior electrical and optical properties when compared with conventional quantum well structures. Droplets of approximately 10 nm diameter are formed naturally by the effect of strain-relaxation when one semiconductor material is grown on the surface of another having slightly different crystal lattice dimensions. As in the case of indium arsenide (InAs) on gallium arsenide



(GaAs), the self-assembly mechanism produces dots with a high degree of uniformity in a single growth step.

The Nanomat project drew on the experience of its academic partners in processing nanostructured materials and utilised some of Europe's most advanced analytical facilities to test their suitability for real-life applications. For long distance signal transmission over optical fibre cable networks, semiconductor laser devices need to operate at wavelengths of 1.3 µm where absorption effects are minimised. For a commercially viable laser diode, the threshold current for switching must also be as low as possible.

The coordinated efforts of the Nanomat project partners focused on improving the parameters of InAs/GaAs quantum dots by careful control of their growth conditions. By the end of the Nanomat project, they delivered and tested quantum dot ensembles capable of lasing at 1.3 µm with the lowest threshold current as yet recorded. This has already been incorporated into a prototype laser diode that may be at the heart of tomorrow's optical communication networks and high-speed data recording systems.

Funded under the FP5 programme Growth (Competitive and sustainable growth).

Collaboration sought: information exchange/training.

[> search > offers > 5106](http://cordis.europa.eu/marketplace)

Laser pulses with high temporal contrast

One of the last major difficulties in the development of ultra-intense and ultra-short laser systems has been addressed during the SHARP project with newly designed schemes for pulse amplification.

Oscillators generating light pulses with a duration of below 1 trillionth of a second (one femtosecond) and energy exceeding 100 nanojoules are of interest for numerous applications. Besides the common material micromachining operations, exciting opportunities have been created for physics experiments that probe unexplored domains, such as laser-assisted acceleration of ion beams.

Nevertheless, light pulses from conventional solid-state oscillators based on Kerr lens mode-locking need to be combined with an amplifier system in order to achieve the desired pulse energy of a few microjoules. The background light generated has been challenged during the SHARP project by adopting an alternative approach to cavity dumping. This so-called amplified spontaneous emission (ASE) needs to be kept as low as possible, because it is the main source of changes to target properties before the arrival of the main pulse.

In the past, acousto-optic modulators had been used to increase the energy of the laser

pulse by a few orders of magnitude at the expense, however, of the oscillator repetition rate. Researchers with the Laboratoire d'optique appliquée in France showed that it is possible to increase the efficiency of cavity dumping by using Pockel cells.

When the laser cavity becomes saturated with energy, the Pockel cells are switched and the intracavity light is allowed to exit, generating an ultra-intense pulse. Interestingly enough, with this electro-optic cavity dumping system the intra-cavity pulse energy could exceed the existing 30 nanojoule limit, which is the critical energy for acousto-optic dumping devices.

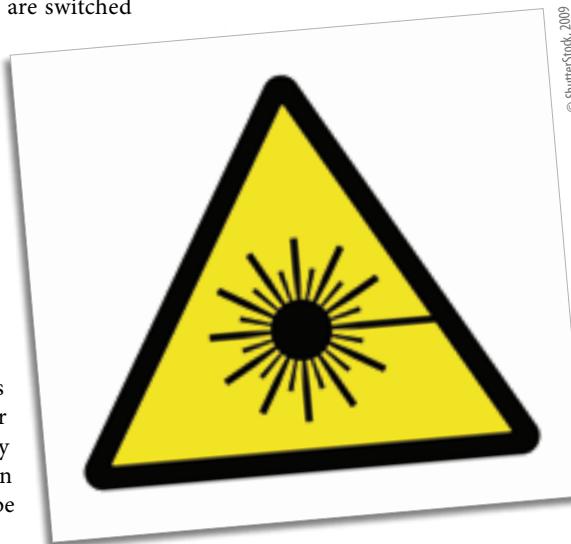
Such cavity-dumped pulses with 10 to 100 times higher energy and, more importantly without significant degradation of the pulse duration, would be

appropriate as seed pulse for the amplifier of high energy laser systems. A smaller gain would thus be needed to achieve the same power level and the ASE would be reduced. The SHARP project partners advocate further research before instabilities due to the presence of excessive Kerr nonlinearities are addressed.

Funded under the FP5 programme 'Human potential' (Improving the human research potential and the socioeconomic knowledge base).

Collaboration sought: further research or development support.

[> search > offers > 5150](http://cordis.europa.eu/marketplace)



Developing safer coating materials

A new coating was developed as an alternative to flocking. The new material not only eliminated health hazards but was also cost-effective to produce and met technical and style requirements.

Medical studies carried out over the last 20 years have indicated that flocking coatings can have a detrimental effect on the health of workers as a result of lung disease. Flocking deposits many small fibre particles, known as flock, onto a surface and is used in many household products such as bags, shoes, furniture and the interiors of cars.

Project partners from the FFLIC consortium joined forces to develop a new coating technology that would prevent microfibres from being dispersed into the environment. Particular attention was paid to the feel and to the optical and acoustic properties of the coating film, which used water-based paints as their fundamental ingredient. The FFLIC project also shortened the four-step

production process to a two-step process, thereby reducing its cost. The new coating was also easier to dispose of when it became necessary.

Researchers from Engineering & Design AG (EDAG) based in Kassel, Germany, carried out a quality analysis on the first samples that were developed. A preliminary assessment was undertaken to determine the resistance of the basic lacquer, which did not contain fibres, against ultraviolet (UV) radiation. In a series of tests lacquers were applied to a variety of plastic test panels to ascertain how paint adhesion was affected by plastic material and coating thickness.

Further tests looked at the effect created by different kinds of fibres. The results of abra-

sion and condensation were also examined. Following the tests, the lacquer formula was changed to better suit the automatic spray guns. The EDAG group also performed a climatic change test. Following rigorous examination the new coating was found to be suitable for a wide range of technical applications. The material also allowed a great deal of design freedom for stylists who considered it to be more like felt than flocking.

The properties shown by the new coating material met most of the requirements set by the automotive industry. It was also found that no fibres were emitted when a coated surface was scratched or abraded, thereby eliminating hazards posed by microfibers.

Funded under the FP5 programme Growth (Competitive and sustainable growth).

Collaboration sought: financial support.

[> search > offers > 5066](http://cordis.europa.eu/marketplace)

Superior coatings through nanoscale surface engineering

Laser processing is often considered to be an expensive process that requires substantial know-how and highly skilled staff. However, such a perception is slowly eroding as an increasing number of laser processes are being employed, beyond the widely accepted laser marking and cutting processes.

The growing complexity and sophistication of systems engineering used in many sectors, including aerospace and robotics has spurred on TRIBO project partners to adopt laser-assisted technologies in the manipulation of nanomaterials. Nanomaterials are known for their outstanding mechanical properties that may lead to enhanced wear resistance of friction joints working under severe conditions.

More specifically, laser cladding can be performed to improve the surface properties of metallic machine elements locally. A cladding material with the desired properties is fused onto a substrate by means of a laser beam. The mixing between the two materials must be as small as possible to utilise the properties of the coating material most effectively.

By improving a technical surface locally with dedicated nanomaterials, an ordinary cheap base material can be used for the surfaces that are not being exposed to high loads. Engineers at the École nationale d'ingénieurs de Saint-Étienne in France mixed various powder materials in a blend to achieve a composite coating with the desired properties.

The rapid laser processing created an array of artificial holes serving as reservoirs for

debris and solid lubricants, which would be gradually released into the contact area. The coatings developed with functionally graded material consisted of solid lubricants such as white bronze (CuSn) serving as a ductile matrix, which was however reinforced by the appropriate ceramic phase.

The wear tests that were subsequently performed showed that the dry friction coefficient of these coatings may reach values as low as 0.12. Furthermore, the unique possibility of using high energy beams to rapidly melt and remix alloying elements was exploited to improve the wear resistance of bearing steels.

The TRIBO project partners used shielding covers to avoid the evaporation of alloying elements from the surface of the base metal, in addition to combining the action of different types of

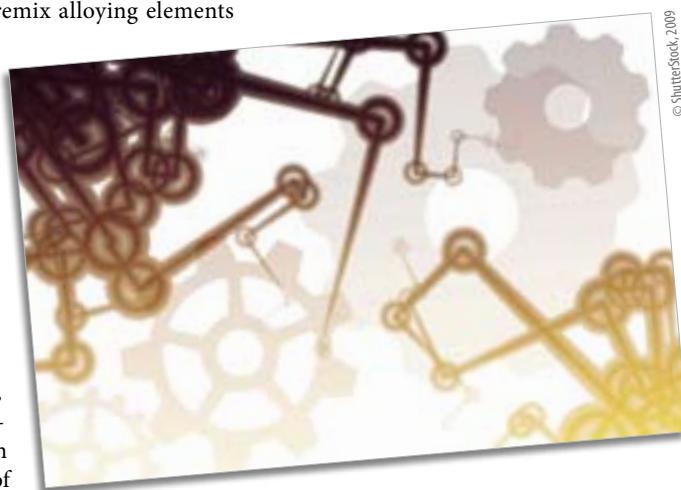
lasers. For example, pulse-periodic and continuous wave lasers were tested on systems of base metal-alloying elements such as aluminium-tin (Al-Sn) and iron-tin (Fe-Sn).

This gave rise to uniform distribution of alloying elements in the molten pool, while the fast cooling of the melt led to formation of Sn-rich precipitations, opening the way for industrial penetration of nanotechnologies. The average concentration of Sn, which can be used as a solid lubricant, was measured by X-ray microprobe analysis and was found to exceed 20 wt.

Funded under the FP5 programme Growth (Competitive and sustainable growth).

Collaboration sought: further research or development support; information exchange/training; private-public partnership; available for consultancy.

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Highly sensitive biomimetic optical sensors

Two basic technologies, biorecognition materials and highly sensitive optical sensors, have been successfully integrated during the MENDOS project, opening the way to the rapid screening of environmental samples for emerging contaminants.

During the last few years, there is a growing awareness of the occurrence and toxicological impact of natural and synthetic trace compounds in the environment. These trace compounds, referred to as emerging contaminants, have been reported to cause adverse effects in wildlife habitats and humans.



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The MENDOS project concentrated on those trace compounds that can interfere with the normal functions of the endocrine system, which controls growth and development of living organisms. By combining optical sensor technology with molecularly imprinted polymers (MIPs), all the drawbacks of current technologies, relying almost exclusively on biological or biochemical assays, were avoided.

With molecular-sized and precisely shaped cavities that enable them to bind to target molecules, MIPs represent a new class of smart materials. Specifically, their ability to selectively extract one or several structurally similar analytes from complex environment mixtures made MIPs ideal for screening endocrine disrupting compounds at trace concentrations.

On the other hand, optical sensors that convert the analyte binding signals to measurable electric ones do not require any labelling or the particular properties of the target analytes. At the laboratories of the Universität Tübingen in Germany, an integrated

sensor setup based on Mach-Zehnder interferometers was developed that promises the highest sensitivity among optical sensors.

Integrated optical Mach-Zehnder interferometers supply information on changes in refractive index and/or thickness of MIP films placed on top of one of its surface wave-guides. However, the suitability of MIP films for sensors based on reflectometric interference spectroscopy (RIFS) and surface plasmon resonance (SPR) was also evaluated.

Although it was not possible to establish a fully functional MIP-based optical sensor platform, significant advances have been made in integrating biomimetic recognition materials into optical sensor systems. After further refinement and validation, these biomimetic optical sensors could be used to screen environmental samples for trace compounds with potential endocrine disrupting effects.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support; financial support; private-public partnership.

[> search > offers > 5071](http://cordis.europa.eu/marketplace)

of binding and eluting chemical agents can be applied without losing their detection and recognition capabilities. The MENDOS project partner recognised in MIPs a robust means of selectively extracting BaP from complex aqueous samples, including tap water and lake water.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support; financial support; information exchange/training; available for consultancy.

[> search > offers > 5094](http://cordis.europa.eu/marketplace)

Biomimetic materials for the characterisation of water samples

Aiming to address the pressing need to assess the endocrine disrupting potential of thousands of chemicals found in common products, an EU-funded project has introduced novel materials with unique recognition abilities.

Endocrine disrupting chemicals (EDCs) can interfere with the reproduction system of humans and animals by mimicking hormones. A large number of chemicals with potential endocrine disrupting activity are found among industrial chemicals, pesticides and pharmaceuticals, but also among natural products such as phytohormones.

During the three-year MENDOS project several key steps towards the development of novel screening systems for EDCs were achieved. Aiming beyond current technologies that rely almost exclusively on biological or biochemical assays, researchers at ARC Seibersdorf research GmbH designed artificial systems mimicking their natural recognition abilities.

Molecularly imprinted polymers (MIPs) which can recognise, by their structure, priority pollutants such as benzo[a]pyrene (BaP) were synthesised in bulk format, as well as in the form of microspheres. Next

to selectivity, the particle size of MIPs was considered of high importance since this is directly related to their affinity capability.

The size and morphology of MIPs could be controlled by varying polymerisation conditions and the concentration of either 4-vinylpyridine or divinylbenzene incorporated as cross-linking monomers between polymer chains. Chromatographic evaluation revealed pronounced selectivity of the developed MIPs with dimensions ranging from 10 to 25 µm. Moreover, the high antibody-like binding properties recommended MIPs as promising solid-phase extraction (SPE) sorbents.

It was demonstrated that MIPs compare favourably with commercially available SPE sorbents in terms of selectivity and recovery. MIPs were proven to remain stable under harsh chemical conditions, and a wide range



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Modelling nano-worlds

Modelling the fabrication processes for integrated circuits can slash production development time and costs by up to 40 %. But as transistors, already at nano-scales, become ever smaller, researchers are modelling new worlds.

Over the past seven years, the microprocessors in everyday electronic equipment have delivered astonishing advances in speed while reducing power consumption per transistor.

That is because the scale of the transistors manufactured in high volumes for these electronic devices decreased considerably. Current research is preparing for the 32 and 22 nm nodes and even beyond.

'At these nodes many new materials and processes are introduced and the devices become so small that we cannot be sure that the concepts developed for simulating the manufacture of larger devices can be transferred directly,' says Dr Peter Pichler, a leading researcher in computer modelling of advanced manufacturing processes from the Fraunhofer Institute for Integrated Systems and Device Technology in Germany.

Computer aided design (CAD) for new technology is becoming increasingly important as transistor fabrication grows more complex and three-dimensional. Modelling in this way can save up to 40 % on development costs for manufacturing technology.

The capabilities of CAD technology have been extended by Pichler and his colleagues in a major EU-funded project. The quantitative models built by the Atomics project will enable breakthrough simulations and optimisation of nano-devices at the 32 nm technology node and beyond.

Important developments by the Atomics team were made in modelling the activation or deactivation of dopants in silicon. Dopants are impurities added in small quantities to modify semiconductors' elec-

trical conductivity. Semiconductors such as silicon or germanium are crystalline lattices in which each atom shares electrons with four neighbours.

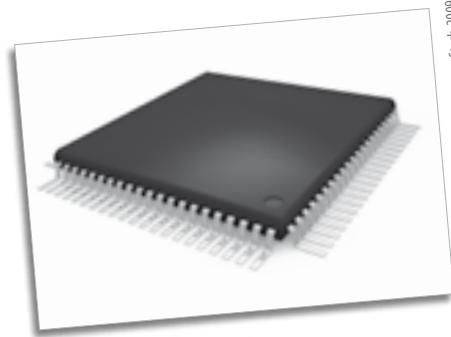
Replacing some atoms with atoms of other elements, such as phosphorus or arsenic that have five bonding electrons, makes extra electrons available. Because of the additional negative charges, these are called n-type (for negative). Doping with acceptor atoms such as boron, which have only three electrons available, creates 'holes' that are positively charged (p-type for positive).

The performance of microprocessors depends on extremely precise methods of ion implantation for almost all doping in silicon integrated circuits (ion implantation is more precise, reliable and repeatable than the older thermal diffusion of deposited dopants used previously). To dope a semiconductor wafer, a stream of ions is fired into the substrate so that the ions come to rest around a defined depth beneath the silicon surface.

'As long as ion implantation remains the standard technique for doping, especially in this context, you will need very high doping concentrations, requiring very high dose ion implantations,' says Pichler. 'However, ion implantation does a lot of damage to the crystal and a damaged crystal does not give you good performance in devices.'

Therefore annealing is used to repair implantation-induced crystal damage through the application of very high temperatures. The earliest annealing procedures were at temperatures of 900 °C and above for hundreds of minutes. Miniaturisation required a continuous reduction of the 'thermal budget', which originally referred to the product of annealing time and temperature.

Annealing in today's production processes usually means a rapid increase to the peak temperature of around 1050 °C followed by immediate cooling. New techniques such as flash anneal-



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ing or non-melt laser annealing will reduce the annealing process from seconds to milliseconds.

The work undertaken by Atomics has also helped to define the research route to computer modelling of processes such as flash annealing, according to Pichler. For many years, silicon dioxide has been the material of choice in field-effect transistors because of its uniformity and high interface quality. But with the 32 nm process, silicon dioxide and related materials, such as nitrided oxides, are reaching their limits and new materials need to be introduced. That adds complexity to the manufacturing process.

The Atomics team established quantitative models for new materials. Most important is probably 'strained' silicon. But also silicon-germanium alloys and advanced point-defect engineering methods were investigated.

Silicon is strained when the silicon atoms are stretched beyond their normal interatomic distance. This can be achieved by putting the layer of silicon over a substrate of silicon germanium. As the atoms in the silicon layer align with the atoms of the underlying SiGe layer, the links between the silicon atoms become stretched — or strained. Moving the atoms apart reduces the atomic forces that interfere with the movement of electrons through the transistor. They can move 70 % faster through a strained silicon transistor and switch 35 % faster, resulting in better chip performance and lower energy consumption.

The models created by the Atomics team have been validated by STMicroelectronics, a globally acting manufacturer of very advanced integrated circuits. And the lessons learnt in Atomics are already being applied by industry. The models have been integrated into Sentaurus Process, the industry-leading process simulation software from Synopsys.



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<http://cordis.europa.eu/ictresults/index.cfm?section=news&tpl=article&ID=90804>

Monitoring wheel dressing for precision grinding

Grinding has always been one of the most precise manufacturing processes. With the appearance of hard metals and ceramics, it has become even more important as a machining method. However, extremely hard materials demand not only selection of the right grinding tools, but also proper dressing tools and their correct use.

A rounded, blunt diamond cannot be expected to produce the same texture of grinding surface as that produced by a sharp diamond. Likewise, it is not possible to produce as smooth and burr-free a cutting surface with light feed and slow traverse speed as can be produced with a heavier feed and high traverse speed.

While the selection of the right grinding wheels is of primary importance in the production of high-grade work, the selection of the appropriate truing tool and its proper use should not be neglected. In fact, incorrect dressing may cause the right grinding wheel to work in an unsatisfactory manner. On the other hand, a skilful operator with the proper dressing tool can reshape a wheel that does not exactly fit the requirements of a specific job.

During the ENGY project, researchers at the Leibniz Universität Hannover in Germany evaluated the effectiveness of acoustic emis-

sion (AE) sensors in online monitoring of dressing. AE sensors have proved to be superior to other sensors, such as force sensors, due to their temperature stability and, more importantly, their high sensitivity. Furthermore, AE sensors are relatively inexpensive and easy to mount.

The ENGY project partners focused on two aspects of the dressing process. The first was the detection of undesired imperfections, such as an out-of-round wheel or wheel contour errors. Usually, the effects of previous dressing or grinding conditions can be eliminated through successive passes. Dressing errors, however, can adversely affect the quality of dressing wheel as the result of fluctuations in dressing depth or dresser wear.

The AE signal indicates whether the dressing depth has remained constant or the dressing lead fluctuates. The latter ultimately influences the surface roughness of the machined workpiece, the other aspect of the dressing process sought to be addressed. The ENGY project team conclusively established that this monitoring strategy produced more consistent results with less variations of the surface roughness.

Funded under the FP5 programme Growth (Competitive and sustainable growth).

Collaboration sought: further research or development support; information exchange/training; available for consultancy.

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Bridging the gap between theory and operational practice

Fatigue is one of the principle sources of damage for aircraft components subjected to high temperatures. The theoretical model developed during the IDA project can be used to accurately predict the growth of fatigue cracks, a parameter essential for maintenance of an ageing aircraft fleet in the airline industry.

Due to their superior mechanical properties and low densities, aluminium alloys have an edge over other structural materials for aircrafts. The airframe of most modern aircrafts consists of approximately 80 %

aluminium in terms of weight. The high strength aluminium alloy 2024, specifically, remains the preferred material for damage critical areas due to its resistance to crack propagation.

On the other hand, medium strength aluminium alloys are used in those areas where it is important to increase strength without excess material. The greatest potential for commercial exploitation is offered by aluminium alloys such as high-purity aluminium-zinc-magnesium (Al-Zn-Mg) alloys. The ultimate objective of the IDA project was to confirm that the theoretical properties of aluminium alloy 2024 verified by experience are transferable to other alloys.

Project partners at the Institute of Structures and Advanced Materials in Greece proposed a new model to predict the rate with which fatigue cracks grow. They took into consideration that the

crack growth rate depends not only on the magnitude of applied stress, but also on the morphology of the crack. Furthermore, crack growth was assumed to correspond to the growth of the plastic deformation zone.

For assessing the lifetime of aircraft structural components, localised plastic deformation was attributed to residual stresses developed in the material ahead of the crack after overloads. The stress intensity was calculated numerically using finite elements. On the other hand, because materials behave differently when subjected to cyclic and monotonic loads, their mechanical properties obtained from tests where the load applied is steadily increased and then reversed were used.

The validity of the proposed model was verified on aluminium alloy specimens and the obtained analytical results were in good agreement with actual test data from fatigue investigations. In addition, information on the evolution of fatigue damage could be provided for service conditions that are difficult to reproduce in the laboratory because of the complexity of the load spectrum.

Funded under the FP5 programme Growth (Competitive and sustainable growth).

Collaboration sought: further research or development support.

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The following upcoming events were selected from the event diary of the Directorate-General for Research and from the CORDIS event calendar. For further information on past and upcoming events, please visit:

<http://ec.europa.eu/research/events>
<http://cordis.europa.eu/events>

Winter school in theoretical physics

A winter school in theoretical physics entitled 'Frontiers in high-energy physics' will be held from 27 December 2009 to 5 January 2010 in Jerusalem, Israel.

The event is designed for advanced graduate students and postdoctoral fellows from all over the world. Jointly organised by the Institute for Advanced Studies (IAS) of Jerusalem and the European Science Foundation (ESF), the event features a variety of speakers from renowned institutes in Canada, Germany, Israel and the United States.

For further information, please visit:
<http://www.as.huji.ac.il/schools/phys27>

Conference on ethics, biometrics policy and international data sharing

The 'Third international conference on ethics, biometrics policy and international data sharing' will take place in Hong Kong, China, on 4 and 5 January 2010.

The conference will focus on research into ethics and policies in the fields of biometrics and data sharing. As the use of biometrics is becoming popular, more concerns on the ethics, privacy and policy implications of biometrics are being raised.

The event is organised by the EU-funded 'Rising pan-European and international awareness of biometrics and security ethics' (RISE) project, which brings together nine institutions from China, Europe, India and the United States.

For further information, please visit:
<http://www.comp.polyu.edu.hk/conference/iceb>

Conference on the hydrogen economy

A conference on 'The hydrogen economy: generation, storage and infrastructure' will take place in London, United Kingdom, on 20 January 2010.

The United Kingdom has a leading role in the race to develop low-carbon tech-

nologies. The emergence of the hydrogen economy has been championed as a future-proofing society against the current energy deficit and climate change. Many obstacles still remain, though, and both academia and industry now must work together to overcome them.

The aim of this event is to provide a forum for industry and academia to interact and explore potential business opportunities, and to learn about the latest innovations within hydrogen technologies including hydrogen generation, materials science for storage and building future low-carbon infrastructures.

For further information, please visit:
http://www.ltnetwork.org/pooled/articles/BF_EVENTART/view.asp?Q=BF_EVENTART_315762

Workshop on sustainable aquaculture in southern Europe

The EU-funded 'Sustainable extensive and semi-intensive coastal aquaculture in southern Europe' (Seacase) project is organising its final workshop on 20 and 21 January 2010 in Tavira, Portugal.

Centred on issues related to sustainable coastal aquaculture in southern Europe, a combination of presentation and poster sessions will address the following topics:

- semi-extensive nurseries;
- extensive systems in ponds and lagoons;
- semi-intensive systems;
- an integrated system;
- technical improvement;
- product quality and certification;
- the current status of extensive and semi-intensive aquaculture and socio-economic assessment.

Funded under the Policies thematic area of the Sixth Framework Programme (FP6), the Seacase project has been developing tools to maintain competitiveness, productivity, profitability and thus sustainability of extensive and semi-intensive aquaculture production in southern Europe. This is to minimise environmental impacts while improving the quality and public image of resulting products.

For further information, please visit:
<http://www.seacase.org/workshop.html>

Conference on the economics of culture, institutions and crime

A conference on 'Economics of culture, institutions and crime' will be held from 20 to 22 January 2010 in Milan, Italy.

Economists have recently started to explore the role of cultural traits and beliefs, cultural diversity, social norms and endogenous preferences for a wide range of socioeconomic interactions. Such elements seem to be crucial for the functioning of institutions and legal systems.

The conference will address some of the following topics:

- dynamic models of cultural transmission and cultural diversity;
- cultural diversity and discrimination;
- political economy of culture and institutions;
- socioeconomic and cultural determinants of crime;
- globalisation, migration and cultural evolution;
- social capital and economic development;
- evolution of culture and institutional change;
- segregation, integration and conflicts;
- historical origins of culture and institutions.

The event is organised by the EU-funded 'Sustainable development in a diverse world' (SUS.DIV) network of excellence, the University of Padua and the Fondazione Eni Enrico Mattei (FEEM).

For further information, please visit:
<http://www.susdiv.org>

Seasar workshop

The European Space Agency (ESA) will hold its third synthetic aperture radar (SAR) oceanography workshop, 'Seasar 2010', from 25 to 29 January 2010 in Frascati, Italy.

Entitled 'Advances in SAR oceanography from Envisat (environmental satellite), ERS and ESA third party missions', the workshop will be dedicated to:

- wave mode processing algorithms;
- ocean wind applications;
- ocean current applications;
- wave applications;
- ice applications;
- oil spill and ship detection;
- methodology and techniques.

The workshop is open to ESA principal investigators and co-investigators, scientists and students working in the field of SAR oceanography, and to representatives from national, European and international space agencies and industry.

For further information, please visit:
<http://earth.esa.int/workshops/seasar2010>

Workshop on multibody dynamics for space applications

The European Space Agency (ESA) will hold a workshop on multibody dynamics for space applications on 2 and 3 February 2010 in Noordwijk, the Netherlands.

The workshop aims to highlight the performance of new technologies and potential applications and promote the competence of European organisations in the field of multibody dynamics. It will bring together representatives of European industry, institutions and universities in order to present and discuss the latest developments in multibody dynamics theory and to explore innovative approaches for aerospace applications.

A variety of topics will be addressed, including:

- flexible multibody dynamics;
- mechanisms dynamics;
- launch vehicle dynamics;
- deployable systems;
- robotic systems;
- control and mechatronics;
- numerical and computational methods;
- multibody software development;
- active and passive controls;
- nonlinear dynamics and vibration;
- multidisciplinary applications.

For further information, please visit:
<http://www.congrex.nl/10m02>

Conference on policy, growth, corporate research and development

The second European 'Conference on corporate research and development' ('Concord 2010') will take place in Seville, Spain, from 3 to 4 March 2010.

Entitled 'Corporate R & D — an engine for growth, a challenge for European policy', the event is being organised by the Institute for Prospective Technological Studies (IPTS) of the European Commission's Joint Research Centre (JRC) and the Spanish Centre for Development of Industrial Technology (CDTI).

The conference aims to link science, business and policy-making, and looks to promote understanding of the policy implications of scientific findings. In particular, it will address the dynamics of corporate R & D, innovation, competitiveness and economic growth.

Organisationaly, the first day of the event will be a forum for academics and practitioners. The second will be devoted to the policy dimension of corporate R & D,

based on the most relevant policy outcomes of debate on the previous day.

For further information, please visit:
<http://iri.jrc.ec.europa.eu/concord-2010>

Workshop series for young journalists

The EU-funded 'My science European program for young journalists' ('My science') project is organising a series of workshops for young journalists.

Approximately 90 young journalists will have the chance to spend one week in one of several European research laboratories, where they will meet researchers, observe scientific experiments and improve their understanding of science.

Individual workshops are the following:

- 'Stem cell and nuclear transfer cloning technologies', BioTalentum, Gödöllő, Hungary (25 to 30 January 2010);
- 'Renewable energy', Europäische Akademie Bozen (EURAC), Institute of Renewable Energy, Bozen, Italy (22 to 27 February 2010);
- 'Environment', EURAC Institute of Applied Remote Sensing, Bozen, Italy (22 to 27 February 2010);
- 'Humanities', EURAC Institute of Minority Rights, Bozen, Italy (22 to 27 February 2010);
- 'Chemical technologies', Institute of Chemical Technology, Prague, Czech Republic (8 to 13 March 2010).

For further information, please visit:
<http://www.my-science.eu>

Week of innovative regions in Europe

The 'European week of innovative regions in Europe' ('WIRE 2010') will take place from 15 to 17 March 2010 in Granada, Spain.

Under the aegis of the Spanish EU Council Presidency in the first half of 2010, the Spanish government will take the opportunity to focus the attention of political leaders and social stakeholders on the competitiveness of European regions. In particular, the event will concentrate on the use of the resources devoted to research and development (R&D), specially the structural funds (SF) and their potential synergy with the EU's Framework Programmes (FPs) and the 'Competitiveness and innovation framework programme' (CIP).

'WIRE 2010' will encompass three different events:

- a conference on the efficient and effective use of the budget earmarked in the

SFs for research and technology development (RTD) and innovation, including their synergies with the FPs and the CIP;

- a conference on research potential, which focuses on the assessment of the results and identification of best practices of the 'Research Potential' (RegPot) calls within the FP7 Capacities programme, aimed at the increase of the research capabilities of the best research centres of the European regions;
- a 'Regions of Knowledge' conference, which deals with the assessment of the results and the identification of best practices of the 'Regions of Knowledge' (Regions) calls within the FP7 Capacities programme.

For further information, please visit:
<http://web.micinn.es/wire>

Workshop series on gender aspects in research

The EU-funded 'Gender in research — toolkit and training' project is offering a series of training workshops on how to integrate gender aspects into FP7 research between September 2009 and November 2010.

These one-day training sessions are intended for anybody interested in rendering research gender-sensitive: researchers, project managers, national contact points (NCP), expert evaluators and others. The sessions will provide practical guidance on how the gender dimension can be integrated in research, using clear examples of how gender is relevant to existing FP7 projects.

Training sessions will take place at different locations across Europe and address different areas of research. The following dates have been set up to February 2010:

- 18 January 2010, Brno, Czech Republic: nanosciences, materials and new production technologies/transport;
- 19 January 2010, Prague, Czech Republic: health/transport;
- 9 February 2010, Berlin, Germany: energy/nanosciences, materials and new production technologies;
- 23 February 2010, Dübendorf, Switzerland: nanosciences, nanotechnologies, materials and new production technologies/environment;
- 24 February 2010, Zurich, Switzerland: energy/nanosciences, materials and new production technologies;
- 26 February 2010, Brussels, Belgium: environment/food, agriculture and biotechnology.

For further information, please visit:
http://www.yellowwindow.be/genderinresearch/index_calendar.html

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