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RESULTS SUPPLEMENT

- Biology and medicine 5
- Energy 17
- Environment 21
- IT and telecommunications 26
- Industrial technologies 39

In this issue

- Bumblebee disease studied, *page 5*
- Reliability of rural electrification systems, *page 17*
- Cloning salt- and drought-resistant poplars, *page 21*
- Me, myself and I: manage online identity more safely, *page 26*
- New processing methods for cotton-based materials, *page 39*



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Something for everyone

There's something for everyone on the Technology Marketplace (TMP),
and therefore there should be something for everyone in the *research*eu*
results supplement. TMP disseminates exploitable results from every
area of EU-funded research. Whether you are interested in aeronautics
or agriculture, in information society technologies, nanoscience or
sustainable development, some of the latest updates on the TMP are
bound to catch your attention.



Our selection for this issue begins with research on a fungal disease threatening the health of
the bumblebee, with significant consequences not just for our little furry friends, but also for
the businesses that rely on their help with crop pollination, and for natural ecosystems. The
disease, caused by the parasite *Nosema bombi*, was at the centre of the work of the Pollinator
project, and is also the focus of the lead article in the biology and medicine section.

In the energy section, we take a closer look at electrification in rural areas around the world,
particularly in the context of their sustainable development. Research conducted by the
Taqsolre project has assessed the suitability of stand-alone photovoltaic systems, analysed
their potential as well as the obstacles to their implementation, and delivered valuable
recommendations.

The environment section features research into the cloning of salt- and drought-resistant
poplars for the reforestation of desertified areas. The Establish project has identified species
such as *Populus euphratica* and *Populus alba* as particularly promising candidates likely to
thrive in inhospitable conditions.

The IT and telecommunications section opens with an article from the ICT Results service,
which regularly contributes material to the *research*eu* results supplement. In this issue, we
are highlighting research into the management of online identities. At a time when forms of
computer crime cashing in on the personal information of unsuspecting computer users is
becoming a growing concern, the PRIME project's guidance on keeping our data safe online
will be more than welcome even to experienced webheads.

As usual, the industrial technologies section brings up the rear, this time with insights into
the potential of corona plasmatic technology to optimise the production of cotton-based
materials. The outcomes of the Cortex project, devoted to corona irradiation in textile
finishing, may help to boost the competitiveness of the European textile industry.

All the projects presented in the supplement are looking for cooperation partners in specific
areas. Some may be seeking financial support to pursue further R & D activities, others may
be ready to conclude manufacturing or marketing agreements, engage in a joint venture or a
public-private partnership, or willing to exchange information. All of them will welcome interest
in their work. Please contact the projects directly if you would like to know more about their
technologies. Address information is available online following the path provided in reference.

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BIOLOGY AND MEDICINE

Bumblebee disease studied	5
Studying inter-vertebral disc degeneration	
Insight on parasite transmission among fish	6
New lupin drinks developed	
Processes for producing lupin protein isolates	
Recombinant fish proteins	7
Sea lice prophylactic for wild fish	
Online measurement tool for the wine industry	
Plant preservation progresses	8
High-pressure processing for food safety	
Improving cryopreservation protocols	9
Protocols for cryoconservation of plant germplasm	
Consumer acceptance of high-pressure food processing	
Optimising the delivery of stroke care	10
Speedy immunoassay for isoflavins	
How policies affect family care for elderly people	11
Pinpointing healthy ageing markers	
Natural killer cells in healthy elderly individuals	
Plant genes make life comfortable for nematodes	12
Nematode feeding sites investigated	
Interferon immunogenicity prediction	13
A new platform to exchange genetic ideas	
Developing methods to detect banned nitrofurans	14
Understanding para-TB epidemiology	
Mapping milk production traits	
Innovative animal breeding techniques	15
Online tools in the fight against mastitis in cattle	
Genetic marker test for mastitis	
Making nursing conditions attractive	16
Recruitment and retention of nurses in the United Kingdom	

ENERGY

Reliability of rural electrification systems	17
Assessing solar rural electrification	
Focus and forum for wood energy sources	
Improved eco-friendly combustion engines	18
Optimising the design of internal combustion engines	
Eliminating 'engine knock' for increased operating efficiency	
Patent database software online	19
Turning pig manure into an energy source	
For more reliable wind turbine technology	20
Water and sun — the future energy sources	
Model library for direct steam generation	

ENVIRONMENT

Cloning salt- and drought-resistant poplars	21
Microsatellite DNA study for stress-tolerant trees	
Watch maps assist landslide early warning	22
Bringing optical technology to the seismograph	
Investigating snow with microwaves	
Climate change and soil health	23
Simulation of carbon dioxide sources and sinks	



IT AND TELECOMMUNICATIONS

Modelling the interplay between water and contaminants in urban areas	24
ICTs for river basin management	
Remote sensing for eutrophication monitoring	
Groundwater contamination assessment tool	25
Encouraging public participation in river basin management	
Me, myself and I: manage online identity more safely	26
Computer interaction gets some humanity	27
Advanced spatial presence methodology	28
Near-photorealistic 3D visualisation	
Depicting real presence in a sense of place	
Haptics: just reach out and touch, virtually	29
Towards global deployment of IPv6	30
Domain names for accessing Internet resources	
Dual IPv4 and IPv6 multicast deployment	31
Designing the next generation of WLAN terminals	
For global, open and dynamic computing environments	32
Intelligent agents reasoning about web services	
A priori verification of web services	
Palpable computing: a taste of things to come	33
Managing secure IPv6 exchanges	34
Legal aspects of Internet protocol version 6	
Deploying the semantic web	35
Co-design of embedded hardware/software systems	
Programming for the global computing environment	36
Computer-aided improvement of articulation	
Education in the third dimension	
Providing for successful ontology reuse	37
Fast-learning computer translates from four languages	38

INDUSTRIAL TECHNOLOGIES

New processing methods for cotton-based materials	39
Novel furry coatings for special effects	
Guidelines for a more comfortable cruise	40
Eco-friendly, light components for transportation	
Airport safety: magnetic fingerprinting in the fog?	
Improving safety in floating offshore structures	41
Eco-efficient hydraulic systems	42
Thermal infrared sensors for accurate motion detection	
Artificial ageing of copper artefacts	43
Dry release for ultrasensitive mass sensors	
Advanced measurement technology for coatings	44
A crystal ball for polymer properties	
Innovative method for nanostructured coatings	
Reducing vehicle dependence at universities	45
Toolbox for polymer production	
Eco-friendly interconnection technology	46
Software gets smart cars talking	
Innovative lanthanide compounds for optoelectronics	47
Monitoring composite tanks	
Advanced technique for composite tank manufacture	

Bumblebee disease studied

The health of commercial colonies of bumblebees used for pollinating greenhouse crops is in jeopardy due to transportable parasitic infections. To help combat this threat, a European study has analysed the genome of one fungal parasite.



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Bumblebees (*Bombus* spp) are very effective pollinators, both commercially and in natural ecosystems. Their feeding activities indirectly promote genetic variation and biodiversity. Moreover, insect pollination is essential for the production of seed from species that rely on outbreeding mechanisms. However, there is evidence that there is a consistent decline in numbers (with possible extinction) in some bumblebee species, which is naturally of concern to conservationists and ecologists.

Bumblebee rearing has developed into a commercial success due to the insect's efficacy in pollinating greenhouse crops. However, development of hundreds of thousands of colonies of bumblebees is bound to be accompanied with an ecological price. One of these is the parasitic disease *Nosema bombi*, a fungal disease that produces spores primarily in the excretory and nervous system of the bee. Apart from physiological effects including diarrhoea and a swollen abdomen, the queen is inhibited from mating and the viability of infected bees decreases.

Colonies of bumblebees are bred worldwide and transported between countries and continents. To avoid introduction of non-endemic species of parasites, it is essential to investigate the genetic make-up of the invader. With commercial interests in mind, together with the future of the European bumblebee population generally, the Pollinator project conducted a study of *Nosema bombi*. The team at Queen's University, Belfast, specifically investigated the genome of the parasite for host-specific variation and possible genetic markers.

The scientists created a genomic library to provide DNA regions that could be investigated for their suitability as genetic and phylogeographical markers. Illuminating results were produced when genetic sequences were isolated from only two spores of the fungus found within one bumblebee.

Amplification, cloning and sequencing revealed that there were multiple ribosomal RNA copies that would give rise to different or non-homologous DNA sequences. The implications of this are that concerted evolution has not produced identical genetic sequences within one spore.

Exotic parasite introductions have a habit of creating havoc within established ecosystems. Armed with results of this nature, science may be one step ahead of the genetic evolution of the fungus and more able to control the parasite within commercial populations of the bumblebee.

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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Studying inter-vertebral disc degeneration

Within the scope of the Eurodisc project, researchers investigated the relationships between the changes in the mechanical environment, cellular activity and tissue breakdown in relation to conditions associated with disc degeneration.

Inter-vertebral disc degeneration, related to spinal disorders including back pain, is the main source of disability in the elderly section of the population. This sort of disorder is a result of a complex interaction between ageing, genetics and lifestyle factors.

Motivated by this observation, the Eurodisc project focused on gaining a better understanding of conditions associated with spinal disc degeneration. This involved detailed studies on the inter-relations between mechanical changes, cellular activity and tissue breakdown.

Aiming to explore the impact of high mechanical loads on inter-vertebral disc cells, the

experimental set-up included an innovative hydrostatic pressure device. This applied high hydrostatic pressure with minimum loads of the order of 3 MPa with the aid of a compression cylinder.

Cell-seeded scaffolds were sealed in sterile infusion bags which were filled with culture medium. These bags were introduced into the device's cylinder tube, which had all its residual air removed and was filled with fluid. For the purposes of the application, a calibrated machine provided the hydraulic loading frame, and a computer-based loading programme supplied the hydrostatic pressure, which was sensor monitored.

Changes in the applied pressure conditions included variation of the pressure magnitude and the duration and the number of repetitions of loading cycles. Apart from disc cell scaffolds, complete disc samples could also be loaded. The obtained results were further analysed and provided disc cell gene expression, cell viability and cell signalling molecules in conditioned media. These were further compared against those derived from control cultures without any load application provided. For further information, please visit: <http://www.physiol.ox.ac.uk/Eurodisc>

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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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

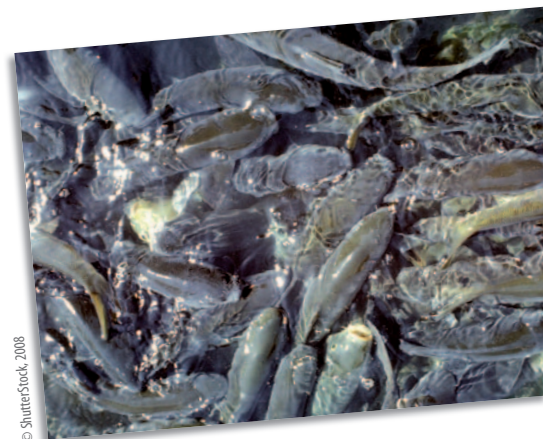
Insight on parasite transmission among fish

The transmission of the myxidiosis parasite among fish in three different ways has been confirmed, and variances of onset and course of infection were investigated.

Enteromyxum leei (*E. leei*) is a critical pathogen for *Sparus aurata* and other fish cultured in the Mediterranean and is responsible for the disease myxidiosis. It causes high mortalities both in netpens and in land-based mariculture systems, with subsequent economical impact. Although myxidiosis is highly relevant, there are major limitations in the knowledge of the parasite's life cycle, transmission, epidemiology, mechanisms of infection and immunology.

In light of this, the MyxFishControl project examined the transmission of *E. leei* through

three routes: cohabitation, oral, and contaminated effluent. Some factors taken into consideration were parasite availability, entry route, differences in fish susceptibility and temperature. As it turns out, parasite stages were located in the different areas of the intestinal tract. Other parts of the digestive system such as the stomach and gall bladder as well as the haematopoietic organs, liver and blood were never found to be infected. Parasites were found primarily in small patches, in which initial stages were usually located in the periphery and more mature stages in the central area.



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Collaboration sought: information exchange/training.

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New lupin drinks developed

Researchers have developed processes to produce new lupin-based drinks. These products were tested for nutrient content and evaluated by a panel of consumers.

The lupin has long been used as a cheap livestock food due to its high protein content. Recently though, further properties have been discovered that could launch it into the realm of a nutritious health food with a string of medical benefits. The seeds are low in lipids and are lactose and gluten free. As part of the diet, they can reduce the risk of developing cardiovascular disease and hyperglycaemia. Agriculturally, the lupin is an aesthetically pleasing crop which is also a nitrogen fixer and therefore deposits nitrogen in the soil.

The partners in the 'Healthy profood' project researched methods to produce food products from lupin ingredients. The team at

Terrena, an agricultural cooperative in France, focused on the production of a vegetable drink that would be a replacement for drinks based on soy or cow's milk. Two basic methods were developed, the first using lupin protein isolate and the second, lupin flour.

The protein-based drink was prepared using high-pressure homogenisation. As for lupin flour products, the scientists extracted the protein at a basic pH in order to obtain the most soluble products. Ultra heat treatment sterilised the drink to increase the shelf life. Analysis of the vanilla-flavoured product showed it was rich in protein, omega-3 and minerals calcium, iron and magnesium.

The cocoa- and vanilla-flavoured drinks were evaluated by a panel on the basis of sensory appeal. Opinions overall indicated that the lupin drinks were comparable to, or better than their soy equivalent as regards appearance, smell, colour and taste.

Lupin-based drinks seem set to expand their market share in the future. As an alternative to genetically modified soy or animal protein, the lupin drink can occupy a niche for a healthy, delicious, nutritious drink. Furthermore, there are possibilities for the development of yogurt- or cream-type products.

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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Processes for producing lupin protein isolates

A European project has developed economically competitive processes for preparing lupin protein isolates (LPIs). This was undertaken while ensuring the optimal technological, sensory and nutritional characteristics of the lupin seeds.

The 'Healthy profood' project aimed to obtain food ingredients from lupin seeds. Two different processes have been developed for the production of LPIs. This included an innovative procedure, from project partner Fraunhofer-Institut Verfahrenstechnik und Verpackung, for separating native protein products from sweet white lupin seeds. The process involved the cleaning, de-hulling and flaking of the seeds, followed by de-oiling with hexane. The resulting white flakes are input material for protein extraction, which was carried out in a new pilot facility.

A second partner, Bioraf, developed a process based on the use of enzymes and the

subsequent ultrafiltration of the protein extract. The result was a native protein concentrate, Protein VI, with a fat content around 7.8 % and a protein concentration of 80 to 90 %. The remaining material contained lipids, lipid-soluble compounds and ash. Lipid-soluble compounds, such as fat-soluble vitamins and phenolics, contribute as antioxidants and are partly retained in the protein product VI. Evaluation of Protein VI showed that the emulsifying properties were competitive in different applications compared to solvent defatted protein isolates. However, Protein VI did not show foaming properties. Both processes were studied using cost models which showed that the

processing of white and yellow lupins into LPIs would be economically viable.

Terrena, a third partner, was responsible for selecting and supplying lupin seeds. Three varieties gave good results: Aster, a winter variety, and Energy and Ares, which are springtime varieties. Selection criteria involved stability of the protein, fat and fibre content, and low levels of antinutritional compounds (particularly alkaloids). Terrena produced an improved flour that could be used as a raw material in the production of concentrate and isolates.

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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Recombinant fish proteins

The dietary balance of fish populations in fish farms is of paramount importance since it can seriously affect overall productivity and health.

The EU-funded Fishcal project studied the role of calcium in fish metabolism and the different sources of calcium for fish growing in aquaculture. Particular emphasis was placed on calcium needs at different stages of development, growth and reproduction. In addition, the role of parathyroid hormone-related peptide (PTHrP) in calcium homeostasis was examined.

The Centre of Marine Sciences, a project partner in Portugal, carried out research work in order to develop the tools necessary for the variety of PTHrP-based studies. Creating recombinant PTHrP *in vitro* with the

same profile as naturally occurring PTHrP is challenging in many ways.

Researchers were successful in developing a recombinant version of sea bream PTHrP, produced in an *Escherichia coli* system. The isolation of the final product was made possible through a simple one-step purification process with continuous elution gel electrophoresis.

Obtaining adequate amounts of recombinant PTHrP allowed a variety of studies and bioassays to be carried out in other parts of the Fishcal project and also in research laboratories outside the consortium.

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Collaboration sought: information exchange/training.

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Sea lice prophylactic for wild fish

Sea lice pose a huge health threat to both wild and farmed fish. Researchers from the Sumbaws project have investigated the efficacy of a prophylactic treatment in wild sea trout.

Sea lice are important exoparasites of fish, both in the wild and in an aquacultural situation. These tiny crustaceans can lower the fitness of the fish and indirectly cause fatalities due to open lesions that prevent the fish from maintaining its osmotic or salt/water balance. If infection rates are severe, the parasites can feed on the fish at more than the growth rate. It follows that developing stock are more prone to this distressing phenomenon due to their small size.

To investigate means of tackling this disease, wild sea trout were tagged with passive integrated transponder tags (PIT tags).

Fish are therefore identifiable and traceable using a tag scanner on recapture of the fish. There were two groups, one treated with a prophylactic substance designed to control the parasite and the other untreated. The experiment took place in the north-west of Scotland.

It was discovered that the treatment had a significant effect on the condition factor of treated fish. Indices of condition indicated that the fish that received the prophylactic suffered less growth constraints whilst in open sea. Possible subsequent effects on growth and survival to sexual maturity

could have significant implications on stock conservation due to the direct relationship between fecundity and size in the female.

Control of this parasite is important, not only for farmed stocks, but also for wild stocks as farming situations are thought to act as sources of infection for this pest. Further research could well bring about more effective controls and superior management of natural and farmed fish stocks.

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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Online measurement tool for the wine industry

The latest advances in computer technology are being introduced to the ancient art of winemaking. The Elen-tool system seeks to improve the quality of wine for all involved.

The Elen-tool project aimed to set the standard in winemaking and make bad wine a thing of the past. Wine producers everywhere take great effort to ensure that consumers only receive the very finest of their product. Standardising wine quality, however, is a major feat given the numerous variables which may affect wine production.

A team of Italian researchers investigated the application of knowledge-based software solutions to the problem faced by wine producers and designed the Elen-tool system. This innovative application of computer technology will allow producers to con-

tinuously monitor the fermentation process from must to wine.

By enabling the continuous monitoring of wine production, wine producers will finally be able to prevent deviations in wine characteristics and therefore weed out wine batches which fail to meet quality standards. The advantage to producers is that they will be able to ensure the high quality of wine production which they desire. This will produce the added benefit of improving the quality and image of their wine production as bad wine is removed from their range. Consumers will also benefit as they will be assured of purchasing wine which has met certain quality standards.

The technology utilised in the Elen-tool system enables a high degree of reliability, ease of use and automation as well as a wide range of adaptability. The system is able to monitor a wider variety of parameters than those which current systems offer, such as temperature, pH (acidity) and alcohol. Perhaps most important of all, the system is able to monitor the complex aromas produced which are critical for wine quality. The system is also environmentally friendly as it does not involve chemical treatments or solvents, thus improving employee working conditions.

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

Collaboration sought: information exchange/training.

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Plant preservation progresses

As humankind plunders ecosystems, preservation of genetic material is becoming increasingly necessary to prevent irretrievable losses. Scientists have devised new methods of cryopreservation to help to preserve the endangered genetic heritage of our planet.

Human activities are reducing biological diversity at an unprecedented rate. Furthermore, it only takes the removal of one species in a bionetwork to trigger the subsequent loss of many. To help stem this loss, various organisations worldwide have set up gene and germplasm banks.

Cryopreservation, however, poses various problems in terms of tissue damage through the formation of ice crystals and damage to the delicate cell structure. Researchers from the Crymcept project have therefore devised new methods to successfully preserve plant species. The protocols developed took into account the cell type and region of extraction from the plant as each has its own unique structure and consequent requirements.

Techniques were developed to actively divide cells at the tips of shoots, several woody species and seeds, among others. As a main source of genetic variation, the seed is a valuable plant organ. Five key stages in the process of coffee seed preservation were investigated, including the effects of seed quality and optimal hydration status. After the results were

obtained, the cryopreservation methods were modified accordingly.

Maintaining the integrity of plant material after the storage period was also an important objective. Problems such as desiccation and post-thaw shoot regeneration were addressed. The success of the research overall is evident. Preservation of banana material has become a routine procedure, and over 400 banana samples were put into storage in liquid nitrogen at project partners' research headquarters in Leuven in Belgium. Going beyond the original project objectives, the techniques can also be used for other plant species, like strawberry, apple, almond, date palm and potato.

Advancements in cryopreservation techniques will be an advantage to any organisation involved in the preservation of germplasm or the use of genetic resources of species. Botanic gardens, seed banks, biotechnology companies and culture collectors all stand to benefit. For more information on the project, please visit: <http://www.agr.kuleuven.ac.be/dtp/tro/crymcept>

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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High-pressure processing for food safety

With the quality and safety impact of high-pressure processing on foods established within the 'Safe ice' project, a new market, still unexplored, may open for frozen products.

Currently established methods for processing and producing food primarily concentrate on combining different processes to achieve desired qualities and shelf life. With the exception of fermentation and the addition of preservatives, these processes primarily have a purely physical effect on the food matrix.

With the recent application of high hydrostatic pressure, a new opportunity arose to efficiently control phase changes during the treatment of foods at low temperatures. The 'Safe ice' project, supported by FP5, sought to estimate the impact of new high-pressure, low-temperature (HPLT) processes on the quality attributes of frozen foods.

Research work carried out at the Berlin University of Technology focused on processing effects on cellular material, which included plant tissue (potato tubers), fish tissue and microorganisms (*Listeria innocua*). Samples were cooled under pressure below 0 °C, but kept in the liquid state according to the corresponding phase diagram. Once the desired temperature was reached, pressure

was released inducing quasi-instantaneous nucleation of ice crystals throughout the sample.

The uniform nucleation in the sample combined with reduced phase transition times usually result in a better-preserved microstructure of the processed food and, importantly, less drip losses. But although the use of high pressure is not an impediment, long processing times are still required. Therefore, before introducing HPLT processes in the food industry, these times must be optimised.

For this purpose, an empirical model was adapted to accurately describe the melting curves of different ice polymorphs for pressure levels up to 400 MPa. Moreover, pressure-supported freezing was investigated to develop a model enabling the calculation of temperature profiles and the pressure-dependent freezing points.

Different metastable states of water (liquid and solid) were experimentally observed and defined according to their process-

dependent stability. Furthermore, the impact on cellular material was investigated by texture and impedance analysis to evaluate the state of the cellular membranes in the sample after treatment.

On the basis of the accumulated results and with respect to essential processing criteria, different food processing strategies were proposed to effectively use the potential of high-pressure applications.

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

Collaboration sought: further research or development support.

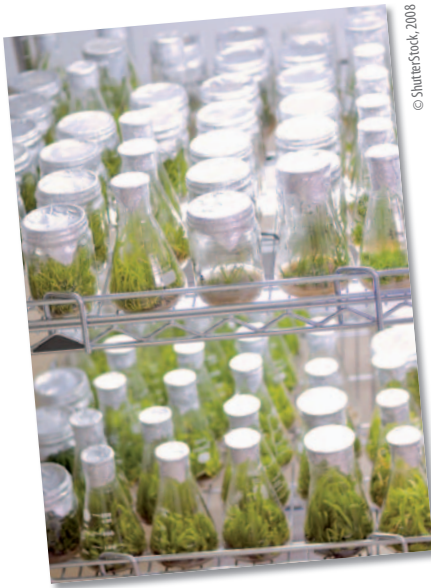
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Improving cryopreservation protocols

Cryopreservation is often used for the long-term storage of tissues and cell lines, but it does not come without certain disadvantages.



In view of the routine cryopreservation of European plant germplasm as a means of conservation, a number of obstacles have to be tackled. The EU-funded Crymcept project focused on removing the obstacles standing in the way of the wide application of cryopreservation in plant conservation.

Cryopreserving European plant germplasm could in fact be one of the few ways to preserve endangered species for posterity. Partners in the Crymcept project set out to define the optimum set of parameters linked to cryopreservation success, in other words minimum tissue damage.

The University of Abertay in Dundee, Scotland, studied the extent of oxidative stress and used the knowledge for the develop-

ment of improved protocols. Oxidative stress monitoring allows researchers to identify the specific steps or components that cause cellular injury and to make the required modifications.

The resulting information can prove extremely useful to researchers and biotechnology companies involved in cryopreservation as well as all those interested in plant conservation studies. Improved protocols for cryopreservation are likely to impact tissue storage efforts in general, including animal tissue as well as plant material.

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Collaboration sought: further research or development support.

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Protocols for cryoconservation of plant germplasm

The conservation and preservation of plant diversity is vital to European industries, farmers and consumers. For the long-term storage of plant germplasm, cryogenic preservation is the only available method.

The main objective of the Crymcept project was to develop new cryoconservation protocols for the long-term storage of plant germplasm. The critical point of injury for cryoconservation protocols was identified by assessing the extent of modifications and loss of proteins associated with the cytoskeleton and signalling pathways.

Results included the development of transglutaminase assays and the identification of markers of desiccation and freezing tol-

erance for profiling cryo-injury. The findings can be used to design and improve new cryoconservation protocols for a wide range of plant species.

It is vital for a successful outcome to use storage methods based on an informed knowledge of cryo-injury, rather than empirical know-how. The identification of critical points through the use of markers of protein modification or loss has resulted in improved storage efficiency. This has helped minimise

the amount of germplasm lost from cell injury and increased confidence in cryostorage.

Innovative benefits have included bespoke techniques for application by end-users, such as germplasm repositories and collections, botanic gardens and biotechnology companies. The main strength of these results is the integration of technological and fundamental approaches to provide markers of cell injury. These contribute to the design of less damaging cryostorage protocols, particularly for storage-recalcitrant germplasm.

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 > 3780

Consumer acceptance of high-pressure food processing

Consumer surveys were used to examine attitudes pertaining to low-temperature, high-pressure processing of food.

The 'Safe ice' project has produced informed evaluations regarding the role, benefits and risks of pressure freezing and thawing of foods. It was important to inform consumers about the unfamiliar concept of high-pressure processing, particularly considering that it has positive outcomes for products.

Consumers are certainly interested in how price can be affected as well as in any associated risks and environmental benefits, rather than in the processing method itself.

It goes without saying that consumer acceptance is a fundamental consideration when a novel method is introduced if it is to be successful in the market. Benefits may include improved acceptability and convenience which can overcome negative consequences such as an increase in price. On the other hand, if risks are perceived, this may hinder the acceptance of a new product.

Consumers may perceive new processing technologies as risky simply because they

have no control over the processing and it is unknown to them. However, if consumers feel that these technologies will bring some personal or societal benefit, they will be more likely to embrace them, such as in the case of biotechnology. Thus, it is important that technological innovations be geared toward the outcomes that consumers want. In this case, those include reduced environmental impacts, desirable quality and reduced prices in food products.

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

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 3710

Optimising the delivery of stroke care

The development of innovative ultrasound imaging equipment within the UMEDS project aims to provide for mobile stroke detection. When linked to advanced telemedicine systems, such diagnostic equipment could offer valuable information to guide prehospital thrombolysis.

In patients with acute cerebral ischaemia, brain perfusion can be analysed by means of different diagnostic techniques, including computed and magnetic resonance tomography. However, it is the continuous development of non-invasive ultrasound techniques that has provided invaluable clinical applications for the assessment of intracranial arterial diseases.

Ultrasound can be utilised at the bedside for critically ill patients and provide timely information on arterial dissection and occlusion of brain arteries, as well as embolic occlusion. The concept of ultrasound perfusion analysis was not new, but the ability to estimate perfusion parameters with accuracy has only arisen with recent developments in ultrasonographic imaging techniques.

Localisation of specific biochemical epitopes with targeted contrast agents afforded the opportunity for imaging thrombus material in acute vessel occlusions. It also provides an effective means for the detection of micro-embolic signals. Moreover, software development at the Inserm laboratories in France has allowed rapid electronic transfer of data from the detector arrays and rapid image reconstruction for subsequent perfusion analysis.

Studies were undertaken to ascertain the optimal delivery mode of microbubbles with antibodies to activate platelets for targeted imaging, and the results were integrated into the image analysis software. The new software supports the automatic factor analysis of medical image sequences

(FAMIS), along with the conventional parametric analysis of temporally arranged sequences.

To minimise respiratory motion artefacts in ultrasound contrast imaging sequences, and furthermore to improve parametric and FAMIS imaging from time sequences, dedicated software developed in Matlab was added. The software package, readily available on a CD-ROM, can be implemented either step-by-step under the permanent supervision of the user or automatically both for clinical and pharmaceutical research applications.

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

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 3756

Speedy immunoassay for isoflavins

Research into the effects of therapies at a biomolecular level requires efficient bioassay techniques to test the efficacy of these methods. Scientists in the Phytos project have developed a rapid assay procedure for quantitative analysis with a high degree of sensitivity.

The menopause and its effects, including the possible loss of bone density, is a source of concern for many women. As a remedy, hormone replacement therapy is an option, but some women choose to go the more natural way and include naturally occurring phyto-oestrogens in their diet. These are present in high quantities in soy products, but are contained in many other foods, like bananas. To

date, however, evidence of their efficacy has been anecdotal.

Phytos, an EU-funded project, aimed to prove that isoflavins, a type of phyto-oestrogen, could prevent osteoporosis in postmenopausal women. An extensive multi-centre controlled trial was conducted in three European countries. As part of this research,

workers at the University of Helsinki focused on the biochemical aspects of developing a sensitive, reliable assay for isoflavins and its metabolic product equol. Equol may have important physiological effects on the adverse effects caused by menopause.

In trials of this nature, there is a vast amount of data spread over centres in a large geographical area. It is therefore important that assay procedures involved can be performed quickly and accurately with routine

laboratory equipment. Prior to this research, the procedure used to ensure the sensitivity required was gas chromatography/mass spectrometry (GC-MS), but this is expensive and cumbersome.

The Helsinki research team worked on the development of a time-resolved fluoroimmunoassay (TR FIA). Immunoassays have the advantage of being a high-throughput method using routine laboratory equipment. The method involved coupling the isoflavins to bovine serum albumin and then using this as an antigen to immunise rabbits. The radioactive tracer europium chelate was used, and then the immunoassay was carried out using plasma or urine. The plasma method gave highly specific results. Over-estimation occurred when urine was tested, but a formula could be used for correction purposes.

The commercial exploitation of these results could have great potential. Within the scope of this study, it allows the simplification of studies of the effects of phyto-oestrogen compounds in humans. These methods are also applicable in a wide range of studies where biochemical assay methods are required.

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 > 3814



How policies affect family care for elderly people

A report which analyses how current EU policies affect individuals caring for elderly relatives has been produced in the hope of highlighting both opportunities for improvement and obstacles to overcome.

The EuroFamCare project has provided a European review of the conditions of individuals caring for elderly relatives with regard to existence, familiarity, availability, use and acceptability of supporting services. Six countries formed a trans-European core group. Furthermore, a pan-European integration of expertise was achieved through the inclusion of national background reports from 23 European countries. The project's motive was to promote changes in management processes at various policy levels to advance social policies for family carers of elderly people.

In light of this, a policy evaluation report was produced by AGE, the European Older People's Platform. It resulted from the review of existing data beginning with policies in public areas such as social protec-

tion systems, labour market and employment, active ageing, economic migration and social inclusion. Since these sectors interact with each other, there can be an indirect impact on the situation of family carers in ways which are unexpected. The lack of cooperation between these different sectors may be one of the hindrances to supporting family carers of older people. Therefore such unpredictable social processes need policy-makers' attention so that family care can be properly influenced.

The review points out key lessons on managing change within the policy environment. This can help policy-

makers integrate research evidence and find obstacles that prevent this. Additionally, major organisational issues regarding recommendation implementation were discovered, and several suggestions were put forth.

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 > 3758



Pinpointing healthy ageing markers

Understanding the physiological processes that accompany ageing is essential in view of healthy ageing.

The EU-funded 'T cell immunity and ageing' (T-CIA) project set out to investigate how human T lymphocytes age over time and sought biomarkers to monitor the ageing process. Comparing healthy donors versus those with certain pathologies could yield important insights into how we age and how our immune system behaves during the process.

Partners focused on the isolation of immunogenetic markers associated with successful ageing using samples from healthy donors aged 66 to 99 years old. The study was carried out across Bulgaria and included healthy young donors aged between 21 to 35 years, used as controls. High-level expression of a series of interleukin genes was found to be associated with longevity in Bulgaria.

A number of other genotypes were linked to healthy ageing among the Bulgarian elderly population; specifically single nucleotide polymorphisms. Conclusions can be drawn once all data have been statistically analysed and recommendations on biomarkers can then be made.

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 > 3636

Natural killer cells in healthy elderly individuals

An efficient immune system seems to be one of the hallmarks of healthy elderly individuals. Scientists have studied the T cell and natural killer receptor molecule status in elderly and young people.

Elderly people suffer from increased susceptibility to infectious diseases and cancer. Immunosenescence, ageing of the immune system, is a multifactorial condition. 'T cell immunity and ageing' (T-CIA), an EU-funded project, has investigated the phenomenon of T cell immunity and its malfunction as a result of ageing. Project partners at the Reina Sofia hospital in Cordoba in Spain studied young and elderly groups for T cell properties and activity.

The chromosomes of cells have an end region called the telomere that incorporates a lot of repeating DNA. With successive cell divisions, it has been observed that the telomere becomes increasingly short. The the-

ory is that this protects the more valuable DNA lower down on the chromosome that is required for cell integrity and function.

Two attributes of the immune system measured were telomere length and presence of CD28 molecules. CD28-positive individuals can provide signals for T cell activation. The results showed that there was a shortening of the telomere in elderly individuals. Interestingly, this was associated with a significant increase in CD28-negative individuals.

In a second strand to this research, the types of T cell were studied. The numbers of naïve T cells were found to be higher in healthy donors, whereas effector T cells were more

common in CD28-negative individuals. Naïve cells can differentiate into memory T cells which can recognise invaders. Effectors however just tend to direct other immune cells.

Possessing long telomeres in immune cells and having lots of naïve T cells thus appear to be two of the prerequisites for an efficient immune system. The continuation of this work could well lead to possible intervention therapy for individuals with aged T cells. If alterations in the immune system of elderly people are defined, then it will be possible to devise strategies to counter these immunodeficiencies.

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

Collaboration sought: information exchange/training.

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Plant genes make life comfortable for nematodes

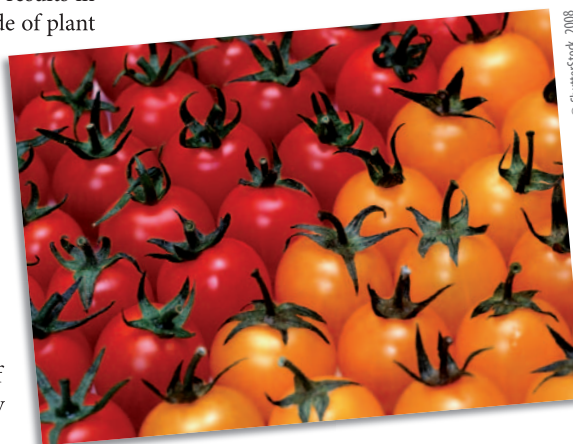
Endoparasitic root nematodes cause extensive damage to potato and tomato crops. A European project has investigated the relationship between plant genes activated by the nematodes to establish their feeding sites.

Plant-parasitic nematodes live in soil and colonise plant roots. Since they usually attack underground plant parts, there are no reliable foliar symptoms for the infestation and severe economic losses may occur. In the case of the potato cyst nematode, land infested by nematodes cannot be used for seed production. It is one of the most serious potato diseases. At best, the parasite causes poor growth and reduced yield.

The relationship between the nematode and its host is a fascinating one. The nematode harnesses its host's genetic mechanism to provide it with a feeding site in the root. Prevention of plant nematode diseases is difficult. For example, the nematode is air- and tuber-borne in potatoes and can lie dormant on a tuber for 10 years. Nematocides are expensive and difficult to apply effectively. One of the best approaches to control would appear to be the development of resistant varieties. Nonema, an EU-funded project, aimed to

study the resistance mechanisms including that conferred by the host genome.

Project partners in the Flanders Interuniversity Institute for Biotechnology in Belgium focused their attention on the way the nematode uses the host genome for its own benefit. One of these adaptations results in the provision of feeding sites made of plant cells modified by the nematode itself. The plant genes expressed as a result of infestation can be classed as nematode responsive and are responsible for the degradation of plant cell walls and modifying proteins. As a direct result of the team's findings, the genes can now be grouped according to plant development biochemical pathways. Moreover, their roles in the construction of a feeding site have been partly illuminated.



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The groundwork as to how exactly nematodes tinker with their host's complex mechanism of cell differentiation has been laid by this project. From an economic point of view, development of resistant varieties would reduce major losses. Obvious environmental benefits would be the reduction of expensive and damaging chemical input into food chains.

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

<http://cordis.europa.eu/marketplace> > search > offers > 3770

Nematode feeding sites investigated

Root-knot and cyst nematodes pose a serious economic threat to Europe's horticultural and agricultural crops. Researchers have investigated nematode proteins that may be responsible for the development of pathogenic factors within the host.

Nematode worms cause a great deal of agricultural damage in a range of crops. In Europe, tomatoes and potatoes are amongst the most important victims of this parasite. Many varieties are very susceptible to damage by these nematodes, which are very difficult to control once an infestation occurs. They are highly persistent in soils and they attack the root system of the plant, causing reduction in yield and or plant death.

Partners in the EU-funded Nonema project have undertaken research to develop genetically resistant crops as an answer to this problem. Basic mechanisms of plant-nematode interactions were studied. Being a parasite, it would be expected that the nematode worm has evolved in line with its host and that

there are biochemical links between the two partners. A search for candidate proteins was conducted in line with the theory that the nematode somehow changed the root cells into giant feeding cells.

The French National Institute for Agricultural Research studied two proteins from the nematode *Meloidogyne incognita*. These play an active role in the cell cycle of its many hosts, including the tobacco plant. The proteins are also involved in stress responses and cytoskeletal organisation and were found in the secretory glands of young infective worms.

The proteins were analysed using two-dimensional electrophoresis and then iden-

tified by means of enzyme digestion and mass spectrometry. The team then went further into their possible operational mode. Using bright yellow cells of the tobacco plant, they tracked the proteins labelled with enhanced green fluorescent protein (EGFP). A strong EGFP signal was located in the cytoplasm and not in the nucleus, indicating that they may be excluded from the nucleus.

The results from this research no doubt constitute a piece of the jigsaw as regards parasite-host interactions of the nematode worms that attack our crops. This can then form the basis of genomic studies to specifically engineer resistant varieties which do not possess the genes to assist the parasitic invader.

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 > 3806

What is a technology offer?

All research results uploaded on the Technology Marketplace are assessed by CORDIS to reveal their exploitation potential. The top ones are selected and re-written as technology offers in a journalistic style. Online, each offer is linked to the related result.

Tempted by a technology presented in this issue?

All of the projects presented in the supplement are seeking cooperation partners in specific areas and interest in their work is welcomed. Please contact their coordinators directly if you would like to know more about them.

Interferon immunogenicity prediction

Immunogenicity of proteins, or their ability to promote an immune response, poses problems for their use in disease therapy. Researchers have developed a model to predict the level of antibodies produced on application of human interferon formulations.

Interferon therapy has amazing potential. Depending on the type of interferon, it has proved to be efficacious in the treatment of viral diseases, certain cancers and some autoimmune diseases, notably multiple sclerosis. Research is ongoing into the side effects of protein therapy using molecules like interferon. One of these is the induction of

the production of antibodies, or antigenicity (otherwise known as immunogenicity).

Antigenicity may thus inhibit the efficacy of the therapy or have other deleterious side effects. The consequences of these reactions have serious implications for both the biopharmaceutical industry and the patient.

This prompted the Lyo-pro project to invest its research efforts in the development of novel freeze-drying methods for proteins. The result of improved diagnostics involved in production of these therapeutic proteins could improve the final quality of the product. The production of lyophilised (freeze-dried) proteins would then possibly reduce the incidence of antigenic effects.

Project partners at the University of Utrecht in the Netherlands devel-

oped another related strand of this research. Their focus was to develop a means by which different formulations of human interferon could be assessed for their level of antigenicity. They used an *in vivo* mouse model that was immune tolerant to human interferon 2. This was due to the introduction of the gene for production of human interferon into the mouse DNA. A sensitive enzyme-linked immunosorbent assay (ELISA) test was then employed to measure the antibody levels.

The results suggested that the mouse model could be used as a screening tool to eliminate immunogenic formulations before they are entered for time-consuming and expensive clinical trials. Obvious beneficiaries of this technology are the biopharmaceutical and related industries. Patients with high levels of neutralising antibodies and immunologists studying immune tolerance also stand to gain from this breakthrough.

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

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

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A new platform to exchange genetic ideas

The Ecaruca database has created a way for medical professionals as well as patients and their families to find information about rare chromosomal disorders.

There are numerous types of chromosomal abnormalities, and finding information about them is not always easy. The Ecaruca project was set up to remedy this by creating a database that can be used by both experts and members of the public to access cytogenetic and medical data on rare (sub) microscopic chromosomal abnormalities. Registered users are able to use the database as an information exchange with access to different research platforms.

The objective of Ecaruca was to collect enough data for both experts and patients and their families to source information about specific types of chromosomal abnormalities. This also serves to facilitate new research across Europe. Ecaruca brought together cytogenetics researchers from all over Europe and promoted fresh research ideas and activities. Researchers with a specific interest were invited to moderate a related website. Although the project has now ended, the database is still leading to new Europe-wide research collaborations and fresh information about the origins and behaviour of chromosomal aberrations. Seven European research groups, including groups from the Netherlands, Sweden and the United Kingdom, came together under Ecaruca, and their research results are available to the database's members.

The Ecaruca database is constantly expanding through the inclusion of cases submitted by account holders (there were over 200 cases in 2005) and the publication of different research platforms. All cases submitted to the database receive a unique identification number, and all related data are linked to that number.

The database consists of two sections. One of these features public pages that can be accessed by anyone and include general information — such as project objectives and downloadable information available in different European languages. Restricted pages, however, can only be accessed by account holders. Recently, an updated version of the website has been launched with improvements to several areas, including the submission and search facilities. The database currently has around 4 000 cases including over 1 000 unique aberrations.

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

Collaboration sought: information exchange/training.

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Developing methods to detect banned nitrofurans

Monitoring the enforcement of an EU-wide ban in nitrofurans antibiotics in the food production chain is a challenging task, given the nature of nitrofurans compounds.

The EU-funded 'Food brand' project set out to develop methodologies for the detection of nitrofurans and their metabolites in the farm-animal food production chain, following their EU ban. The nitrofurans class of antibiotics has been shown to induce toxicity, but their detection in animals and food products is not always straightforward.

Nitrofurans metabolise rapidly *in vivo* and their residues are unstable, therefore testing

for either is ineffective. Subsequent metabolites, however, are extremely stable and can be present in food products even after freezing and cooking. Research prior to the project has shown that bound nitrofurans residues combined with mild acids (like stomach acids) result in toxic compounds, which can be screened for.

Project partner Queen's University, Belfast, developed a series of enzyme-linked immu-

nosorbent assay (ELISA) test kits for nitrofurans, furazolidone and its metabolites as they have previously been widely used. In addition, the university has also validated liquid chromatography methods for the detection of nitrofurans.

The project's deliverables have brought about new standards in the detection efforts of laboratories worldwide. These methods could also be applied in the future for the detection of additional compounds and residues in the food chain.

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

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 3812

Understanding para-TB epidemiology

Protecting domestic livestock from disease is an important issue — not only for animal welfare, but also for agricultural policy across the EU.

The EU-funded 'Para-TB transmission' project evaluated the extent of *Mycobacterium avium* subspecies *paratuberculosis* (Map) penetration in wildlife species and the knock-on effect on the health of domestic ruminants. The overall aim of the project is to shed light on the role of wildlife hosts in Map epidemiology in domestic ruminant species, a previously unexplored topic.

Project partners examined all aspects of the extent of Map presence in wildlife spe-

cies, including the development of models to assess the role of wildlife hosts in Map infection of ruminant herds. The School of Veterinary Medicine of the University of Thessaly, Greece, followed quantitative and qualitative approaches in developing these models. A series of parameters was taken into account in order to arrive at accurate predictions relating to the epidemiology of Map infection.

Risk assessments for each of the risk questions that were posed were formulated tak-

ing into account the time the herd spent outside, among other factors. This important parameter essentially described the time during which the herd and the individual animals might be at risk of being infected by wildlife carriers of Map.

Use and application of such models could prove extremely useful in a variety of settings across the EU.

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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Mapping milk production traits

Milk production traits in cattle are heritable characteristics. A team of European scientists from the BovMas project has identified areas of the bovine genome that affect yield and milk percentage protein.

The basic objective of this project was to map quantitative trait loci (QTL), stretches of DNA closely linked to the genes, for these milk-producing traits. Advanced mapping techniques were then used in combination with identification of markers for the required traits. Milk production could then be optimised in dairy and dual-purpose cattle where the males are used for meat and the females for milk production.

Researchers at the Ludwig-Maximilians-Universität in Munich concentrated their research on various dual-purpose breeds including the Fleckvieh/Red Holstein cross. Cattle have a long generation interval, and the team was aware that there were limited possibilities for QTL mapping for introgression of the desired traits. To overcome this problem, the large advanced backcross population of Fleckvieh cattle that has been

developed over the past 30 years was used in the programme.

Among the techniques used for high-resolution mapping of the QTLs was identical-by-descent (IBD) mapping. This speeds up the mapping process by effectively only using donors with matching sequences. For the QTL mapping procedure, selective DNA pooling was utilised. Therefore, the marker allele frequencies were estimated in pooled DNA samples of phenotypically extreme individuals. The results achieved the identification of 31 QTL markers in 26 out of the total 29 bovine chromosomes.

The main limitation of selective DNA pooling was that fine resolution mapping is not possible. However, these results have laid the foundation for the application of genomic methods of selection in cattle breeds. Inter-

ested breeding organisations can also use the data and tools for the production of superior herds.

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 > 3794



Innovative animal breeding techniques

Ensuring the safety of the food chain depends on a variety of parameters at different stages of the production process.

The EU-funded 'GeneSheepSafety' project set out to develop methodologies to address the safety and quality of food in the sheep production chain. The partners focused on a series of aspects including genetics, traits related to animal health, traits linked to food quality and the genotypes linked to those.

The Roslin Institute, a project partner in Scotland, studied Scottish Blackface sheep in terms of genotypes linked to carcass composition and meat quality. Genotyping studies revealed that genetic improvement of meat quality and overall composition

is indeed possible. Specifically, traits like intramuscular fat content, flavour and overall appreciation can be predicted and hence manipulated through measurements of muscle density.

In other words, genetic manipulation could result in individuals with improved traits, for higher-quality food products. The innovative aspect is that for the first time it has been clearly demonstrated that meat quality can be improved readily using non-destructive methods. This type of study could have important implications for animal breeding

across Europe, ensuring animal welfare as well as consumer protection.

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 > 3807



Online tools in the fight against mastitis in cattle

Breeding cattle that possess an inherent resistance to mastitis could provide a long-term viable solution against the disease.

The EU-funded 'Mastitis resistance' project sought to examine the genetic characteristics of European cattle found to be susceptible and resistant to mastitis. Isolating the genetic loci responsible for these traits is likely to allow selective breeding of cattle herds with natural immunity to mastitis, without the need for antibiotics and other means of control.

The Roslin Institute, a project partner, developed a software tool for the simulation

and prediction of introgression programmes in livestock. Introgression essentially refers to the transfer of a specific gene from one gene pool to another by backcrossing with one of the parents. In this case, introgression programmes were of particular significance between resistant and non-resistant breeds of dairy cattle.

The software tool, a Windows-compatible application which features a graphical user interface, allows the user to modify and

enter different sets of parameters in order to arrive at a realistic simulation accounting for all possible variations. The researchers are keen to enter into a joint venture agreement, which would allow the commercial exploitation of this tool.

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

Collaboration sought: joint venture agreement.

<http://cordis.europa.eu/marketplace> > search > offers > 3751

Genetic marker test for mastitis

Mastitis is a serious threat to the integrity of the milk production industry in Europe. Researchers have identified important genetic regions that could facilitate the implementation of breeding programmes to reduce the incidence of the disease.

Mastitis, i.e. inflammation or infection of the mammary gland, is a distressing disease — not only for the cattle infected, but also for their farmers. It has been estimated that 40 % of the total herd in the United Kingdom can be affected in one year. The effects of mastitis are usually reduced milk yield and quality as well as extreme discomfort for the cow. Improvements in animal husbandry and hygiene can improve the situation, but another means of control would be breeding for mastitis resistance.

Accordingly, the 'Mastitis resistance' project has completed research on the fine mapping of the bovine genotype. This was in relation to the characterisation of quantitative trait loci (QTL) that affect mastitis susceptibility in milking herds. The stretches of DNA that are associated with resistance to the disease

have been studied in families within Finnish Ayrshire, Danish Red and Swedish Red. These are breeds traditionally farmed in Nordic areas. Agricultural practices from these regions have a very strong tradition of recording data regarding the health and disease resistance of their herds.

A team of scientists at the Danish Institute of Agricultural Sciences concentrated their resources on the development of a marker haplotype test for clinical mastitis. These tests involved the fine mapping of a small region of chromosome 9. This revealed a few alleles that can unambiguously identify all other required polymorphic sites in the region. This means that the test is certain to predict the presence of the single polymorphism in this region of the chromosome responsible for mastitis resistance.

These results are available for use in commercial breeding programmes, and a patent application for this exploitation has been sought. Together with the cooperative nature of the breeding initiatives in Nordic areas, they will no doubt be instrumental in the control of this economically significant disease.

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 > 3781



Making nursing conditions attractive

Nursing is undoubtedly a demanding career, where working conditions are of paramount importance. A European project has studied what constitutes an attractive working environment for the nursing profession.

There is a general shortage of nursing staff in Europe. This situation is predicted to become more crucial with the increase in the percentage of elderly people and consequent parallel demands for hospital care. The project 'Nurses' exit study' (NEXT) evaluated exactly which factors were responsible for the lack of healthy ageing at work in the nursing profession. They hoped to identify reasons for the mass exodus from the profession, which occurs prior to retirement age in most cases.

Workers at the Catholic University in Louvain in Belgium undertook a study to account for the large range of nursing turnover — from less than 1 % to just over 13 %. The group studied the effects of commitment, managerial practices and work environment as relevant factors. The mode of study involved categorising the institutions into the most attractive with the lowest turnover and conventional with the highest turnover. Investigations then took the form of a comparison between the two defined types of hospital.

Statistically significant differences were found as regards many criteria relating to overall professional conditions. Attractive institutions reported higher work satisfaction, more patient-centred and superior professional care. Nurse autonomy in terms of decision-making was also more prevalent in attractive workplaces, and there was a better perception of working relationships, with both senior nurses and doctors. Not surprisingly, burn-out level was lower in attractive hospitals. Consequently, there were less reports of conflict between work and personal home life, due to empathic work scheduling.

Overall, these results reflect the advantages of transformational leadership where management inspires employees and recognises the value of teamwork. Furthermore, attractive organisations have a high degree of support, reward and recognition

where nurses feel valued. High commitment is achieved by good relationships between all staff and open and timely communication.

Hospital managers should be able to utilise these results to transform their workplaces if necessary. Prevention of low productivity and high turnover will help the development of a European model of attractive health care organisations and raised standards.

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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Recruitment and retention of nurses in the United Kingdom

Lack of human resources, particularly in nursing, has previously been identified as the most pressing problem facing the United Kingdom's National Health Service (NHS). There are now more strategies to attract and retain nurses in the United Kingdom than anywhere else, with valuable lessons for policy-makers abroad.

The aim of the 'Nurses' exit study' (NEXT) was to examine the contribution of senior nurses responsible for retention and recruitment (RRNSs). Data were obtained through telephone interviews which were transcribed and analysed by content. The RRNSs were all experienced nurses with regular clinical

experience on the wards. As international recruitment declined, strategies were implemented to recruit locally. Because of the high expense involved, only very senior or highly specialised nursing posts were advertised in the national press.

Recruitment strategies for health care assistants were designed to reach individuals who might not have previously considered working in health care. Recruiters visited schools and further education colleges to discuss career opportunities in the NHS. Potential recruits were guided through the application and interview process and given information regarding training. Similar approaches were taken with student nurses. RRNSs discussed employment issues and career planning with students. Help was given to complete satisfactory curricula vitae, fill in application forms and perform well at interviews.

RRNSs operated an open-door policy with newly qualified nurses, which was designed

to identify and tackle problems as they arose. Opportunities for continuing professional education featured heavily in retention strategies for these staff, with an emphasis on fairness and equity. RRNSs frequently mentioned experiencing inequity during their own early nursing careers and wanted to avoid this problem for the newly qualified nurses they hoped to retain. RRNSs focused on work-based learning for new registrants. This avoided the problem of covering the clinical areas when staff were attending courses. All the trusts required D-grade nurses (the most junior) to demonstrate competency in fundamental clinical skills. Formal study programmes for new recruits were arranged by most postholders, and new nurses were helped to develop peer support groups.

Attracting and retaining experienced E-grade nurses has proved challenging. A range of approaches was employed, including the holding of open days and advertising in the local press. The majority of RRNSs analysed exit questionnaires completed by nurses leaving the trust to identify their reasons for departure.

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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Reliability of rural electrification systems

The sustainable development of the world's rural areas involves the provision of a reliable, cost-effective energy source. Accordingly, partners in the Taqsolre project have analysed the reliability of stand-alone photovoltaic (PV) systems.

The electrification of rural areas in developing countries would give people access to a range of energy services previously not available to them. Small systems would power domestic appliances such as lights, television sets, mobile phones and computers. On a community scale, the development of schools and health care would be facilitated. Residential life, farming and irrigation could all be mechanised and upgraded.

PV solar energy is considered to be the most promising system to deliver electrification to rural communities. Unfortunately, the introduction of PV systems is hampered by technical, social and economic barriers that tend to limit dissemination of the technology. The scope of the project was therefore broad, but EU-funded Taqsolre aimed to identify the root causes of the problems in a drive to find solutions.

Project partners at Universidad Politécnica de Madrid tackled the issue of dependability of stand-alone PV systems. For reliability of a system, the ability to maintain it and the availability of replacement parts are also relevant. The analysis also took into account the effect of component failure. One innovative approach was inclusion of the effect of loss of power or load probability.

To aid the implementation of PV systems, the team also provided a quality reference for the inverter as a guide for users and

procurers. The inverter effectively manages the power and creates a flow of supply that is sufficiently strong and consistent. In addition to the reliability criterion, safety, energy performance, ease of use, installation and maintenance were covered.

Future targets of research will no doubt build on the progress of systems set up in Latin America, Africa and Asia that are actively using the results of this project. As part of the initiative, the Madrid team set up a practical seminar in Lima for technicians involved in this scheme whose objective was to set up 1 000 solar home systems.

The results of the analysis are available and have been targeted towards researchers and systems designers. These have been distributed through peer journals, conferences and a hands-on approach at workshops. For interested parties, a website which gives details of objectives and schemes through a photo gallery can be accessed at: <http://www.taqsolre.net>

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3829



Assessing solar rural electrification

A report produced by the Taqsolre project analyses the status of solar rural electrification in developing countries and focuses specifically on the aspects of quality.

Rural electrification via photovoltaic solar energy is important in reducing the instances of populations without electricity access. However, its implementation has fallen short of meeting the suggested targets. This is because of technical, social and economic obstacles limiting the dispersion of photovoltaic technology. In light of this, the Taqsolre project set out to evaluate the status of solar electrification in different

countries and thus assist in the further planning of such projects.

Part of this effort consisted of the analysis and evaluation of solar rural electrification markets. An initial report based mainly on an extensive literature review was compiled. It provides an overview of field findings with various technical and non-technical hindrances leading to early failures of solar systems. In many coun-

tries, quality assurance processes have been applied; however, their effect on quality levels is still under examination.

The report is useful for professionals dealing with quality aspects of solar rural electrification, particularly in the planning stages. Furthermore, system hardware balance designers may use the data and background information on technical failures.

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3752

Focus and forum for wood energy sources

The Echaine website provides a vital meeting point for a project that aimed to double the amount of renewable energy from wood sources by 2010.

The Echaine project focused on identifying and evaluating socially and environmentally friendly wood production chains in Europe with the aim of increasing renewable energy wood sources for heating and power production in the EU from 6 to 12 % by 2010. Much of the success of the project will depend on a positive attitude by the public, so the Echaine website, dedicated to sharing information and receiving feedback, is a vitally important part of the project.

The site has a general area of information about Echaine, a public forum for exchange of opinions, a frequently asked questions section and a list of useful references and publications for consultation. There is also a private partner area, which requires a username and password. This has detailed information about the partners, a private forum and a private planning tool for meetings and objectives.

The website has innovations such as a geographical information system (GIS) appli-

cation, which is being used for a cross-country analysis of wood energy sources and issues. There is also a tool for analysis of the socioeconomic issues relating to renewable wood energy sources. The website is flexible and can be modified for use by future projects.

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3746

Improved eco-friendly combustion engines

Under the auspices of the COMET project, researchers have studied the physico-chemical reactions of diesel engines for the development of advanced particulate filter systems.

The COMET project focused on developing a coated sintered metal trap for the needs of heavy-duty applications. The work involved the modification of an engine to include appropriate exhaust gas recirculation for improved injection/combustion. Special care was taken to enhance the engine's characteristics in order to minimise nitrogen oxides and limit the particulate material.

Having characterised the filter material in terms of its filtration efficiency, backpressure and regeneration performance, further

investigations on material corrosion were conducted. These provided valuable information on the filter operation temperatures. Moreover, ash and soot deposit properties were also sought and characterised.

One of the most important parts of the project's work involved study of the reactivity of diesel soot deposited on a metallic filter. This offered valuable insight into the reaction mechanism of diesel soot with exhaust gases, such as nitrogen dioxide, and oxygen, without neglecting the water vapour effects.

Optimising the design of internal combustion engines

While detailed experiments over a wide range of operating conditions are extremely time-consuming and often impractical, simulations of cavitation flows can support the design of fuel injection systems from the beginning.

Fuel injection systems in the popular automotive diesel engines are required to operate properly at highly varying operational conditions, because fuel pressure drops locally below the vapour pressure. Vapour bubbles form in the fuel, and as vapour subsequently condenses in regions of higher pressure, bubble-collapsing loads may lead to cavitation erosion of the injection systems' components.

Within the framework of the Prevero project, different test configurations were investigated at the laboratories of project partner AVL List GmbH. Experimental studies of the flow inside real-size nozzle geometries revealed the complexity of structures formed over a number of cavita-

tion regimes. In an attempt to gain a better understanding of cavitation flows and their effects on performance and durability of fuel injection systems, discharge coefficient measurements were compared with model predictions.

More specifically, a multidimensional computational fluid dynamics (CFD) model accounting for the onset and development of cavitation inside nozzle holes was developed and assessed against the experimental data collected. The effects of the cavitation model's assumptions as well as those of the sub-models for phase-interactions on the predicted results of nozzle discharge were evaluated. Additional considerations of the numerical implementation and of the dis-

The impact of an oxidising catalyst on the reaction mechanism and the kinetics of soot combustion were also investigated. With the aid of a specialised kinetic model, applicable where a thin layer of soot is deposited on the filter, the effects of exhaust gas components were validated.

The kinetic model can be employed in studies requiring a complete prototype of the soot trap regeneration mechanism. Project results can improve the prediction and validation of the regeneration strategy of soot traps leading to eco-friendlier and better-performing combustion engines.

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3713

cretisation scheme were employed to optimise the predictive capability of this mathematical model.

Based on the multifluid formulation of multiphase flows, this mathematical model has been validated to the level where it can usefully identify many of the cavitation effects on nozzle performance. Cavitation significantly influences the atomisation process of the emerging fuel, which in turn is one of the key factors affecting the performance and exhaust emissions of injection diesel engines. Implemented in the Eulerian multiphase module of the commercial code FIRE, cavitation modelling can contribute significantly to the design and optimisation of fuel injection systems.

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

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 3827

Eliminating 'engine knock' for increased operating efficiency

Compared to conventional engine testing, novel quantitative imaging techniques have offered additional essential information on spark ignition characteristics in efforts to assess automotive engine designs and alternative fuels.

Control systems of modern automotive spark-ignition engines are designed to continually adjust the spark timing and angle, in order for power generation and fuel economy to be maximised. However, spontaneous combustion of the air and fuel mixture may occur ahead of the spark-initiated flame front, midway through the combustion cycle. Such abnormal combustion,

more commonly known as engine knock, may cause extremely high pressure spikes that can destroy pistons and rings in the engine.

The results of recently completed experiments and kinetic modelling simulations of the spark-ignition process offered new insights into how auto-ignition is

initiated and influenced by engine and fuel parameters. The ultimate aim of the Minknock project's research efforts was to clarify which parameters are most important, so future work can be better directed toward possible mitigation of problems. Thermal, fluid mechanical and chemical mechanisms, with the potential

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continued on page 19

Patent database software online

In order to manage innovation information, the '3rd Genlac' project has designed software for an online patent database.

Large area deposition of energy-efficient optical coatings is a field that has undergone many innovations. Novel types of coated vacuum glazing elements have significantly assisted the reduction of energy consumption and CO₂ emission, thus reducing the greenhouse effect. The '3rd Genlac' project has investigated the material science and process technology involved.

In order to manage innovation information, the project developed software for an online patent database. It is based on PostGreSQL and may be accessed by web browsers. The patents which are housed in the database

are organised into patent families known as 'inventions'. The structure of the data allows an immediate overview of the main ideas of an invention since it contains key features, special characteristics and invention-related material. Furthermore, patent documents such as applications and research reports are housed along with publication codes, application and publication dates, which makes the legal state of invention easy to trace.

Invention reports can be produced for each applicant, and that database is equipped for multi-user access. The history function allows for every data change to be recorded.



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Search methods for each invention can be pinpointed, which allows for technical area development to be monitored through repetition of search methods over time. This database may be used for other technological areas as well.

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

Collaboration sought: licence agreement.

<http://cordis.europa.eu/marketplace> > search > offers > 3826

Turning pig manure into an energy source

A Dutch firm has invented a heat recovery system that could help modernise European pig farms, reducing their energy consumption and greenhouse gas emissions.

The agricultural and livestock industries have voracious appetites for energy, water and other precious resources. The concept of sustainability can and must be promoted, for example through measures to reduce dependence on fossil fuels.

The 'Life quality' programme funded a unique project aimed at recovering heat from pig manure on pig farms. The 'Pig heat and straw' project was led by R & R Systems, a Dutch company with extensive experience in energy recovery systems. The new technology was implemented at two large pig farms, one in the Netherlands and one in Poland.

The energy salvaged is used to heat the farm's energy-intensive installations, such as rooms where newborn pigs are raised as well as the farmer's residence. An added benefit

of the system is that ammonia, methane and other noxious air emissions from the pig manure are significantly reduced, improving working conditions for farm staff.

Data collected from the two test sites indicated that energy savings on the order of 50 W/m² could be achieved. This figure doubled when a solar roof was added to the building. The efficiency, and thus economic feasibility, of the system depends on maintaining a suitably thick layer of straw and manure of at least 40 cm.

The results of the pilot study reveal that the new technology is best suited to sow farms or sow and fattener farms. Yet, additional technical improvements could make it profitable in more applications. It should be noted that the climate benefits include not only reductions in fossil fuel consumption,

but also decreased methane emissions. Methane is a strong greenhouse gas addressed by the Kyoto protocol.

R & R Systems has patented the technology. The market for this product is expected to grow as the percentage of pig farms using straw is anticipated to increase significantly over the next few years.

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

Collaboration sought: licence agreement.

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continued from page 18 **'Eliminating "engine knock" for increased operating efficiency'**

to be harnessed and controlled in view of rapid energy release and minimum risk of engine damage, may even be found.

For this purpose, advanced non-intrusive and quantitative imaging diagnostics techniques were employed at the laboratories of the Consiglio Nazionale delle Ricerche on an optically accessible spark-ignition engine. To visualise the inside of a prototype Zetec-SE Sigma engine's head, materials that are transparent but resistant to thermal stress were chosen for the engine cylinder. The engine, equipped with a modern ported fuel injection system, was led by a flexible

electronic control unit to ensure optimum combustion.

Imaging and chemiluminescence analysis from ultraviolet to visual were simultaneously performed to examine the evolution of spray and flame with high temporal and spatial resolution. In the process, HCO and OH radicals proved to be suitable tools for evaluating the reactions occurring in the combustion chamber and, furthermore, for identifying the auto-ignition start. Detected homogeneously distributed in the combustion chamber, their concentrations were ascertained to be dependent on the fuel

properties and not influenced by the operating conditions.

On this basis, detection of engine knock and controlling ignition timing to allow an engine to run at the knock threshold could provide for the optimum fuel consumption of spark-ignition engines.

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3708

See also page 47 (offers 3777 and 3820)

For more reliable wind turbine technology

Motivated by the lack of guidelines on the repair of composite structures for wind turbine blades, an extensive survey of current repair practices has been conducted within the 'Optimat blades' project. Applied to defective fibre-reinforced plastic parts, they could help to avoid rejection of products during manufacture and prolong their service life.

In order to fulfil the potential of wind energy, the development of larger wind turbines and more extensive use of offshore locations will be necessary. On the other hand, as the financial investments required to enlarge the size and installed capacity of wind turbine generators grows, pressure for reliable and structurally optimised blades increases.

Within the framework of the 'Optimat blades' project, a survey of repair techniques applied on faulty composite material parts was carried out. In many cases these were revealed to be inappropriate, since for restoration of the structural integrity of damaged parts, it is initially necessary to be able to model the damage. Moreover, the results

of simple stress analyses to determine the degree of structural integrity loss could lead to the definition of the best repair scheme.

More specifically, the project's industrial partners focused on defects present in the structure due to faulty manufacture or even due to inherent variability of the composite material. Although composite structures offer many advantages over conventional materials, they are also prone to damage resulting from mechanical contact or environmental effects. The first issue the partners sought to address was to assess whether these flaws would have reduced the structure's residual strength below an acceptable level and if they would grow while in service.

Water and sun — the future energy sources

The Hydrosol project employed advanced ceramics manufacturing for the implementation of an efficient honeycomb monolith reactor capable of hydrogen production with the aid of solar energy.

Harnessing the abundant solar energy has already been practised during the past few decades. Solar power plants in many regions of southern Europe take advantage of this form of renewable energy for heating and electricity purposes. Aiming to exploit solar energy to its full potential, the Hydrosol project focused on producing hydrogen, a fuel free of carbon dioxide emissions that can easily be stored and transported.

Hydrogen production was based on the decomposition of water to hydrogen and oxygen, simply the most economically attractive reaction. The project work had to overcome a major

technological barrier, namely the extremely high temperatures required when coupling solar energy with the water dissociation reaction. Until then, lower temperatures resulted in less favourable thermodynamic yields.

Addressing this issue, innovative catalysts were developed and employed in a new two-step process. The first step involves catalyst activation for water dissociation and hydrogen generation, and the second step concerns catalyst regeneration. The basic concept was to use a single solar energy converter for the whole process — water decomposition and catalyst regeneration.

Model library for direct steam generation

Europe has taken the lead globally by putting aggressive energy and climate change policies in place. New software developed with German know-how will help drive the adoption of solar power as a viable alternative to conventional fossil fuels.

It has been estimated that the introduction of direct steam generation (DSG) technology to parabolic trough solar collectors could result in major improvements in performance as well as cost savings. The Inditep project was funded under FP5 to evaluate the potential of large-scale (megawatt) DSG systems.

Researchers with Deutsches Zentrum für Luft- und Raumfahrt (DLR) in Germany specialising in solar applications contributed to Inditep's objectives by providing the

software tools necessary for the investigation. They modified an existing simulation tool for conventional power plants, entitled IPSEpro, to work for solar thermal power plants. Calculation of the heat balance and other parameters was made possible by the creation of DSG-specific model components by DLR.

These components have been gathered into a model library that can be exploited for a number of different tasks. For example, the software can be used to design the complex

The next step was to assess patch repairs employed for major structural restoration, which essentially involves replacing the lost load path with new material joined to the parent structure. Bonded external patches were found to be easily applied under field conditions and importantly, successfully employed, depending on the stress requirements of the area. Furthermore, the flush patch repair configuration has the benefit of a uniform shear stress distribution in the adhesive layer and is particularly suited to external repairs of thick laminates.

Key lessons learned could provide the basis for an extensive experimental investigation, the results of which can be employed for the selection of suitable repair techniques or wind turbine blade parts.

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

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 3766

For this purpose, a suitable support structure was developed by exploiting suitable ceramic (silicon carbide, SiC) honeycombs with sufficient thermo-mechanical characteristics. A series of small-scale and large-scale re-crystallised silicon carbide (Re-SiC) one-piece extruded multi-cell honeycomb monoliths were realised. These were found suitable for absorbing the concentrated solar irradiation very efficiently in order to serve as redox pair material carriers. Cast parts were used for the reactor's housing vessel. For more information on the project work, please visit: <http://www.hydrosol-project.org>

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

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 3878

network of solar collectors, separators and other key pieces of equipment that comprise a solar thermal power plant. Subsequently, the model library can provide estimates of the load and electricity generation of the plant when it is fed with the necessary meteorological data (e.g. solar radiation) for a particular region.

This functionality was exploited during Inditep to aid the design of a 5 MW test facility in Spain and will assist the penetration of DSG technology in Europe.

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

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 3745

Cloning salt- and drought-resistant poplars

Reforestation of desertified areas of our planet is becoming increasingly necessary. Researchers in the Establish project have devised a method to clone trees on a grand scale for suitability testing.

Loss of forest and woodland areas is still occurring globally on an unprecedented scale. Reasons for this are varied but include acid rain, urban development, wildfires and clear cutting for economic purposes. The results of deforestation can be far-reaching. Climate change, soil erosion and loss of biodiversity are just a few effects that may be caused by ecosystem destruction of this nature.

Reforestation is just one of the remedies that may be harnessed to attempt to reinstate and restabilise ecosystems. One problem that ecologists are faced with when considering reclamation is that the changed ecosystem may have become arid or saline due to microclimatic change. Edaphic changes may make the soil very inhospitable. The EU-funded Establish project has investigated the identification of species of poplar that are stress tolerant and will be able to resist the rigours of such a hostile environment.



In order to test species and their cultivars for their suitability in breeding programmes, there has to be sufficient plant material for the screening procedures. The drive to create reforestation programmes concerns the whole world, and macro-array tests and experiments for salt resistance require a large amount of plants.

To supply this amount of material, the team from the Hebrew University of Jerusalem collected actively growing twigs from three locations with varying height from the spectacular Ein Avdat forest. The forest is situated in the Israeli Negev desert and is home to an indigenous species of tree, the Euphrates poplar (*Populus euphratica*).

Two types of material were collected. First, stems were treated to produce callus tissue that was meristematic and would divide to give adventitious buds. These then grew to yield cloned plantlets to be used by partners for growth, physiological and molecular studies. A second source of research material came from leaves that could be used for protein and micro-array studies. They can be frozen in liquid nitrogen and stored at -80°C or freeze dried for analysis at a later stage.

Results show that the team has successfully established a method for the micropropagation of *Populus euphratica* plantlets. These can then be supplied to researchers and laboratories worldwide interested in the reclamation of salt-damaged and drought-ridden areas.

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 > 3811

Microsatellite DNA study for stress-tolerant trees

Increasing levels of urbanisation and industrialisation have caused unprecedented levels of soil deterioration. Using molecular ecophysiology, scientists have conducted research into the selection of stress-resistant trees as a way to reclaim desertified land.

Deterioration of soil, air and water systems means that environmental changes can occur on both a localised and a global scale. One effect of this is that large areas of land are becoming desertified and affected by increasing salt levels every year. In cases where an ecosystem is severely damaged, reclamation to avoid erosion becomes necessary.

Planting trees is one means available and, ecologically, this fulfils many functions. For reclamation, the trees act to prevent further soil erosion and are also likely to improve the physical environment for the successful establishment of a diverse ecosystem. Furthermore, wood is an economic crop and can provide local income if managed carefully. Accordingly, scientists in the Establish project have researched the development of stress-resilient trees by selecting salt-resistant ecotypes.

Edaphic or soil damage creates a very hostile environment for the establishment of a replacement ecosystem. Ideal candidates, however, are poplar species *Populus alba* and *Populus euphratica*. They often show a high degree of resistance to salinated soil, but the level of resistance varies according to the cultivar and its genetic make-up. The project partners identified genetic markers and then tested suitable cultivars for reclamation ability. These stress-resistant trees would then be able to form the basis of biotechnical and more conventional breeding programmes.

One of the teams working at Università degli Studi della Tuscia in Italy used microsatellite DNA as the source of markers for this research. Microsatellite DNA consists of small simple sequence repeats. Genetically,

they tend to be neutral and can be amplified for further study. These were then used to develop random amplified polymorphic DNA (RAPD) markers to identify ecotypes, with different levels of salt stress tolerance. The scientists were able to distinguish between tolerant and intolerant ecotypes, and three of the sequences were amplified and characterised so they could be classified as sequence-characterised amplified region (SCAR) markers. Both types of marker were actually used to identify quantitative trait loci for canopy development, another important trait.

Results of this project also included the establishment of a gene finder programme that has served to strengthen international links. Information is available on the project's website, which has details about the objectives, work packages and scope of the research: <http://www.user.gwdg.de/~establis/>

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 > 3793

Watch maps assist landslide early warning

A watch map has been developed for use in an integrated early warning system for landslides, resulting in a cost-efficient and broad prototype for EU citizens.

The LEWIS project developed a new integrated earth observation (EO) method for creating landslide-warning maps. The process began with the analysis of historical multi-source satellite data that detects surface feature changes of causative and

triggering mechanisms which happened prior to landslide occurrences. The images were gathered from test sites which already had available records of ground-monitored landslide motion. Surface changes were then



tested against landslide occurrences in the instrumented test site areas.

Finally a warning map that can highlight seven levels of warning was created through the use of static and dynamic information gathered from EO data and ground networks. It operates according to displacement information coming from the persistent scatterers detection and from the results of the inference engine. In this way, it can incorporate and automate expert competences so increasing landslide hazard may be recognised. For example, when a land-use change occurs in an area with possible susceptibility, it produces a warning represented by a warning map. This technology is of particular interest for land-use planning, civil protection and for private entities such as insurance or engineering consultancy services.

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

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 3791

Bringing optical technology to the seismograph

The University of Kent at Canterbury (UKC) applied its expertise in advanced optics to develop a new generation of sensors to measure seismic activity.

Earthquakes remain one of earth's most potent natural disasters. Europe is home to several seismically active regions including, but not limited to, the Mediterranean. Effective assessment of seismic risk relies on long-term monitoring with accurate instrumentation.

Traditional sensors are based on mechanical components that record motion in three dimensions. FP5 funded the Optsdet project, whose aim was to introduce optical techniques to seismic instrumentation. The

Applied Optics Group of the UKC, a partner in the project, created a new breed of sensors based on Michelson interferometry.

In order to cover the large range required without sacrificing resolution, UKC developed two complementary accelerometers, one low-resolution and one high-resolution. The low-resolution unit employs optical fibres and mirrors that mimic the mass-spring oscillators in conventional systems. Fibre length and ends are constrained to overcome problems with polarisation, back

reflection and so forth. Optical fibres also form the heart of the high-resolution accelerometer, encompassing a pair of compliant cylinders.

The Optsdet prototypes promise significant improvement in the signal-to-noise ratio and other performance characteristics. UKC was also able to successfully combine multiple sensors to provide tri-axial measurements, which are required to fully characterise earthquakes.

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3792

Investigating snow with microwaves

Scientists with the National Research Council of Italy (CNR) discovered new ways of analysing backscattered microwaves to help determine several important features of snow.

Remote sensing is a vital tool in many environmental disciplines. It can provide data for large areas in a relatively short period of time, including inaccessible regions where ground-based measurements are not feasible. Data are gathered by analysing the backscattered signal of pulses emitted from satellite-borne sensors.

The EESD programme funded the Envisnow project to advance remote sensing of snow. CNR, a member of the Envisnow consortium, focused its attention on the microwave portion of the spectrum.

CNR applied its expertise in scattering theory to develop two new models, based on dense medium radiative transfer (DMRT) and strong fluctuation theory (SFT) respectively. The code was implemented in Matlab. Sensitivity tests performed with experimental data provided insight concerning the use of the models with both dry and wet snow.

An additional milestone achieved by CNR during Envisnow is the invention of a new algorithm to retrieve dry snow water equivalent

and snow depth. It was validated with special sensor microwave imager data over Finland and with advanced microwave scanning radiometer data over Norway.

The results of a statistical analysis demonstrate substantial improvement over established techniques such as inversion. CNR also notes that the new algorithm is particularly suited to applications where surface monitoring stations are few and far between.

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

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 3833

Climate change and soil health

A study produced by the Natural Environment Research Council (NERC) indicates that warmer, drier conditions will negatively impact the cycling of carbon, water and nutrients in the soil of shrubland ecosystems, especially in northern Europe.

The effects of climate change on soil health have not been fully investigated, yet soil is an integral part of all ecosystems. In the context of the Vulcan project, warmer night-time temperatures and reduced rainfall conditions were simulated in six shrubland ecosystems spanning southern and northern Europe. The goal was to anticipate changes in soil behaviour that can be expected over the next few decades as temperatures rise and the frequency of droughts increases.

NERC, a participant in the Vulcan project, monitored the effects of the modified weather on several key soil parameters. An alarming finding was that hotter temperatures led to increased carbon loss from the soil layer via respiration, constituting a positive feedback. On the other hand, in general, reduced rainfall led to decreased

carbon loss. The overall effect was positive at the northern test sites in Denmark and Wales.

Drought conditions appeared to negatively affect soil water capacity over the long run. NERC also examined changes in the rate of generation of plant litter and its subsequent absorption into the organic soil reservoir. The most critical variable was found to be plant type, so the overall effect will depend on the number of species and their abundance in the shrubland ecosystem. Evidence of the cumulative effects of warmer, drier conditions was observed in the form of a 15 % decrease in organic matter content over a six-year period.

With respect to soil nutrients, the data reveal that nitrogen production increased

when the test plots were exposed to higher temperatures, but only when soil moisture was within certain bounds. Unfortunately, the extended periods of drought are likely to push northern shrublands into the moisture danger zone. Phosphorus levels were relatively unaffected by the simulated changes in weather patterns.

The results of the Vulcan research demonstrate the vulnerability of shrubland ecosystems to climate change, particularly in northern Europe. NERC and its partners disseminated this knowledge through papers, meetings, newsletters and so forth in the hope of inspiring further action to limit climate change. In addition, the data can be used to improve soil parameterisation schemes in global climate models.

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3773

Simulation of carbon dioxide sources and sinks

Modelling the effects of carbon dioxide (CO₂) fluctuation globally for international agreements on emissions has not proved an easy task. The EU-funded Camels project has simulated carbon balance from historical land-use data to add valuable realistic evidence for international use.

The Kyoto protocol, the commitment made by more than 170 countries to reduce their CO₂ emissions, is due to expire in 2012. At present, international talks are under way to formulate a new treaty. For Europe and other developed continents, a key feature of the agreement is that they are allowed to offset, in part, CO₂ emissions against carbon accumulated by changes in land-use management. For example, planting woodland that would act as a carbon sink.

Of course, every model is correct in its own right, but the processes involved are so numerous and complex that each pro-

duces its own estimate of large-scale carbon uptake. For example, discussions and arguments continue on the extent of usefulness of carbon sinks. This may be limited due to the counter-effect of increased drought during summertime that may well reduce any benefit conferred by increased periods of photosynthesis in spring.

The Camels project aimed to utilise all data sources including CO₂ fluxes and measurements, satellite retrievals of vegetation chlorophyll and forest parameters. These would then be combined with present terrestrial

ecosystem models (TEMs) to produce estimates of the European land carbon sink. Project partners at the Meteorological Office (Met Office) in the United Kingdom studied the carbon cycle throughout the 20th century. The Met Office surface exchange scheme (MOSES) model was used to simulate sinks and sources of CO₂. MOSES predicts land-atmosphere exchanges of CO₂ by simulating photosynthetic activity and plant and soil respiration responses to imposed climate changes.

Another Met Office study uses historical information input data from two independent source data sets for an even longer period of 300 years. These were utilised to model the effects of land-use induced by human interference over this period. In this model, the history of the grazing land was taken into account. Whether it was derived from forest or natural grassland affects the nature of the soil carbon pool.

The models from integrated data sets that form the basis of these results from the Met Office are available as coordinated input for international programmes. In view of the dynamic nature of climate prediction that is itself a work in progress, models giving an accurate, reliable picture are of paramount importance.

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

Collaboration sought: information exchange/training.

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Modelling the interplay between water and contaminants in urban areas

Simulations with the urban volume quality (UVQ) model during the AISUWRS project provided insight into the relationship between contaminants and water resources in several different urban water systems.

The earth's limited water supplies are threatened by population growth as well as increased frequency of drought, flash floods and other phenomena associated with climate change. Now more than ever the rational and sustainable use of water resources is imperative. This applies for urban areas as much as for areas under cultivation or arid regions.

The AISUWRS project examined the interaction between contamination, water resources and the surrounding environment in urban areas. The consortium included the Commonwealth Scientific and Industrial Research Organisation (CSIRO) of Aus-

tralia, a nation that has faced widespread water shortages in recent years.

CSIRO brought its modelling experience to the AISUWRS consortium. The primary tool employed was the UVQ water and contaminant balance model. UVQ addresses the sources, sinks and transport of different contaminants and water, including the drinking water supply, wastewater treatment systems and stormwater runoff.

UVQ output includes water flow rates, contaminant loads and other parameters at different points in the system. The user can modify various water management processes and gain an

understanding of the corresponding impact on the entire water/contaminant life cycle.

In the context of AISUWRS, UVQ was applied in the case studies of four different cities. The results will be of interest to the relevant water management authorities. UVQ, which has been copyrighted by CSIRO, can also be used to design an optimal urban water system for a new city.

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

Collaboration sought: further research or development support.

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ICTs for river basin management

Securing clean, sustainable water resources for the future is a significant challenge for the EU's Member States. A report from the Harmonicop project examines the role ICTs can play, particularly in facilitating public participation (PP).

The EU's Water Framework Directive (WFD) targets a new attitude toward water management. It embodies a more holistic approach known as river basin management (RBM), which involves a wide range of stakeholders not necessarily limited to one region or country.

As in many other disciplines, ICTs can play the role of the enabler. In the case of RBM, ICTs can help achieve the desired level of PP and subsequent social learning (SL) between actors by making the two-way exchange of information easier.

The Centre national du machinisme agricole, du génie rural, des eaux et forêts

(Cemagref) investigated the use of ICTs in RBM and summarised its findings in a publicly available report. Their research addressed both hardware and software and was not limited to computer-based tools. All in all, Cemagref identified approximately 20 tools.

The tools were categorised based on four criteria relevant to the WFD vision: communication direction (top-down, bottom-up, bi-directional), public size (small working group, general public), usage purpose (such as information/knowledge management, interaction support or simulation) and phases in the PP process. The tools are defined according to these criteria in the

report, which also goes into further detail regarding mapping applications, simulation models and role-playing games.

An important section of the report is dedicated to developing a methodology for assessing ICT tools. Aside from basic functionality, usability and user-friendliness as well as the contribution to PP and SL are also evaluated. The methodology forms part of an overarching approach entitled 'pool of questions' applied during the Harmonicop case studies. More information, including the entire ICT tools report, can be found at the project website: <http://www.harmonicop.uos.de>

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

Collaboration sought: further research or development support.

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Remote sensing for eutrophication monitoring

The application of remote sensing techniques in the monitoring of marine and coastal waters has the potential to provide synoptic information on many biochemical parameters. The new medium-resolution imaging spectrometer aboard the Envisat satellite, along with dedicated algorithms, will facilitate the assessment of phytoplankton biomass, spatial magnitude and eutrophication.

Knowledge of phytoplankton distribution and dynamics in North Sea coastal waters is vital to ensure a scientific basis for coherent management of human activities which impact the coastal environment. Conventional water sampling programmes can support only sparse spatial and temporal coverage, and subsequently cannot identify the

causes of specific events or cover the strong variability characterising coastal waters.

The Revamp project's ultimate aim was to develop an improved product from MERIS observations, namely an atlas containing maps of validated chlorophyll concentrations for the North Sea. The new gener-

ation satellite sensor MERIS, designed for monitoring marine water quality through high spectral and spatial resolution observations of water colour, could potentially revolutionise the monitoring of algal biomass. Before this can be achieved, MERIS algorithms require rigorous development, testing and validation.

For this purpose, a dedicated software environment has been developed for validating the suitability of bio-optical models and inversion algorithms for retrieving regional chlorophyll concentrations from MERIS

continued on page 25

Groundwater contamination assessment tool

The AISUWRS project has developed a decision support system (DSS), a tool which merges groundwater models to allow for proper selection and comparison. This permits users to locate possible groundwater contaminants within the unsaturated zone until they enter the aquifer.

The project set out to evaluate and improve the sustainability of urban water resources and systems with the aid of computer tools. It has analysed a broad spectrum of urban water supply and disposal methods by showing how each one varies in the way contaminants are handled. The sources, their flow paths and the sinks of contaminants were identified for various urban areas. The effect that contaminant loads have on their potential to pollute groundwater was calculated. Detailed field studies were conducted in four case study cities.

Additionally, a management and decision support system was designed to utilise innovative pipeline and urban water system

assessment procedures. This permits the transfer of specific guidelines and recommendations to protect urban water resources. Applying the DSS offers the potential of a holistic urban water system tool allowing the flexible representation of water services. In turn, a broad array of both conventional and new techniques for providing water supply as well as stormwater and wastewater services can be presented and examined.

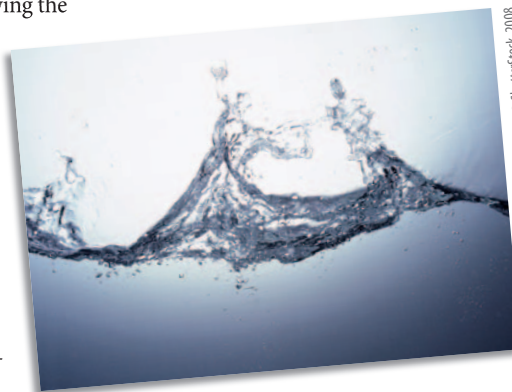
The tool allows users to examine the probability of significant uncertainties like modifications to water consumer behaviour or climate change. End-users can create the best solu-

tions for particular scenarios according to the possibility for groundwater contamination. These may include altering customer preferences and treatment as well as creating improvements to the system to reduce contamination.

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

Collaboration sought: further research or development support.

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Encouraging public participation in river basin management

The Harmonicop project has produced a report aiming to enhance the awareness of the role of participatory river basin management with regard to the European Water Framework Directive (WFD).

The main goal of the Harmonicop project was to increase understanding of participatory river basin management in Europe and facilitate the execution of the WFD on this matter. The research, carried out in nine countries through in-depth case studies, concentrated on specific scientifically challenging criteria. These included scale issues, the role of information and information tools and the cultural, political and geographical context of this initiative.

Following this, an inception report was created to explain the project's approach to public participation. It also examined

core issues which the project covered. The goal was to enable feedback from the different governments and stakeholder groups in the project's early phase and to facilitate research plans.

Since the WFD requires EU Member States to manage their basins and reach good water status, it is a critical water directive. The public is consulted three times per year regarding river basin management planning. Social learning is the key effect of public participation and thus Harmonicop sought to further the evolution of this aspect. Social learning can include groups learning how to

cope with issues such as river basin management in which all groups are interested.

In order for river basin management to be genuinely participatory, the models and information tools employed for its support and legitimisation need to be designed in a participatory manner. Furthermore, a literature review was created and methodological support given to the teams conducting the case studies. Potential users can convey requests or contribute comments and suggestions at the Harmonicop website.

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

Collaboration sought: further research or development support.

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continued from page 24 'Remote sensing for eutrophication monitoring'

observations. The Revamp MERIS processor exploits the basic Envisat MERIS and advanced along-track scanning radiometer (AATRS) toolbox, which is freely available from the European Space Agency. Implemented in the Java programming language, it allows the development of specific algorithms for processing MERIS images without requiring knowledge of file formats.

The Revamp MERIS processor supports requests in the form of XML files or posed through an interactive interface that may include simple processing calls for one

Revamp product. Large batch processing jobs are also supported, which is an important feature for the production of a yearly atlas of chlorophyll concentration maps and indices to underlying processes such as a eutrophication index. Importantly, requirements for image suitability and indicators for chlorophyll-product quality have been designed and incorporated into the operational version of the processor. The latter is expected to contribute to chlorophyll-a mapping within the framework of the future global monitoring for environment and security (GMES) project.

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

Collaboration sought: further research or development support.

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Me, myself and I: manage online identity more safely

A scrap of information here, a little detail there ... the web is safe if you guard what personal and financial information you provide. Or is it? Identity theft and cyber-spying are on the rise, and keeping track of what you reveal is nigh on impossible. Not for much longer, if European researchers get their way.

Strangers can build a fairly complete picture of our movements, transactions and relationships from the cyber-trail we leave behind. This has major implications for what has become a pervasive tool to society, business and administrations.

Privacy and identity management are fast becoming fundamental to future developments on the Internet. Hard-won trust in e-commerce and in using e-government services, for example, could quickly erode if security issues are not properly addressed.

Two basic rules govern how people can protect themselves better online, according to specialists. First, we need to 'separate contexts' so that observers cannot accumulate sensitive data — basically, by making it much harder for cyber-spies to join the online dots of our lives. Second, and crucially, we have to really keep track of what we do disclose.

These rules form the basis of the concepts and prototypes developed within the PRIME project. Perhaps borrowing from the Joan Armatrading song, PRIME's mantra is 'Me, myself and I! Manage your identities safely'.

'Our main aim is for people to gain autonomy over their personal data, so they can make informed decisions on what information they provide online,' says project partner Marit Hansen of Germany's Independent Centre for Privacy Protection (ULD, the Data Protection Authority for Land Schleswig-Holstein).

Like a good poker player who never fully reveals his hand, good identity management (IDM) means choosing and developing appropriate partial identities. For example, OnionCoffee is a PRIME software module written in Java to help end-users exchange information anonymously over the Internet.

It is a bit of a balancing act. To get the most from online services, we often have to disclose more about ourselves, but can we do it without unnecessary exposure? PRIME thinks we can.



The EU-funded project has put together a toolbox, console (interface for managing identity online) and middleware (software to glue components together) to help individuals and organisations wrest control of their online identities.

The toolbox or building blocks make good use of tutorials, application modules and documentation, including a White Paper published in 2007. The tools PRIME developed marry the need for accountability (i.e. proving you are 18 to enter certain websites) with the need for anonymity.

A key component is the use of 'private credentials' derived from certificates issued by, say, professional ID providers, such as online payment operators, on different pseudonyms for the same person.

'Multiple private credentials can be created from a single certificate,' Ms Hansen says. Using cryptography, there is nothing tying them so the person's anonymity is assured. If the system is abused — i.e. through fraudulent or antisocial behaviour — the anonymity built into the private credentials can be revoked, and appropriate action taken against the individual, she warns.

Better-designed websites and workflows, separating different tasks and corresponding databases, would also help protect users' privacy, PRIME research suggests. As, too, would a commitment by organisations to enforce their data privacy policies more diligently, and to make them easier for online customers and users to understand and verify before and after transacting.

'Sticky policies' can also be written into IDM applications so that the policy literally travels on the back of the data being transferred. This means, if data is passed on (legally) to third parties, the policy stays with the data, thus protecting the source's privacy (i.e. you and me).

So using a combination of pseudonyms and PRIME private credentials, data provided through e-commerce, e-health, or e-government applications are secured against future misuse. In principle, this also works in webmail accounts and online social networking, which is one of the extended scenarios dealt with in the follow-up project PrimeLife, starting in 2008.

Another web-based system developed by PRIME also helps us keep track of what we have already put out in cyberspace. The 'Data track' tool in PRIME's console works like the web history in your browser, monitoring the 'what', 'to whom' and 'when' of online transactions.

'Data track' also records the privacy policies of the service providers, and lets you query how your data have been used after the fact. It also helps you (re)use appropriate accounts — logins and passwords — in different contexts, keeping them apart (unless otherwise instructed).

PRIME has developed its tools and applications in the spirit of the EU's 'privacy enhancing technologies' (PET) initiative. According to the European Commission, wider development and use of

continued on page 27

Computer interaction gets some humanity

Human-computer interaction has not improved enormously since Mark Twain's time, when the typewriter was invented. A European research task force hopes to change that by making human-computer interaction (HCI), well, 'similar' to the way humans interact.

Mark Twain famously invested, and then lost, a fortune on the first typewriter, in 1874. Since then, HCI has moved beyond basic key-entry (here, the mouse is the most pervasive development), but the keyboard's legacy lives on. We are still using Qwerty, a layout designed to slow down the typist's speed, because the mechanical keys would jam together if pressed in rapid succession.

Similar, a European task force focused on HCI, plans to change all that. And it is not taking half measures, either. Similar is not content to just tweak keyboard layouts. Instead, it is going to throw the entire gamut of modern interface devices — from speech, gestures, vision, haptics and even direct brain connections — at the problem.

Its aim? Inject some humanity into the computer interaction process. The task force wants interaction to evolve from human-to-computer to more like human-to-human interactions.

'We are a network of excellence, so our main goal was to create a viable and sustainable community for HCI research,' explains Benoît Michel, manager of the Similar project. 'That covers a broad range of areas ... human-to-human interaction via a computer, or straightforward HCI, or one person interacting with many others, supported by a computer, or many people interacting together.' However, he adds, 'it also involves research areas like interface theory, or signal processing, or interface prototyping. HCI covers a lot of research domains, and we aimed to bring these together in one pan-European network.'

Based on its results, it appears Similar accomplished its mission. The 32 direct

partners and 8 associated partners were responsible for close to 1 000 article publications over the four-year life of the network. Their work also saw 32 books published by consortium members, and dozens of PhDs were awarded or are still under way.

The network developed an open-source, rapid prototyping software for interface design, called OpenInterface, which regroups a core program and plug-in technology. It means researchers have a standard, open-source programming tool for various interface functions, such as speech recognition, haptics, video and others.

If the researcher is not happy with currently available software, he or she can write a new plug-in to provide the desired functionality. In this way, the capabilities of the OpenInterface software will expand. The network also engaged in standard-setting work with the World Wide Web Consortium, to establish agreed ways to design and interface programming tools with the UsiXML user interface description language.

Similar set up a foundation that is sustainable beyond the life of the project, which finished work in November 2007. The foundation fosters networking between interface design and signal-processing experts, is responsible for the ongoing development of OpenInterface, and publishes a quarterly newsletter to keep members informed of new developments.

The network also set up a well-regarded annual summer workshop called eNterface, which impressed reviewers. It, too, will continue to run.

The project was associated with numerous spin-offs. Tactics is a tactile mapping system that provides 3D relief maps to help the blind to familiarise themselves with a city or neighbourhood. 'It's like Google maps with Braille, and it is now a commercial start-up and will develop commercial products,' Mr Michel says. Alterface is another company associated with the project. Though they spun off their research home a little before the network launched, they were closely associated with it. Alterface develops multi-modal interfaces for theme parks.

It is almost impossible to say what new types of interface design will emerge from the vibrant and active research community created by Similar, but it will almost certainly result in advances in almost every area of interface design. 'At the beginning of the network, we brought together specialists in all aspects of interface design, and experts from the world of processing,' Mr Michel notes. 'The interface researchers know a lot of theory and have many design ideas, but the signal-processing scientists know how to take those ideas and make them work. Linking these two fields had never happened before. And now Europe has a very active and highly visible and effective interface research community.'

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<http://cordis.europa.eu/ictresults/index.cfm/section/news/tpl/article/BrowsingType/Features/ID/89510>



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continued from page 26 **'Me, myself and I: manage online identity more safely'**

PETs should boost efforts to protect citizens' privacy. The project is also actively engaged in standard setting, such as ISO and W3C, in identity management.

Since 2004, PRIME has pioneered this multiple-context approach to digital IDM, Ms Hansen suggests. Today, as online security concerns have grown, there is an even stronger case for its approach, as well as an untapped market for its components, especially with digital signature providers and mobile data handlers.

'The market is ripe for better data protection and privacy solutions, especially as more mobile data transactions take place, and

we are well placed to capitalise on this,' Ms Hansen confirms. 'In fact, we're very interested in commercial or marketing partnerships to make this happen.'

PRIME has already spun off a location-based service system to Germany's T-Mobile and plans to refine some of its tools and platforms, particularly in data structuring and workflow, in PrimeLife, which was recently presented at the Cistrana topical seminar on ICT security.

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<http://cordis.europa.eu/ictresults/index.cfm/section/news/tpl/article/id/89504>

Advanced spatial presence methodology

A systematic comparison of different ways of measuring spatial presence has been conducted in order to offer insight into common and innovative means of measurement.

In previous research, certain aspects of presence have been neglected. In light of this, the 'Presence: measurement, effects, conditions' (MEC) project had set out to advance presence research methodology and investigate interactive and immersive educational media and psychological determinants of presence.

Among the project's goals was the comparison of various methodologies which are able to measure presence experiences using a psychology-based theoretical model. Additionally, it employed questionnaires, think-aloud, distraction-paradigm, eye-movement

recordings and functional magnetic resonance imaging (fMRI) methodologies in various media settings. A third goal was to examine the influence of motivational dispositions and skills of users on presence experiences.

The findings are considered to further fundamental and applied presence research significantly. For example, they can inspire reflection on the dependence of research results obtained with different methods. The findings can also infer suggestions for the selection of an appropriate method for different research questions, media stimuli

and study participants. Additionally, practical knowledge can be gathered regarding the application of common methods to successfully assess presence in the future.

In order to reach its goal, MEC had engaged a systematic, experimental cross-media research programme. It focused on controlling numerous factors that are external to measurement questions. A standardised questionnaire served as a crucial measure of spatial presence canvassing various concepts that the model addresses. A total of 290 students from Finland, Portugal and the United States participated in the investigations.

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

Collaboration sought: further research or development support.

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Near-photorealistic 3D visualisation

An innovative software platform was developed within the Benogo project to bring remote worlds to the user's location with unprecedented high fidelity, creating an artificial environment that appears realistic.

Recreating real places — as distinct from virtual places or environments — using virtual reality technology raises a series of significant challenges. Nevertheless, innovative techniques and hardware capabilities promise photorealistic, three-dimensional visualisation of actual physical

places for a moving observer, even for real-time applications.

The Benogo project was initiated to build on research into a new image-based rendering (IBR) technique that has been carried out by the Hebrew University of Jerusalem, one of the project partners. IBR is a visualisation technique offering clear advantages over traditional three-dimensional model-based computer graphics.

More specifically, the IBR technique does not require a reconstructed geometrical model of the scene; a rough scene geometry description is sufficient. By simply acquiring images at specific viewpoints in a systemic fashion, images that were never taken can be composed by combining small image parts from the available ones.

As IBR cannot be supported by fast purpose-designed graphics hardware, researchers at the Aalborg University

have developed a dedicated software platform. For sufficient support of the massive data exchange and transformation required, this software platform provides for input data and processing to be distributed on an arbitrary number of networked computers.

Moreover, by integrating traditional model-based computer graphics, sound and IBR with user tracker technology, this software platform enables users to explore a world being presented through visualisation and sound. For users to move about and have a proper response to changes in viewpoint, only a head-mounted display set and head-tracking system is required.

Since the very early stages of the project, extensive tests have been carried out, even with the first versions of the system, to establish the potential of this technology. In addition, a transportable and stand-alone version of the system was assembled and demonstrated to conference attendees, who were impressed by what they experienced.

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3716

Depicting real presence in a sense of place

The place probe is a novel camera technology which incorporates a wide array of stimuli and techniques in order to express an individual's sense of place.

Real places containing both man-made and organic objects are difficult to represent in a virtual environment. Therefore, the Benogo project developed the place probe, which permits near-photorealistic, 3D, real-time visualisation of real and perhaps known

places for the observer. This therefore brings new insight to real presence.

The visualisation can support the feeling of presence in a real scenario even though it is artificially accessible for visual inspec-

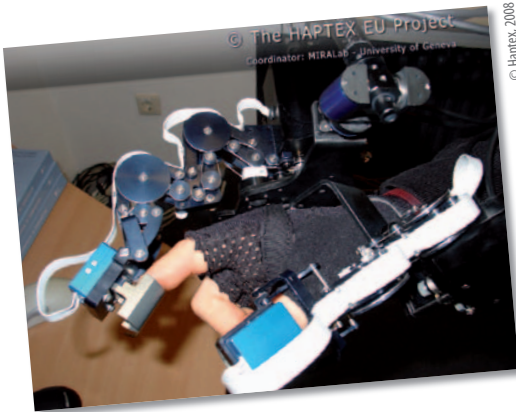
tion. The employment of this technique, in combination with advanced versions of augmented reality, can form a broad multilevel interpretation of presence based on a context which is normally unavailable.

The empirical studies that were conducted indicated that additional instruments should be included within the probe. One of these

continued on page 29

Haptics: just reach out and touch, virtually

European researchers have pioneered a breakthrough interface that allows people to touch, stretch and pull virtual fabrics that feel like the real thing. The new multi-modal software linked to tactile hardware and haptics devices has enormous potential for shopping, design and human-machine interaction.



of movement with just 20 frames a second, but touch is much more sensitive. You need 1 000 samples a second to recreate touch,' she told *ICT Results*.

In the end, the team created two models. One global model tracks the overall properties of the material. A second, fine-resolution model then maps the actual sensation on skin. All this information had to be combined with a detailed visual representation of the textile.

'That was another major problem,' Professor Magnenat-Thalmann notes, 'because the two must be in sync or the sensation will not be realistic.' Like a video with the audio out of sync, any latency between the visual and the sensual destroys the effect.

These were three major challenges from the outset, but they were just the beginning. 'We had major jobs to do with the hardware, too. Nobody has combined a force-feedback device with a tactile one,' Professor Magnenat-Thalmann reports.

Haptex overcame this problem by developing a powered exoskeleton glove with a pair of pin arrays that provide tactile sensation to two fingers. The glove gives the sensation of bending and stretching the fabric, while the pin arrays convey texture. Then this integrated device is combined with the visual and tactile database to give an overall impression. 'We have a working prototype device

and we have validated it. It gives a reliable and reproducible sensation of real fabrics in a virtual world,' Professor Magnenat-Thalmann says.

Reviewers were very impressed with the project's results, but Professor Magnenat-Thalmann says the project did not achieve all that they hoped for. 'Originally, our vision was to create a system that allowed users to distinguish between, say, cotton, wool and silk in a blind test. The system is not that sensitive yet.'

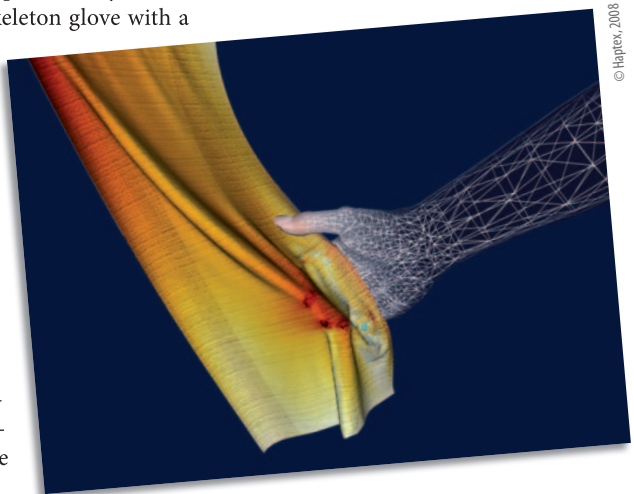
It is, however, in pre-commercialisation form. The team now hopes to secure funding for a second project that will take the device from prototype stage to full commercialisation. If they succeed, it will be a first of its kind.

It will also mean entirely new markets. The textile industry and online shopping are obvious examples, but Professor Magnenat-Thalmann also sees applications in gaming, where it could be used to make virtual worlds more realistic.

Promoted through the ICT Results service.

<http://cordis.europa.eu/ictresults/index.cfm/section/news/tpl/article/BrowsingType/Features/ID/89473>

See also page 36
(Education in the third dimension)



A revolutionary new interface allows users to really feel virtual textiles. The system combines a specially designed glove, a sophisticated computer model and visual representation to reproduce the sensation of cloth with an impressive degree of realism.

'It is a multi-modal approach that has never been tried before,' says Professor Nadia Magnenat-Thalmann, coordinator of the 'Haptic sensing of virtual textiles' (Haptex) project.

The new system is a major breakthrough achieved through highly focused work of a small consortium of five research institutes. In just three years, they have created a pre-commercialisation prototype of the device and its related multi-modal software.

But it was not easy. Creating the realistic sensation of deformable textiles required a huge amount of modelling. 'That was our first big challenge,' Professor Magnenat-Thalmann says, taking precise measurements of the tensile, bending and stretching properties of the material.

'You also need very high resolution; the visual system will give a realistic impression

continued from page 28 **'Depicting real presence in a sense of place'**

is the visitor's book which contains written reports with open-ended questions about the individual's experience. Sketch maps are also included in order to offer information on layout and key location features depicting the aspects of the location that people remember. There is also a section in which participants rate the salient features of the place as well as semantic differentials in which the environment is rated on a scale. Finally, participants are asked to come up

with six words best describing their experience of being in a specific place.

During the course of the project, it became evident that soundscape was a key factor of a sense of place and thus an extra section was added specifically to cover sound. The overall aim of using the probe was to discover what was lacking from the experience of a virtual environment when compared to its real-world counterpart. That is, as an alternative

to merely providing a quantitative score for place or presence. This approach, in combination with traditional questionnaire methods, should offer advanced insight into the degree of presence that people experience and how their sense of place impacts this.

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

Collaboration sought: further research or development support.

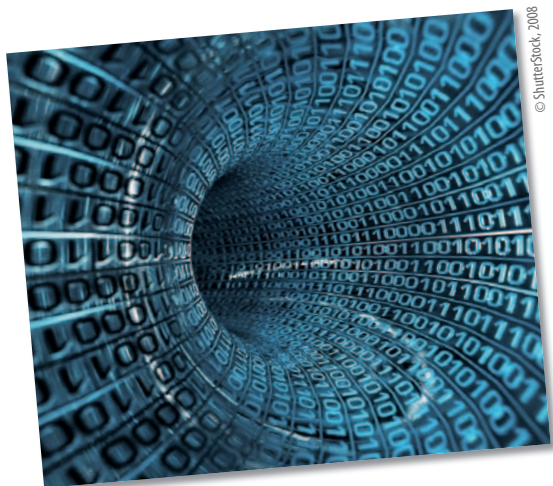
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Towards global deployment of IPv6

Aiming to promote the adoption of Internet protocol version 6 (IPv6), the 6NET project has demonstrated that IPv6 is deployable in production environments with points-of-presence located in national research and education networks.

Over the past years, numerous national research networks and academic network backbone providers have deployed IPv6 in production. In dual-stack networks, native IPv6 connectivity was made available between diverse points on the Internet extending from North America to Europe and south-east Asia.

In Europe specifically, the GÉANT network has offered a production IPv6 unicast service since 2003. Nevertheless, the challenge ahead remained to push IPv6 deployment into universities and end sites in academic networks. Efforts in this direction have been accelerated by the results of the IST-funded research project 6NET.



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The ultimate aim of the 6NET project was to establish a production IPv6 network within the academic community with links to existing IPv6 networks. Within a university network, services should not only be deployed to support teaching and research activities, but more importantly an ideal seeding ground for innovation should be offered.

A dual-stack IPv6 environment was deployed and the introduction of IPv6-only devices into the network was

enabled in the University of Southampton. The IPv6 deployment was not straightforward as, besides the traditional IP infrastructure (mail, domain name system, etc.) used, advantage was taken of new IPv6 features such as source-specific multicast and mobile IPv6.

Given that there was no available network infrastructure for IPv6 routing, 802.1q virtual local area network (VLAN) support was required to distribute IPv6 connectivity where hosts chose to select it. To enable parallel interoperability with legacy nodes, dual-stack networking was used, namely IPv4 to communicate with IPv4 nodes and IPv6 to communicate with IPv6 nodes.

The IPv6 deployment experience gained within the 6NET project was used to produce international 'cookbooks', targeting network administrators. These include reference books on routing, migrating backbone and campus networks to IPv6, as well as on network management, which are available on the 6NET project website.

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3755

Domain names for accessing Internet resources

A small domain name system (DNS) proxy has been developed within the 6NET project to perform translation of the queries that it forwards to one or more real name servers which will resolve them recursively.

6NET was an IST project aiming to demonstrate that continued growth of the Internet can be met by exploiting new Internet protocol version 6 (IPv6) technology. More than 30 project partners from the commercial, research and academic sectors combined their experience and resources to build and operate a pan-European native IPv6 network connecting 16 countries.

This network was extensively used to test a variety of new IPv6 services and, crucially, interoperability with legacy applications. It allowed practical operational experience to be gained, and provided the means to evaluate migration strategies, which are important considering that IPv4 and IPv6 will coexist for several years.

IPv6 was intended to be used as the transport protocol as widely as possible during the life cycle of the 6NET project. This required alignment and integration of the 6NET DNS service with the existing IPv4-based Internet. DNS is a complex set of functions and services which can provide a reliable translation from names

to addresses (IPv4 and IPv6) and from addresses to names.

More specifically, the forward DNS service provides name-based identification and access to the various components available on the Internet, by supplying an IP address. On the other hand, the reverse DNS service provides the translation of numeric IP addresses back to meaningful names, as well as for some security facilities. Within the 6NET network, DNS services were operated on top of the IPv4 protocol stack.

TOTD, a small DNS proxy name server running on a single host, proved useful for laptop and other portable devices that roam between IPv6-only, dual stack and IPv4-only networks. This facilitates applications with an IPv4-only resolver to make DNS queries via

the proxy, when IPv6-only DNS servers are available. However, transition mechanisms deployed somewhere on the 6NET network could be tested when a TOTD DNS proxy was shared by multiple sites.

Documentation as well as the source code of the DNS proxy software are freely available for a variety of operating systems on the Internet.

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3815

See also page 34 (offers 3821 and 3799)



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Dual IPv4 and IPv6 multicast deployment

Deployment of both Internet protocol version 4 (IPv4) and Internet protocol version 6 (IPv6) multicast has been made possible within the 6NET project to allow the distribution of identical content only once in the dual-stack networks. The network itself can handle subsequent duplication and transport to the intended receivers.

While the existing IPv4 simply cannot support an Internet scaling to many billions of globally connected hosts, IPv6 provides a 128-bit address space. During the design of IPv6, the Internet Engineering Task Force took the opportunity to make further improvements beyond providing a unique address for about 340 undecillion hosts.

Extensible and highly adaptable to future requirements, IPv6 will however have to coexist with IPv4 for many years; thus finding ways for the two to interoperate is of great importance.

Within the European 6NET project, dedicated transition techniques were developed to address multicast issues. If all parties intending to communicate have applications and host operating systems that support the same Internet protocol, there is usually no serious issue arising during data delivery. On the other hand, a multicast source can stream to both an IPv4-only and IPv6-only group to allow all users to reach it. If the multicast source cannot be made dual-stack, hosts that support only the other protocol will not be able to access it, unless some translation is performed somewhere on the path in between.



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Research work at the Uninett laboratories focused on deploying multicast in dual-stack networks. In this case, one would preferably deploy both IPv4 and IPv6 multicast using a protocol-independent multicast-sparse mode (PIM-SM) domain with rendezvous points. IPv4 multicast addresses were embedded into IPv6 by prepending them with a specific /96 IPv6 multicast prefix, such that for each one there would be a respective IPv6 multicast address. Subsequently, an IPv6 host in PIM-SM domain could receive and send to any IPv4 group by using the respective IPv6 group.

With the rendezvous point for the prefix used as the gateway, a video conference with multiple participants deploying both IPv4 and IPv6 would be supported, as would two-way connectivity. This gateway could for instance be placed on the border between an IPv4-only and an IPv6-only network, but it could also be placed within a dual-stack network. Such a single gateway was successfully deployed as a service to the entire 6NET and M6BONE network.

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3795

See also page 34 (offers 3821 and 3799)

Designing the next generation of WLAN terminals

The next generation of wireless local area network (WLAN) standards will be based on multiple-input and multiple-output (MIMO) systems. The FLOWS project proposed an innovative receiver architecture to support multiple modulation schemes, multiple antenna configurations and multiple space-time coding schemes of the IEEE 802.11n standard.

The major challenge facing the future wireless communication systems is to provide high data rate access to multiple mobile users, while ensuring end-to-end quality of service (QoS). MIMO wireless technology seems to provide for the increased spectral efficiency required through spatial multiplexing as well as improved link reliability due to antenna diversity.

The principal requirement for the practical implementation of MIMO systems is to be able to transmit data from a set of physically separated antennas and receive signals in a like manner. In particular, the individual identity of signals transmitted and received at each antenna must be preserved, as well as possible, from baseband through to the antenna and vice versa.

The FLOWS project focused on the radio-frequency (RF) components of MIMO systems that translate the received messages from the multiple antenna array to baseband. Subject to several effects, the RF

system may be the source of possible degradation in the performance of the overall MIMO system. More specifically, the effect of the RF system's impairments consisting of non-linearities and imbalances present in both the transmitter and receiver was evaluated for different architectures.

Building on existing approaches for multiplexing together signals from several antennas in time or frequency, researchers at the Phillips Research Laboratories in Surrey designed a new architecture for MIMO receivers. The received signal at each antenna was given a unique identity by the application of an orthogonal code and these were then combined into one, prior to passing them through a single radio receiver.

Moreover, the possibility of a reduction in the replication of RF elements and its potential impact on performance were investigated and confirmed by means of extensive modelling work. The code-multiplexed receiver was proved to offer a promising solution for

reducing parallelism and functional replication in the MIMO RF system, while ensuring high bit error rate performance.

This method of combining several signals into a single carrier by means of Walsh functions has already been used to differentiate users and services in code division multiple access (CDMA) mobile telephony.

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3824



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For global, open and dynamic computing environments

Following a logic-based approach, the 'Societies of computees' (SOCS) project developed a modular model for intelligent agents in dynamic environments.

The SOCS project focused on appropriate computational models for the description, analysis and verification of individual and aggregated computational entities. These entities, named computees, interact in global, open and dynamic environments and can form complex organisations, the societies.

The declarative model developed for computees includes a knowledge base (K) to reason with, goals (G) to be achieved, and plans (P) to achieve the goals. The so-called KGP offers a suitable framework for computees to

perform a synthesis of their reasoning and pursue their goals, which can be adapted to changes.

Provision has been made for managing the heterogeneous behaviour of computees. The use of the modular, flexible and declarative specification control model KGP allows modelling of both the reasoning capabilities and the reasoning of behaviour. The KGP model contributes to the development of user-friendly, intelligent and transparent systems for managing daily activities and electronic information.

The project work may fulfil useful applications in complex environments including new forms of communication and commerce. Moreover, the new techniques support a ubiquitous accessibility of electronically available information and its exploitation through intelligent, distributed and collaborative means. For further information on the project, please visit: <http://www-lia.deis.unibo.it/Research/Projects/SOCS>

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3768

Intelligent agents reasoning about web services

Social infrastructure developed by the 'Societies of computees' (SOCS) project provides a social model and an abductive proof procedure for the on-the-fly verification of the compliance to protocols of interacting agents in a global computing setting.

Offering principles, methodologies and architectural patterns, service-oriented architectures (SOAs) have emerged as a new paradigm for structuring inter- and intra-business information processes. Web service composition, where business functionalities are encapsulated in software components and can be invoked through a stack of Internet standards, provides a practical instance of these architectures.

In this context, the need for more sophisticated standards and, in particular, for runtime testing of conformance to rules and specifications motivated the exploitation of the society constraint information flow framework (SC-IFF). SC-IFF was developed within the SOCS project to provide a formal language for defining agent interaction protocols. Its operational counterpart is mainly based on the IFF abductive proof procedure

and can be used for verifying the compliance of individual web services to global protocols or choreographies.

SC-IFF has been integrated in SOCS society infrastructure (SOCS-SI), a Java software application able to monitor agent interactions and forward them to SC-IFF for reasoning. SOCS-SI receives as input the choreography's specifications along with the events happening, and provides to the user the results of SC-IFF computations on conformance issues through a graphical user interface. Besides providing for conformance verification at runtime by checking immediately incoming events from various sources, SOCS-SI is able to analyse log files containing relevant events.

SOCS-SI together with its proof procedures constitute an attractive framework for web service designers to reason about expectations, social protocols and properties in a setting where information is partial. Moreover, it may pave the way for new concepts in agent society engineering, driven by reasoning about properties and helped by formally grounded verification tools.

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

Collaboration sought: further research or development support.

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A priori verification of web services

Recent advances in logic programming have opened up the possibility of easily designing complex web service protocols from simpler ones, by eliminating difficulties arising due to different platforms and languages.

Web service composition promises to considerably reduce development time and costs, by taking off-the-shelf components and joining them in a working application. Although very appealing, it leaves questions open, such as the correctness of the composition or even the interoperability of the web services.

Stemming from previous experience in multi-agent systems (MAS), a formal framework has been introduced for the automatic verification of the compliance of web services to common rules and specifications. The society constraint information flow framework (SC-IFF), developed within the 'Societies of computees' (SOCS) project, can

be applied to situations involving reasoning with incomplete information and dynamic occurrence of events.

SC-IFF includes proof procedures to check, a priori and on the fly, the compliance of agents with multi-agent protocols, in addition to a language based on abductive and constraint logic programming. More specifically, the compliance of individual web services to Internet protocol definitions and agent communication language

continued on page 33

Palpable computing: a taste of things to come

Virtually everyone stands to benefit from the more pervasive use of computer technology. But while adding microchips to more everyday objects can make lives easier and even save them, the approach creates some unique problems of its own. 'Palpable' rather than 'ubiquitous' computing promises a solution.

'Palpable computing,' a term coined by Professor Morten Kyng, a researcher at the University of Aarhus in Denmark, refers to pervasive computer technology that is also tangible and comprehensible to its users.

Ubiquitous computing, in the traditional sense, is based on the vision of making the computers invisible, Professor Kyng suggests. 'The problem is that when the technology is invisible you can't see what it is doing, how it functions or comprehend it.'

Anyone who has tried to connect their mobile phone to their laptop can attest to that. But while the invisibility of ubiquitous computing technology may be a mere inconvenience for many, in some cases it can be a serious, even life-threatening problem. A breakdown in communications that cannot be quickly fixed during a natural disaster can cost lives, as too can interoperability failures in hospital equipment.

By making the technology visible when it needs to be and comprehensible all the time, palpable computing reduces the complications of using the technology, while opening the door to developers creating new applications more easily.

The vision of ubiquitous computing has focused on tools honed through use over time and well suited to what they are designed to do, Professor Kyng comments. 'The problems arise when you want or need to do something new or different from what the designers intended: the user is not really in control,' he adds.

Over the last four years, Professor Kyng has led a team of more than 100 researchers from across Europe working on making palpable computing a reality. They have developed software architecture for palpable computing systems as well as a toolbox

for developers to create applications that has recently been made available under an open-source licence. The researchers, who received EU funding in the PalCom project, also developed several test platforms that have served to highlight the benefits of their approach.

One of them was used when the Tall Ships' Races — the world's biggest competition for sailing ships — visited Aarhus in July 2007. The platform enabled police and fire fighters to interact with a three-dimensional (3D) workspace of the Aarhus harbour and its surroundings, displaying the location of key personnel, cars, ships and equipment to give a general overview of what was going on.

'Large-scale events, such as the Tall Ships' Races, can be very hard to gain an overview of. With a million visitors and a huge area, it is challenging to monitor every critical spot. In my opinion, PalCom's technology has enormous potential — not only for events [like this] but also for monitoring major accident scenes,' notes Aarhus fire chief Jakob Andersen.

A second test platform was created to enhance therapy for disabled children, while a third was designed to help landscape architects visualise the location and assess the visual impact of large development projects (such as wind farms and industrial buildings).

The system involves a camera, placed on the roof of a car, connected with a laptop running an advanced 3D-visualisation programme which provides landscape architects with a much more precise indication of where

a new building will be located and its impact on the surrounding landscape as they drive around.

'The potential uses for palpable computing are diverse, although initially I think the key markets will be in areas such as emergency response and health care, where there is an urgent need for increasingly efficient and effective technology,' Professor Kyng says. The University of Aarhus and several other project partners are concentrating on the development of applications using PalCom's architecture in those fields. Professor Kyng's team, for example, is applying the technology to help women through pregnancies and to improve the treatment of hip replacement patients. One palpable computing system being developed to enhance post-surgery monitoring will allow hip patients to leave the hospital 24 hours after surgery, he estimates, rather than the current three or four days.

The PalCom coordinator notes that the trial systems have elicited considerable interest and expects the open-source release of the toolbox to lead to new applications. 'Ultimately, success in the marketplace will drive the technology forward,' he says.

Promoted through the ICT Results service.

<http://cordis.europa.eu/ictresults/index.cfm/section/news/tpl/article/BrowsingType/Features/ID/89462>



continued from page 32 'A priori verification of web services'

semantics is verified on the basis of the current history of events.

A variant of SC-IFF, called gSC-IFF, provides for the generation of a history of events, compliant to a specific protocol, besides verifying whether a history is compliant with a protocol. Furthermore, the histories generated by the gSC-IFF proof procedure are not only a collection of events, but they

can contain variables and represent classes of event histories.

gSC-IFF has been proven sound, which means that the histories it generates are guaranteed to be compliant with the agent interaction protocols, while supporting the user's goals. By generating positive and negative expectations, the protocols' compliance can be dynamically checked while

these are being designed. More importantly, its ability to prove the properties of the protocols themselves makes gSC-IFF a valuable tool for protocol engineering.

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3804

Managing secure IPv6 exchanges

Promoting the use of Internet protocol version 6 (IPv6) in Europe, the Euro6IX project developed a policy-based network management tool for handling security issues in modern networked environments.

The Euro6IX project envisaged a large, scalable and native IPv6 backbone of traffic exchanges with connectivity across Europe and other Internet protocol version 4 (IPv4) and IPv6 exchangers. In order to allow participation of new players — other than research users — in the IPv6 trials, key applications and services were developed and ported.

The basic infrastructure consists of three levels, namely the Internet exchange (IX) level, the backbone level and the node level. The first involves regional native IPv6 exchanges and the second, pan-European core network interconnections of the regional exchanges. On the node level, Internet and service providers can access the core network to provide IPv6 services and end-user access.

The key aim was to offer advanced network services along with a repository of IPv6-enabled applications for trials both within Euro6IX and with third parties. In order to achieve the same level of robustness and service quality as the one currently offered by the IPv4 IX networks, issues like security should be adequately handled.

Therefore, Euro6IX implemented a policy-based network management (PBNM) architecture for providing a security framework for the management of policies in IPv6/IPv4 networks. On the basis of public key cryptography technology, the University of Murcia (UMU) developed the so-called UMU-PBNM tool for effective management of security issues in IPv6-networked environments.

The advanced tool features easy system access with the aid of a user-friendly Internet browser on the policy console. It also provides administration support in accordance with specified role, interface and template concepts. Additionally, the tool offers security monitoring of virtual private networks, routing and multi-homing.



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Integrated with domain name system security (DNSSec) extensions, it may also be employed for storing device certificates. Moreover, it is extendable to accommodate future needs on advanced network services. For more information on the project, please visit: <http://www.euro6ix.org>

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

Collaboration sought: further research or development support, private-public partnership — available for consultancy.

<http://cordis.europa.eu/marketplace> > search > offers > 3821

Legal aspects of Internet protocol version 6

A new publication, released by the Euro6IX project, aims to contribute basic knowledge about the technical specifications of Internet protocol version 6 (IPv6). Moreover, this book provides a unique analysis of legal issues that have arisen during the adoption of IPv6 and affect the right to privacy and data protection.

IPv6 has been developed in response to a series of perceived problems, which primarily involve exhaustion of the current Internet protocol version 4 (IPv4). However, a number of changes were also made in data formats and the interpretation of data fields to make the network operate better in the long term. The design process has essentially been completed and a protocol specified after considerable implementation experience, although refinement work continues.



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As a consequence of the transition from IPv4 to IPv6, numerous projects are dedicated to the study of its development and implementation from a purely technical perspective. The European project Euro6IX sought to analyse the possible implications that the adoption of IPv6 might have in terms of privacy and data protection. Whilst the transition to IPv6 is both necessary and inevitable, concerns about the design of one type of IPv6 address using unique identifiers have already arisen with regard to privacy issues.

An IPv6 address could be considered as personal data, because it contains a unique identifier linked directly to the terminal interface using the specific IP address and to its user. In this respect, the current European legislation on data protection was analysed with the purpose of estimating whether it contemplates and regulates pos-

sible problems from the IPv6 implementation. This analysis was further motivated by the fact that existing data protection legislation is currently being consolidated and is becoming known by companies, organisations and citizens acquiring greater knowledge of their rights and obligations.

European directives, agreements and conventions on data protection that might be initially implemented to IPv6 were analysed in terms of their adequacy to detect new aspects of IPv6 adoption. In addition, it was examined whether information on IP addresses could be processed in conformity with the current legislation and under the existing IPv6 specification. Finally, the possibility of adopting technical solutions that have been developed to preserve the privacy of this protocol's users was considered.

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

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

<http://cordis.europa.eu/marketplace> > search > offers > 3799

See also pages 30 (offers 3755 and 3815) and 31 (offer 3795)

Deploying the semantic web

Semantic information can be extracted from web data and warehoused in a way that enables its efficient retrieval by means of an innovative business-oriented framework developed within the Parmenides project.

Strategic decision making, especially in the growing fields of business and competitive intelligence, requires the acquisition of relevant pieces of information such as market trends, fusions, and company values. It is characteristic that the extraction process of this information from multiple sources is resource intensive and, moreover, has to be performed regularly and quite frequently.

Within the Parmenides project, funded by FP5, an ontology-driven systematic approach for integrating the entire process of information gathering and analysis was adopted. For decomposing business into conventional queries, dedicated methods were developed that semi-automatically establish ontologies over specific application domains, annotate documents with ontology components and identify entities within them.

Two complementary methodologies were exploited for the establishment of ontologies over unstructured texts, essentially press releases and reports that are not

part of a database. The template-oriented methodology, with its origins in natural language processing, expresses the structure and semantics of documents by means of rule templates and enriches them with formal annotations.

On the other hand, the knowledge discovery in databases (KDD) methodology supports the discovery of concepts and relationships characterising the documents. Furthermore, it is relevant to the domain of discourse. Extracted information assets are preserved in a document warehouse to support knowledge discovery tasks over time and to enable the spotting of new trends that would remain hidden otherwise.

Although the plethora of 'ready to use' ontologies offers standardised conceptual material, often combined with valued suggestions about the associated conceptual relations, this knowledge must frequently be restructured. The Parmenides knowledge



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extraction system can cover the paucity of ontological material for domains which are currently the focus of numerous research activities.

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3737

See also page 37 (offer 3744)

Co-design of embedded hardware/software systems

Support tools for the object-oriented design of hardware/software systems, based on the System C description language, were developed to provide the migration path from executable specifications to efficient hardware implementations.

The steadily increasing complexity of embedded systems comprising hardware and software components requires comprehensive methodologies that support the design process from multiple levels of abstraction. A most interesting development was the adoption of well-known and approved object-oriented modelling and synthesis techniques widely employed in software development. Nevertheless, there are major differences between the nature of software and hardware, and direct adaptation of common object-oriented programming languages would not be possible.

System C is a C++ class library and methodology that introduced the missing, but typical hardware features in C/C++. Within the Odette project, the transition from objective VHSIC hardware description language (VHDL) to System C was achieved. This change was mainly driven by the project's industrial partners who saw this as the best

way forward. More importantly, dedicated tools for the co-simulation of the functional and temporal behaviour of the hardware and software were developed at the Synopsys laboratories in France, which provide executable specifications of the complete system.

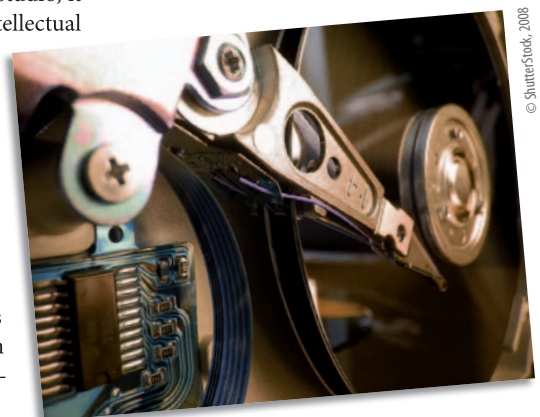
As part of the System C design and verification tool suite CoCentric® System Studio, it allows System C users to employ intellectual properties developed in VHDL. Moreover, the co-simulation environment provides for the simulation of the complete hardware/software system, where the software parts of the model are written in C/C++ and hardware parts in System C. Modelling of the complete hardware/software system, described in different languages, is enabled by the ability of the System C modelling environment to cooperate with HDL simulators.

The dynamic behavioural model of the hardware/software system, in interaction with its environment model, can subsequently provide the necessary insight for an in-depth analysis of complex designs. For refinement, software-hardware partitioning, simulation and verification tasks during the design process tool support is provided from the highest abstraction levels down to the register-transfer level within one single environment.

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

Collaboration sought: information exchange/training.

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Programming for the global computing environment

Meeting the challenge of global computing requirements, the Mikado project led to the development of suitable programming language technologies, such as 'Typed concurrent objects' (TyCO).

Emerging global computing environments show increased demands in the range of interactions among users, in addition to an unlimited number of components and objects. Moreover, mobility, predictability, security and fault tolerance are important features in global computing. Current middleware and programming language technologies are potentially insufficient in meeting these demands.

Addressing these needs, the Mikado project developed a new core domain-based programming model for the specification and programming of highly distributed and mobile systems. On the theoretical basis of this model, researchers defined specification and analysis techniques aimed at enhancing the safety and trustworthiness of systems. The programming model, along with the techniques, were employed

for implementing concrete programming technologies.

One of the developed programming languages was the TyCO distributed programming language. This object-oriented, concurrent language relies on an extension of an asynchronous calculus, namely the pi-calculus, and features first class objects, asynchronous messages and process definitions. The latter offer the basis for modelling object classes. For more information, please visit: <http://mikado.di.fc.ul.pt/index.html>

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3714

Computer-aided improvement of articulation

Computer technology has been exploited to aid therapy for speech disorders in the most efficient and friendly way.

Under the auspices of the Ortho-logo-paedia (OLP) project, a complete computer-based system was developed that may significantly contribute to therapies for specific speech disorders at the articulation level. The system effectively combines automatic speech recognition and distance learning.

Based on real-time audio-visual feedback of the subject's speech, therapy can be specially designed and customised to each individual's specific needs. With the aid of statistical data models developed during a training phase or therapy session, speech produc-

tion is evaluated. The distance learning capabilities allow remote collaboration and exchange of data for further analysis of different cases.

Part of the integrated system incorporates an articulation practice software tool that uses real-time phonetic mapping technology. The so-called STAPTk offers visual feedback of speech articulation using a kinematics map. The user's speech activates a moving sprite around a window area that has been set up according to particular sounds. The closer the acoustics are to a

target sound, the nearer the sprite comes to the specific target.

The developed prototype has been based on a neural networks technology trained to map acoustics to a two-dimensional position. The key application of the innovative technology is in speech therapy when training individuals to improve articulation. Other applications include practising speech in second language learning. For more information on the project, please visit: <http://www.xanthi.ilsp.gr/olp>

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 > 3730

Education in the third dimension

So far, most learning has focused on abstract symbolic knowledge like writing, or passive receptive iconic knowledge through images. But there is a third kind — 'enactive' knowledge, or learning by doing. It is the information we acquire using our whole bodies, and it is a new paradigm in IT-assisted education.

Learning by doing, or by 'enaction', started at the dawn of humanity itself, from the time the first proto-human discovered that a bone could become a tool. But it is a practice that has become marginalised in developed societies, as convenience and, increasingly, technology lure people away from craftwork and physical labour.

Today, knowledge mediated by computers is transmitted symbolically, through writing, or iconically with pictures. But not, perhaps, for much longer.

Thanks to an EU-funded research network, called Enactive, there is now a large and thriving research community working on computer-assisted 'enactive' knowledge. Experts in robotics,

virtual reality, experimental psychology and neuroscience share resources and information.

'Four years ago when we started, there was no research community for IT-assisted, enactive knowledge,' says Enactive's coordinator Massimo Bergamasco. 'There were relatively isolated communities in experimental psychology and neuroscience, but there was nothing that linked those fields with specialists in computer science, or multimedia, or robotics.' Now there is a society, there is a conference, and one of the network's partners is setting up a lab dedicated to this research.

It is a tremendous achievement, but what will it all mean?

It is easy to imagine various potential applications. How about using a screen, a glove and a handheld 'chisel' to become a carpenter? You could change the settings to reflect different types of wood, and you could mess up as many pieces as you like because they would be replaced virtually. But, at the end of it, you would be a fully skilled craftsman.

Does it sound a bit far-fetched? Well, in a separate EU-funded project, called Haptex, researchers have successfully created the 'feel' of a virtual fabric. Its texture, strength and elasticity are all transmitted via a glove. First-time users are really surprised at how real this virtual fabric feels.

Professor Bergamasco highlights other potential applications. 'We see concepts in different fields, like rehabilitation, surgery, industrial training, space exploration. The number of potential applications is virtually limitless.'

continued on page 37

Providing for successful ontology reuse

For a massive knowledge web, where both users and computers can navigate, realistic and numerous domain-specific ontologies are required. Instead of attempting to capture the entire web in a gigantic index, the Wonderweb project proposed that each application should extract an ontology segment specific to its particular needs.

Along with the rapid development of the World Wide Web, the amount of available information online has increased exponentially. A lack of standardisation and common vocabulary would result in heterogeneity, hindering information exchange and communication.

Ontologies, capturing the semantics of information from various sources and providing a concise and declarative description, have therefore gained unprecedented significance. It is the increasing awareness of the benefits of ontologies in information processing that has led to monolithic ontologies for real-world domains.

Within the Wonderweb project, coordinated efforts have been devoted to the development of modularisation methods and tools for managing large domains containing thousands of concepts. This notion of modularisation comes from software engineering, where it refers to the design of software from well-defined components that can be handled and reused independently.

Researchers at the Vrije Universiteit in Amsterdam sought to address the scalability problems by means of a partitioning method purely based on the structure

of the ontology. Ignoring its inefficiency in capturing important dependencies that could be found by analysing classes and the logical definition of concepts was a practical consideration.

A structure-based semantical investigation could scale up to large ontologies that contain hundreds of thousands of concepts. This iterative partitioning has already been successfully applied to real-world ontologies available in a web ontology language (OWL) or resource description framework (RDF) schema, including the suggested upper merged ontology (SUMO).

SUMO was developed within the IEEE Standard Upper Ontology Working Group as a standard ontology that will promote data interoperability, information search and retrieval, as well as natural language processing. In a second experiment on the partitioning

created for the administrative part of the National Cancer Institute (NCI) ontology, promising results were achieved with this minimal approach.

It remains to be investigated whether the use of additional structural information to the hierarchy concept produces better results. Another direction for future research is the method's performance on graphs that include dependencies resulting from user-defined relations.

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3744

See also page 35 (offer 3737)



continued from page 36 **'Education in the third dimension'**

Imagine a surgeon practising a delicate procedure on a virtual patient, until he or she becomes expert. Or, one day perhaps, it will be possible to model an individual patient and practise a particularly tricky operation virtually, before trying the real thing. It is all built on the idea that we learn better by doing something than by reading about it, or even watching a video.

But the real wonder of this research is that experts do not know what marvels enactive knowledge could yet unlock. Creating computer-assisted, enactive devices will provide tremendous tools to disciplines like experimental psychology and neuroscience.

Imagine a language interface that hears what you say and responds appropriately. Will you learn better, faster, or not? What does 'whole body' education tell us about human psychology, evolution and learning mechanisms? And what new potential enactive

applications will those experimental discoveries enable?

We do know that, in the shorter term, it will be discoveries made through a combination of haptic devices, audio and video. Haptic devices are interfaces that provide a physical feedback to the user. Typically they appear, in a very primitive application, with video game control pads. The pad shakes each time an impact occurs on screen, for instance.

There are far more sophisticated devices, however, like the haptic glove created by Haptex. Combined with audio and vision, haptic devices can provide uncannily realistic impressions of reality.

'Most of the work within the next few years focuses on audio, vision and touch; there is no real work on taste or smell yet. Different groups are looking at different things, like audio with haptics, video with hap-

tics or combinations ... The network has really inspired a lot of activity,' Professor Bergamasco explains.

'In fact, the Network of Excellence was a superb platform to promote this field,' he reveals. 'We had 25 groups, research institutes, mostly in Europe, but with some in the United States and Canada, and the degree of interaction between them now is amazing.' It means that the whole field of technology-assisted, enactive knowledge is just at its very beginnings, but thanks to the work of the Enactive Network of Excellence, the field is set to expand rapidly.

Promoted through the ICT Results service.

<http://cordis.europa.eu/ictresults/index.cfm/section/news/tpl/article/BrowsingType/Features/ID/89485>

See also page 29 (Haptics: just reach out and touch, virtually)

Modern approaches to machine translation between languages require the use of a large 'corpus' of literature in each language. Now an EU-funded project has demonstrated a cheaper solution which compares favourably with the market leaders in translating from Spanish, German, Greek or Dutch into English.

A corpus is a large body of written material, amounting to tens of millions of words,

In Greek, for example, the verb can precede the subject of a sentence. ‘So if you come in with a Greek sentence, “Eats Mary a cake”, you would like the machine to be able to translate it into English and rearrange the words to make “Mary eats a cake”, explains Dr Markantonatou. ‘Pattern matching is a good way of doing that because it is able to take patterns from the source language and make them like the target language.’

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The problem now is what to do next. Results from METIS II are being followed up in national research programmes in Belgium and Spain, but there are no plans as yet to further develop the whole system. Some of the components created in the project, such as dictionaries and associated language tools, could be marketable in their own right, but would need an industrial partner to provide the investment needed to turn the prototype into a commercial product.

'For Greek, it would be an excellent opportunity because there is nothing really good for [translating it] at present,' Dr Markantonatou told *ICT Results*. 'With a better lexicon, fixing bugs and making algorithms more efficient, this kind of thing could work. In another two or three years, METIS could be a very serious competitor to Sysstran. It's a matter of funding.'

<http://cordis.europa.eu/ictresults/index.cfm/section/news/tpl/article/id/89533>



New processing methods for cotton-based materials

The textile and clothes industry is a highly competitive marketplace. To improve standards, researchers from the EU-funded Cortex project have investigated the application of corona treatment during the manufacture of cotton-based materials.

Advances in polymer technology have given rise to the development of a huge range of textiles. The natural properties of cellulose-based plant fibres can be mimicked by their artificial counterparts. However, in many cases there is no substitute for the natural material to produce the qualities that the consumer demands. A prime example is polycotton. By blending the two types of fibres, the easy-care, low-shrinkage characteristics of polyester are obtained with the natural soft feel of cotton. Moreover, from an economic point of view, the cost of a synthetic/natural mix fabric is highly competitive.

The use and or inclusion of cellulose-based fibres can, however, be problematic. They are all naturally repellent to water (hydrophobic) due to the large amount of impurities which form a barrier. Treatments during manufacture include dyeing, printing, bleaching, waterproofing and finishing to make them wrinkle free. These processes necessitate that the material be uniform as far as absorption is concerned, and this is difficult to accomplish due to variations in hydrophobicity.

To eliminate the problem, several wetting agents can be applied. These increase the spreading and penetrating properties of a liquid by lowering its surface tension. Problems associated with the wetting agents are pollution, increased cost, foam formation and reduced production. Another way would be to increase the bath temperature, but this can lead to aggregate formation within the bath.

Partners within the Cortex project have researched into another means of solving this inherent problem. Scientists at Universidade do Minho in Portugal investigated the application of corona plasmatic technology to modify the surface of the materials. This involved the application of an electrical discharge between an electrode and a counter-electrode, used only to make a connec-

tion to the electrolyte. Meanwhile, the fabric moves through the impregnation bath between the electrodes.

The team also investigated the temperature and humidity levels required for the different materials in order to optimise the discharge effect. Textile material studied included cotton, flax, hemp and blends with synthetic fibres when there is a high proportion of the cellulosic material.

A patent has been granted for the technology developed and its use with cellulose-based material. The overall result of application of this technology could be a more competitive textiles industry within Europe, especially in the face of escalating competition globally.

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

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

<http://cordis.europa.eu/marketplace> > search > offers > 3819



Novel furry coatings for special effects

Special effect coatings like flock have revolutionised our material environment. Scientists have been working on refining the materials used to improve their properties while lessening their environmental impact.

The environment around us, from our home to our car and the workplace, is full of special effect surfaces. One of these is flock. Flocking gives aesthetic properties; it is soft to the touch and velvety. From a practical point of view, it has reduced water condensation properties, it is a good insulator, and its mechanic-acoustic properties can be manipulated to suit its application, for example noise abatement. However, it has several disadvantages, the main one being its adverse environmental impact. The fine air-borne fibres with a diameter of only a few thousandths of a centimetre can cause lung damage and disease. Other drawbacks include cost and limited freedom of design and effects.

The EU-funded FFLIC project aimed to develop innovative flock coatings that elim-

inate these inherent disadvantages. As well as developing new materials, it focused on testing methods for optical and acoustic properties using virtual models and investigated means of reducing manufacturing problems. The research team at the European Centre for Coating and Surface Technology (ECCS) investigated different coating formulations for the production of special surface effects.

Based on a binder or adhesive developed by Dupont, a project partner, the team tested around 60 effect carriers. The final nature of the effect carrier would appear infinitely variable. This is because the properties depend on the sizes of particles, the amount used, and the structural type — powder, fibre and ground rubber being just a few examples.

Several different formulations were chosen on the basis of appearance and spray ability. Market partners continued the selection process by testing for other properties depending on the intended application. Apart from the obvious reduction of fibre contamination of the air, the selection of novel and environmentally friendly coatings has the advantage of being able to use industrial waste products. Two of the possibilities were rubber and plastic, both potentially problematic in terms of recyclability.

Overall, the technical improvements achieved in these results will be indispensable in the quest for special coatings that are low-cost and eco-friendly. The net effect will no doubt be increased competitiveness for European businesses.

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3883

Guidelines for a more comfortable cruise

Guidelines have been created to offer important information, experience and tips regarding the best design for ships in terms of motion sickness and passenger comfort.

Motion sickness standards for ships designed for leisure or transportation are outdated. Even though ships can function in severe weather conditions, they are required to stop operations when they fall short regarding passenger safety and comfort.

The Compass project has developed a new motion sickness prediction model and real-

istic standards for motion sickness and passenger comfort in sea transportation. The main goal was to improve the safety of passenger and crew as well as to make passenger and cruise vessels in the European shipping industry more efficient and competitive.

Under this initiative, operational guidelines were designed to provide information, ex-

perience and tips for the best ship design and operation. They include both cruise and passenger ships in regard to operational decisions like weather routing, improvements in comfort level, engineering assessment and internal design for passenger comfort. As an end product, the integrated design tools and guidelines look very promising for European shipyards.

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

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 3800

Eco-friendly, light components for transportation

The Amitem project has generated a prototype component that is based on a new cost-efficient and environmentally friendly technology for transportation applications.

Europe's transportation industry today needs not only to stay competitive, but also to increase its market share in the global market. This can only be accomplished by reducing time to market and production costs while improving production flexibility and mechanical properties. At the same time, environmental aspects also need to be taken into consideration as energy consumption during manufacture is excessive.

Taking these factors into account, the Amitem project focused on developing new woven textile-reinforced thermoplastic components. These lightweight continuous

fibre-reinforced structures could alternatively be employed for use with the commonly used metals, light metal alloys and thermoset composites in the ground transportation industry. The project developed two innovative mould technologies for generation of the structures. Both technologies involved heating the resin and textile structure rather than the complete mould, with significant energy, cost and economic savings.

One of these technologies, the so-called HTex process, allows positioning of pre-impregnated two- or three-dimensional tex-

tile inserts in a dedicated mould. The textile material used could be carbon, para-aramid or glass, coated with a thermoplastic resin. The developed two- or three-dimensional hybrid yarn structure undergoes heating and compression. The resultant molten thermoplastic resin comes in the form of a matrix of the solidified thermoplastic composite. The developed and successfully tested prototype is a pressure vessel for transportation applications with one-side or two-side openings.

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

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 3802

Airport safety: magnetic fingerprinting in the fog?

By monitoring tiny fluctuations in the earth's magnetic field caused by a passing plane, a team of European researchers has developed an innovative system to increase airport safety even in the worst weather conditions.

Using magnetic field detectors, a team of researchers, led by Uwe Hartmann and Haibin Gao of Saarland University in Germany, has developed a unique system to pinpoint the location of aircraft at airports even in places where other traffic monitoring systems face difficulties.

Their novel approach, tested at airports in Frankfurt and Saarbrücken in Germany and in Thessaloniki in Greece, relies on an array of small, cheap sensors monitoring the 'magnetic fingerprint' of planes — the slight influence aircraft's metallic bodies have on the earth's magnetic field. 'Our tests have shown that the system detects all passing aircraft, 100 % of them, and in 75 % of cases can pinpoint their location to within 7.5 m — a level of accuracy comparable to

most existing air traffic management systems,' Dr Gao says.

Most importantly, the system, developed under the EU-funded Ismael project, has some unique advantages over the most common ground-based monitoring systems in use today.

Because it relies on detecting changes in the earth's magnetic field, the Ismael system can see through obstacles, such as buildings and the fingers of airliner parking bays — structures that create potentially dangerous areas of shadow for radar systems, particularly at large, sprawling airports. And, unlike cameras or human air traffic controllers, it can monitor planes even in the heaviest down-pour or the thickest fog.

'Thessaloniki airport has a major problem with fog, so bad in fact that it has to close for part of the year because air traffic controllers can't see the aircraft at the end of the runway 2 km away. In the tests, the Ismael system showed it can solve that problem,' Dr Gao explains.

The project manager says that, in all the trials, the system lived up to the researchers' expectations, and it has continued to prove its worth in Frankfurt where it is still operating on an experimental basis. The system has also elicited interest from other airport authorities around the world, although it is likely to be several years before it is used commercially.

'You have to use the best components, the best materials and get new equipment certified for use in an airport environment. That all makes sense from a safety point of view, but it also means that it takes seven years, on average, for a newly developed system to be installed,' Dr Gao says.

continued on page 41

Improving safety in floating offshore structures

Addressing wave impact phenomena on floating offshore structures, the Safe-flow project focused on formulating recommendations for new rules and regulations.

Oil and gas exploration and production are often based on offshore structures, such as floating production, storage and offloading (FPSO) systems and drill ships. These structures are subject to so-called 'green water', the phenomenon of high waves flowing onto the deck. Additionally, regular damage may occur due to waves impacting on the hull of these structures.

Although modern floating offshore structures are able to withstand the most severe weather, the wave impact phenomena are very complex in their nature. Since oil and gas activities involve a high risk for both environment and personnel, the safety and reliability of floating offshore structures are very critical parameters.

Safe-flow focused on offshore structures such as floating production units and drill ships under impact loading of 'green water' and waves. The key aim was to develop suitable technology including design and operational guidance, calculation methods and tools as well as risk assessment procedures. An important aspect of the project's work was the development of recommendations for the establishment of new standards for floating offshore structures.

Until the beginning of the project, the existing class rules and regulations were found insufficient to deal with the circumstances of FPSO operations. Particularly, classification rules initially set for sailing ships did not require the use of the sensitive equipment on deck that is typical for floating production systems. The British Health and Safety Executive (HSE) and the Norwegian Petroleum Directorate (NPD) joined forces and conducted a study on the vulnerability of several British and Norwegian FPSOs.

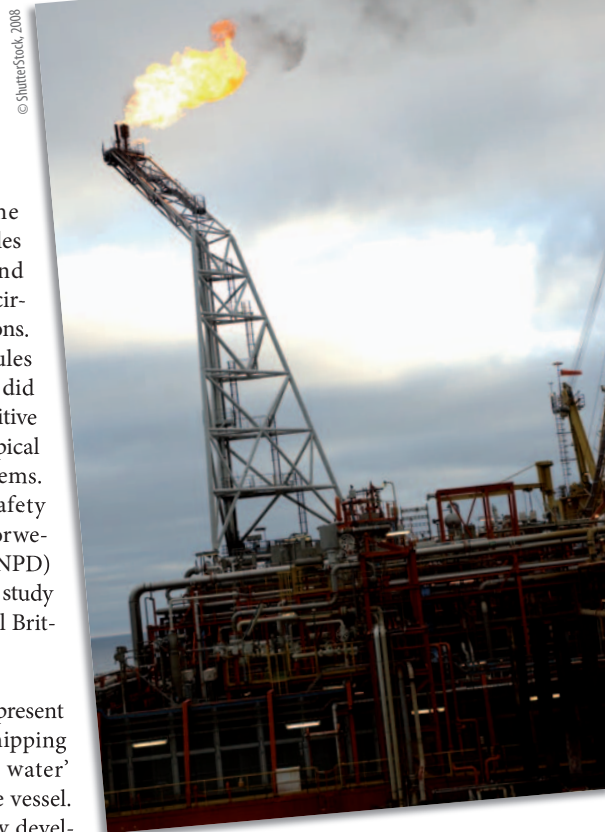
All 21 systems were found to present a medium to high risk of shipping critical amounts of 'green water' onboard from the side of the vessel. Based on the new technology developed in the Safe-flow project, a set of recommendations for new standards were formulated, including rules and regulations for floating offshore structures. These recommendations are expected to help classification societies to improve their rules and guidance. The enhanced standards combined with design optimisation may lead to

a safer and environment-friendlier deployment of FPSOs in European waters.

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

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 3875



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continued from page 40 **'Airport safety: magnetic fingerprinting in the fog?'**

The project partners, a mixture of academia and technology firms, have therefore approached big equipment manufacturers already supplying the airport market for assistance. 'We are looking for a partnership and investment to take this forward and, so far, there has been a fair amount of interest,' the project manager says.

Even though the certification process is likely to push up costs, Dr Gao assures that the Ismael system will remain a cost-effective way to complement and improve existing traffic management systems at big airports, and to install a comprehensive monitoring system at small airports that may otherwise not be able to afford it.

runway lights, just a few located at the entry and exit gates to the runways and in other key areas would be sufficient to boost safety.

In fact, the technology need not be confined to runways and docking bays alone. 'During the course of the project, we saw the potential to use this system in crowded airport parking lots to monitor car traffic and let drivers know where unoccupied spaces are available,' Dr Gao says.

And because systems used in parking lots do not have to meet the same high safety and reliability standards demanded of airport systems, the Ismael technology could start being used in that context much sooner.

Promoted through the ICT Results service.

<http://cordis.europa.eu/ictresults/index.cfm/section/news/tpl/article/BrowsingType/Features/ID/89466>

See also page 46 (Software gets smart cars talking)



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The sensor units, which are currently about the same size as a PC graphics card, but could be as small as a coin in the future, are expected to cost several hundred euros each. Although an airport could monitor the whole length of its runways with them, possibly by installing them conveniently beneath the

Eco-efficient hydraulic systems

Focusing on sustainable development and environmental impacts of grinding processes, the ENG Y project developed new technologies and improved existing approaches, including the optimisation of hydraulic systems.

Grinding processes are used in the manufacture of machined parts in a wide range of industrial sectors, such as the automotive, aerospace, bearing and guide-ways production industries. One of the main drawbacks in using grinding technologies is the required high energy and power consumption and consequently the resulting dramatic impact on the environment.

Aiming to improve the energy efficiency along with its environmental aspects, the ENG Y project addressed all issues related to the grinding process. More specifically, project work resulted in several eco-efficient machine prototypes and concepts for grinding and grind-hardening. The latter refers to shortening of process chains through utilisation of heat produced during grinding for hardening the work pieces.

Part of the project work concerned the optimisation of machine tool subsystems in order to fulfil the objective of energy consumption reduction. One of these involved the hydraulic system used in various applications in machine tools. Such applications include, for instance, hydraulic drives for main and in-feed movements and clamping devices for slides, work pieces or work piece handling.

Normally, hydraulic systems need to work at both high and low flow rates and display certain advantages, such as low part volume and high power-to-weight ratio. Despite these, hydraulic systems may display low efficiency, sensitivity to dirt and high heat generation. Addressing these issues, the ENG Y project took into account all operation parameters of hydraulic systems and

proposed two solutions to be adopted in their design.

The first involves the use of two pumps, one for high pressure and another one for high flow rates at low pressure. Driven by one motor, the two-pumped system could be coupled via a valve for simplicity in installation, using one hydraulic circuit instead of two. Additionally, since the high flow rates are only required at short interval times, the second suggestion focused on the use of a high-pressure storage facility. This would allow pump operation in an interval mode providing the option of pumping smaller flow rates under storage conditions. For further information on the project, please visit: <http://www.lms.mech.upatras.gr/eng y>

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

Collaboration sought: information exchange/training — available for consultancy.

<http://cordis.europa.eu/marketplace> > search > offers > 3798

Thermal infrared sensors for accurate motion detection

Integrated thermo-electrical sensors, implemented in complementary metal-oxide semiconductor (CMOS) devices, are offering the promise of low power consumption for high-precision motion detection applications.

Continuing progress in processing technologies has stimulated the rapid devel-

opment of integrated micro-sensors, in particular intelligent sensors with the same technology as integrated circuits (ICs). Importantly, implementing sensors in standard CMOS technology can ensure competitive prices by exploiting the strong manufacturing base of IC technologies, already perfected in low-cost mass production.

The Tech-tir project, funded under FP5, sought to address their lower sensitivity when compared to sensors implemented in specialised sensor technologies. Research conducted in the Elkron laboratories demonstrated the possibility of making up for the performance loss by co-integrating

interface electronics, often rendering the design of the latter a challenging task.

CMOS as a thermo-electrical infrared radiation sensor has the advantage of linear self-generated response without requiring bias or temperature stabilisation. The thermal infrared array sensor could thus be integrated on a single chip providing for amplifiers and signal processing capabilities. Such an approach allows rapid progression towards miniaturisation of thermal infrared sensors, without any loss of efficiency due to electromagnetic noise. Moreover, CMOS could be operated at very low voltage levels and still present good functionality, since it requires only limited amounts of energy.

The highly sensitive sensor interface for CMOS-compatible thermo-electrical infrared radiation sensors designed and manufactured within the Tech-tir project opens up interesting possibilities for motion detection applications. The same approach could be tailored for different ranges of wavelength and further applications areas.

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

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

<http://cordis.europa.eu/marketplace> > search > offers > 3839



Artificial ageing of copper artefacts

Preservation of artefacts that could be almost 6 000 years old is an expensive but crucial task faced by museums. Scientists in Greece have devised an artificial means by which copper can be aged to create material for research into improved conservation methods.

Bronze archaeological artefacts represent the development of many civilisations from a period around 3000 to 1000 BC. From China to Babylonia through to the Aegean, the Bronze Age reflects the cultures in terms of tools, art and architecture and the degree of their civilisation.

Copper-based artefacts develop a patina or an external layer of corrosion products over time in air, water and soil — indeed anywhere these valuable pieces are deposited. The challenge for museums is overwhelming as they must attempt to continue to protect restored pieces from the rigours of the atmosphere. Also, the artefacts may be contaminated with soluble salts such as chlorides, so the piece will continue to erode unless treated.

Researchers from the Efestus project have developed new methods to restore and conserve these precious artefacts. The project team at the National Technical University of Athens devised a means by which copper alloys can be artificially aged. This was achieved through a combination of chemical and burial treatments of materials similar to those used in the appropriate historic time. The idea was that the degraded copper could then be used as material for trial of the newly developed restoration methods.

The whole procedure was devised on the basis of the project's in-depth study of the corrosion process. This involves the formation of an outer layer of copper (II) compounds and an inner layer of the copper mineral cuprite. A layer of copper chloride develops under

the cuprite. One of the chemical culprits that speeds up this process is the layer of cuprite. This is thought to allow the transport of chloride and oxide ions inwards. Unfortunately, the chloride ions then act as a so-called autocatalyst. This means that they speed up the reaction in which they are involved and, furthermore, are one of the products. The result of this reaction is that more chloride ions accumulate together with copper chloride as well as cuprite.

Research of this nature can benefit the financial health of museums. Continuous restoration and maintenance of artefacts is expensive, and novel methods could help to prevent the corrosion in the first place. The money saved could then be allocated for the installation of environmentally controlled cabinets to control this damaging process.

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

Collaboration sought: marketing agreement.

<http://cordis.europa.eu/marketplace> > search > offers > 3782

Dry release for ultrasensitive mass sensors

Nanoelectromechanical systems (NEMS) have amazing potential as force and mass sensors at submicron levels. Using new nanolithographical techniques, European scientists have developed a novel process to increase the throughput within mass-sensing applications.

Significant advances have been made in the microsystem and nanotechnology fields regarding the development of mechanical mass sensors. Pivotal in this research was work accomplished during the EU-funded

Nanomass II project. The overall project objective was to combine complementary metal-oxide semiconductor (CMOS) circuitry with nanotechnological processes to develop advanced molecular sensors. Industrial application of the device as a very compact and sensitive environmental or biochemical sensor was also evaluated.

Due to the technological advancements achieved, the sensors have an unprecedented level of accuracy in terms of mass resolution and spatial sensitivity. The basis of the mechanism is an array of nano-scale silicon cantilevers. Array fabrication makes it possible to optimise the function of the devices by differential detection and to allow the specific detection of single molecules.

In order to increase the throughput of functional cantilever devices, the project team at Mikroelektronik Centret in Denmark worked on a new protocol to produce suspended nanostructures. The process involved a dry-release method. This utilised a layer

of light-sensitive material, photoresist, which was then removed through an oxygen ashing system using a plasma source. A fluorocarbon film, which acted as an anti-stiction coating, was deposited in a single reactive ion etching sequence.

This newly developed process has multiple advantages. It is contamination free and lends itself to batch processing. The resultant products can be stored long-term without the development of undesirable stiction (static friction). This is due to the deposition of an anti-stiction layer through the merging of the dry-release method and plasma deposition. Fabrication-induced stiction is eliminated by means of this anti-stiction layer, as well as friction phenomena during mechanical operation (in-use static friction).

The application of nanotechnology and resultant nanodevices is on the verge of conferring a huge economical advantage in the combination of CMOS and nanotechnology. Projects of this nature are set to realise the potential of demonstrations, once confined to a laboratory, in a productive industrial setting instead. For interested parties, more information is available on the project's website: http://einstein.uab.es/_c_nanomass/nanomass.html

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

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 3805



Advanced measurement technology for coatings

Under the auspices of the Abrade project, an innovative monitoring system for measuring hard coating layer thickness was developed.

Nowadays, there is an ever-increasing need to improve the safety and reliability of key components in major industrial sectors, such as transportation, chemical, energy and process industries. The use of high-performance materials and coatings can significantly minimise component failures. However, the most commonly used chemical and electrochemical surface coating processes are not only environmentally unfriendly, but may also create hazardous working conditions.

Aiming to provide a cleaner technology for replacing the dangerous chemical stripping process, the Abrade project focused

on developing an adapted abrasive water jet (AWJ) removal method for hard coatings. The new adaptive AWJ system for coating removal was designed to be used with a manipulator or industrial robot. The project work paid attention to the controlled removal of coatings at high volume rates.

Project partners concentrated on the development of an AWJ coating removal strategy by integrating a computer-aided design geometry model and thickness measurement data. For this purpose, a non-destructive technology (NDT) for monitoring hard coating thickness was required.

This involved an adaptive sensor for in-process hard coating layer thickness measurement. Optimisation of the probe geometry and design can allow reliable monitoring of the different types of high-velocity oxygen fuel thermal spray coatings.

Apart from coating removal, the NDT monitoring system may be also employed for coating measurements, for instance in quality and process control applications. The NDT-coating monitoring method offers a better knowledge of process conditions and may improve the production capacity significantly.

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

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 3801

A crystal ball for polymer properties

Polymers form the backbone of the manufacturing industry due to their multi-functional nature. A team of scientists has devised a software package whereby the type of polymer can be predicted based on the designer's required properties.

The range of polymers in relation to structure and function is seemingly infinite, from synthetic hair to heat-resistant cookware through to waste pipes. Macroproperties of the polymer reflect the changes undergone when the material is subjected to pressure, temperature, light, electrical and magnetic forces. Included also are its behaviour when dissolved in a solvent or its chemical reactivity. To vary these properties, the chemical engineer has many means including changes in monomer identity, chain length, branching and composition of branch, as well as in the degree of crystallinity.

The result is a bewildering choice of materials for the manufacturer. The European

project PMILS set about making the life of the industrial polymer user easier. Partners designed modelling tools whereby the performance of polymers and the mechanisms involved can be predicted through the advanced software tools.

More specifically, a team of scientists within the project developed the computer-aided polymer design (CAPD). This analyses the user's required target properties and gives output in terms of the required polymer units and their number, in addition to branch details including length and molecular weight.

As such, it gives the production engineer a list of candidate polymers that can then be

tested to identify the final choice of polymer. Two tools were developed, one for generating property predictions and another for generating the molecular structures of the chemicals. The CAPD tool is user-friendly, as it is Windows-based and has an interface which is easy to use.

The CAPD tool is capable of assisting in polymer product development by allowing the designer to concentrate on the most promising candidates for a successful product. Further development of this technology could refine the tool further for a more specifically defined output.

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3734

See also page 47 (offer 3736)

Innovative method for nanostructured coatings

The TRIBO project resulted in a novel thermo-diffusion synthesis process for advanced coatings aimed for high-performance materials used in friction joints.

Friction joints are widely used in many industrial sectors such as the aerospace, automotive and energy industries. These joints are subject to high contact loads and operating temperatures and therefore, they should display an outstanding performance under these conditions.

Motivated by this, the TRIBO project concentrated on improving the performance of friction joints using advanced solid lubricant coatings (SLCs). These new coatings have been generated on the basis of a novel nanophased powder material that is deposited by high-energy fluxes.

A key project result involved a novel architecture of multilayer wear resistance coating using molybdenum disulphide (MoS_2) intercalated with doping materials. For this purpose, a prototype technology for diffusion synthesis of SLCs was realised. The MoS_2 -based SLCs are directly synthesised in surface layers of friction parts using a thermo-chemical diffusion process.

Due to its excellent structure and weak bonds between S-Mo-S layers (perfect cleavage), MoS_2 presents excellent tribological properties. In addition, the lubri-

cating properties of MoS_2 are especially effective in vacuum and inert gas environments over a wide range of temperatures and loads.

The synthesis of MoS_2 coatings comprises formation of the molybdate and molybdenum oxide layer on the surface of the steel substrate. The developed substrate is further treated in the vaporous sulphur environment to form MoS_2 . Other similar methods include physical vapour deposition (PVD), powder plasma spraying (PPS), powder detonation deposition (DPD), chemical vapour deposition (CVD), and laser-induced chemical vapour deposition (LCVD).

continued on page 45

Reducing vehicle dependence at universities

The Nantes Métropole Urban Council (UCN) has successfully applied a number of different measures to reduce vehicle traffic on and around the Tertre Campus of the Université de Nantes in France.

The recent population explosion in the region of Nantes has affected its major academic institution — the Université de Nantes. As the student population and infrastructure continue to expand, so does the need for a sustainable transport concept.

Through its participation in Vivaldi, an R & D project sponsored by the 'Growth' programme, UCN tackled the challenge of the Tertre Campus. UCN worked closely with the university, student associations and other members of the local community to make alternative modes of transport more attractive without sacrificing mobility.

The team started by redesigning the campus layout to improve access for pedestrians and bicycles. Vital space was gained by planning a phased reduction in the number of parking spaces available. Mass transit options were enhanced with the introduction of a shuttle boat service. In addition, the Vélocampus initiative made bike rental an easy, inexpensive option.

Finally, for the remaining student population not covered by the aforementioned options, a carpooling service was established. The advantages of the Internet for fast, easy communication were incorporated

into the scheme, which can be viewed at: <http://www.illicovotourage.com>

The success of the measures rests largely on the participation of the university community. Initial feedback indicates increased bus usage while modifications to the shuttle boat schedule may be necessary in order to realise its full potential. Looking to the future, a sustainable source of funding must be found to ensure that Vélocampus can continue to operate. Other challenges include constructing additional bike and pedestrian pathways in the neighbouring communities.

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

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 3715

Toolbox for polymer production

Progress in the production of novel polymers to fulfil the needs of an expanding materials industry is hampered by the presence of flow instabilities during manufacture. A toolbox has therefore been devised to determine the performance of different polymers depending on the production technique used.

Polymers have a large range of structures and resultant functions. This is dependent on many variables. These include the structure of the basic monomer or repeating unit, the nature and extent of branching and the manufacturing conditions. The development of new polymers to fulfil market needs would seem inexhaustible. Consumer and legislative pressure such as recyclability provide a constant catalyst for innovation.

However, restrictions to the expansion of this industry remain in the form of so-called flow instabilities. Well documented for as long as the industry has existed, they appear largely as a result of high flow rates

during manufacture. This is unfortunate, as modern production lines are capable of a high-speed flow rate on extrusion lines. A trial-and-error approach to the eradication of these flow instabilities has been found to be effective, but this has proved to be time consuming and expensive.

Consequently, the objective of the 3PI project was to develop a rational approach to the elimination of these defects. This is crucial, as they can cost the industry dearly in terms of time from production to use in a specific process. Project partners at Dow Benelux B.V. in the Netherlands worked on a conglomeration of these variables. Essentially, they performed

a 'round robin' test of all the techniques and the polymers yielded. The results have been summarised in a toolbox that can be used by manufacturers to further evaluate the polymers on their production line.

The scientists have succeeded in putting together a powerful combination of factors to predict sources of flow instability. The potential economic benefits that accompany this toolbox are undeniable. It has enabled the previously problematic determination of differences between polymers. Furthermore, it has opened the door on improvements to previously well-established protocols for polymer processing.

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

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 3783

See also page 47 (offer 3736)

continued from page 44 **'Innovative method for nanostructured coatings'**



In comparison to the conventionally used techniques such as PVD, the novel thermal-diffusion synthesis features lower production costs, a key factor for wide industrial applications. Unlike other methods, the diffusion method was also proven reliable in terms of tribological assemblies operating under

hostile conditions, i.e. in vacuum, radiation and oxygen environments.

The equipment prototype was realised and installed at the École nationale des ingénieurs de Saint-Etienne (ENISE) in France. It was successfully tested along with the synthesis technology resulting in the fabrication of numerous thermo-diffusion coatings of high quality.

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

Collaboration sought: further research or development support, joint venture agreement, information exchange/training, private-public partnership — available for consultancy.

<http://cordis.europa.eu/marketplace> > search > offers > 3818

Eco-friendly interconnection technology

The Imecat project resulted in a cost-effective interconnection technology aimed at applications in environmentally friendly assembly processes.

One of the critical challenges that many European industries face in order to stay competitive is the development of new high-density, environmentally compatible interconnection technologies. Within this context the Imecat project focused on developing suitable interconnection materials, such as lead-free solders and adhesives. The new materials may be employed in several industrial sectors ranging from automotive and telecoms to manufacture of liquid crystal displays (LCDs), and smart cards.

One of the key project results involved the development of a cost-effective connection

technology using isotropically conductive and non-conductive adhesives (ICAs and NCAs respectively). Based on a patented invention, a combination of NCAs and ICAs is employed for a flip-chip interconnection of silicon dies onto printed circuit boards (PCBs). Within this project, the technology was modified to allow connection of flex to glass and become more cost-effective.

Process modifications were found to lead to stable and reliable low-resistance contacts. In addition, the use of boards or glass substrates of a bigger size allows printing of several substrates using one print stroke with

significant cost savings. In comparison to the use of anisotropic conductive adhesives (ACA), the adoption of an ICA-NCA interconnection is more complicated, but less costly due to the use of inexpensive base materials. For further information, please visit: <http://trappist.elis.ugent.be/ELISgroups/tfcg/projects/imecat/Welcome.html>

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

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

<http://cordis.europa.eu/marketplace> > search > offers > 3776

Software gets smart cars talking

New technology allowing a group of vehicles to exchange data automatically with each other and with traffic control centres could pave the way for a more efficient and safer European road network. The Com2React (C2R) team says their technology could be useful to drivers, traffic police, emergency services and companies with a fleet of vehicles to manage.

The researchers developed a system to help inform drivers of poor weather or road conditions immediately ahead, allowing them to choose alternate routes, easing congestion and cutting down on accidents, says Chanan Gabay, the C2R project coordinator.

Being able to share such data is a crucial component of any future automated road traffic management system that aims to provide drivers with 'live' information en route. Vehicle-to-vehicle (V2V) communication is also key to the vision of the intelligent car, one able to process data and aid drivers.

The EU-funded Com2React project's main achievement was to develop software that creates a virtual traffic control sub-centre, which temporarily forms to manage a moving group of vehicles in close proximity. The software assigns the role of the virtual control centre automatically to one of the vehicles in the group according to rules embedded in the C2R software. 'A lot of areas are not covered by regional traffic control centres,' Dr Gabay says. 'By creating virtual sub-centres, the system extends the traffic networks to those areas.'

The sub-centre obtains and processes data acquired by the group of vehicles and rapidly provides the driver with instructions related to local traffic and safety situations. The software also transmits selective data to a regional control centre and receives cur-

rent traffic information to distribute to the vehicles. The updated 'common knowledge' is then processed by each vehicle's software, allowing drivers to make informed decisions.

The concept works as information processed through the virtual sub-centre can be better directed to the relevant vehicles, avoiding information overload, Dr Gabay says. 'Local communication is much faster than remote communication and can, therefore, enable an immediate reaction to sudden events,' he adds.

The challenge for the C2R research team was to develop software able to handle a large amount of relevant shared information intelligently. The resulting system is made up of software linked through a series of sensors.

The software is designed to handle safety alerts, link into a vehicle's navigation system by providing real-time traffic information, and organise the data according to an individual driver's needs. And a prototype system, tested in Munich and Paris last summer, proves that it works. 'We showed that the conceptual part of vehicle-to-vehicle communications can be done.'

Now, the team is looking for further funding to bring down the cost of the system to about EUR 100 per vehicle before it can be accepted by vehicle manufacturers and com-

mercialised. Currently, the system costs 'thousands' of euros, he says.

The regulation and harmonisation of V2V communications could also pose another obstacle to the technology, he believes.

The Com2React team is holding seminars with ministers of transport from Israel and with the European Commission in a bid to develop the concept further. The team is made up of researchers from Armines-École des Mines, Arttic, Everis, INRIA, Intempora, the Jerusalem transportation authorities., Motorola, Navteq, PSA (Peugeot Citroën), Sphericon, the technical university of Munich, Telefónica and Transver.

Peugeot is interested in the technology, according to Dr Gabay, but is waiting until the costs are brought down first. Israel's government is also considering the technology, Dr Gabay adds. 'Another team member is promoting the technology in Spain.'

Their business plan forecasts that the concept and technology could be profitable after three years. 'It is a real breakthrough,' Dr Gabay says. 'As far as is known, no distributed programmes are under way in a peer-to-peer mode on top of an ad hoc network implementing a concrete traffic application.'

Promoted through the ICT Results service.

<http://cordis.europa.eu/ictresults/index.cfm/section/news/tpl/article/id/89520>

See also page 40 (Airport safety: magnetic fingerprinting in the fog?)

Innovative lanthanide compounds for optoelectronics

The OPAMD project has developed novel lanthanide complexes for cost-effective and eco-friendly infrared semiconductor applications.

Compared to its existing inorganic counterparts, polymer-based technology has been considered as more environmentally friendly. Due to its excellent performance coupled with inexpensive production and ease of manufacture, this technology is highly suitable for use in data, telecommunication and optical computing applications.

Motivated by this, the OPAMD project focused on the fabrication of new polymer-based materials and devices for further deployment in photonic technology platforms. Research work resulted in two fam-

ilies of materials emitting in the visible and infrared along with device demonstrators for further commercial exploitation.

One of the key project results involved novel lanthanide complexes of sandwich type and perhalogenated sandwich type erbium. For the synthesis of these innovative complexes, a wide range of compounds was developed. This range included quinolate, betadiketonate and sulfonyl imide as well as other complexes of mainly erbium, neodymium and ytterbium ions for applications in the near infrared spectrum.

The developed lanthanide complex doped polymers are capable of emitting in the infrared region by photoluminescence and possibly electroluminescence processes. In both processes, there is light emission due to either photon absorption or an electrical field/current passing through. Their primary applications include infrared light-emitting diode applications. For further information on the project, please visit: <http://www.tyndall.ie/projects/opamd>

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3736

See also pages 44 (offer 3734) and 45 (offer 3783)

Monitoring composite tanks

Aiming to promote cleaner and safer vehicles, the ZEM project developed a novel inspection method that uses embedded fibre optics sensors for composite tanks.

The need for further reductions in polluting emissions urged the automotive industry to promote cleaner vehicles, such as fuel cell and natural gas vehicles (NVGs). Apart from the environmental savings, a lighter storage technology would also improve the energy consumption. Both environmental and energy savings should not compromise the structural safety of the vehicle.

Until now, most of the control methods used for composite natural gas cylinders in service involved hydrostatic testing at around 300 bars. This method requires dismantling

of the cylinders from the vehicle. To avoid this dismantling, a visual inspection method could alternatively be used, yet both methods provide information only on whether the cylinders pass the pressure test or not.

The ZEM project resulted in a new inspection method that offers information about the behaviour of the pressure vessel on a permanent basis. The new method employs an optical fibre sensor system that is embedded in the cylinder, providing information continuously either at refuelling or at inspection stages. Thereby, it would be easy to deter-

mine the existence of any deformation that could further develop into a failure.

The monitoring system uses a threshold deformation value specified by the nominal and the first test deformation values. When this is exceeded, re-inspection is necessary. The new, optical fibre method was tested and found successful in the detection of any overpressure and artificial damages as cuts, flaws, shocks, impacts and delamination. The novel inspection system is expected to improve both the safety of vehicles and the service process.

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

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 3777

Advanced technique for composite tank manufacture

The ZEM project has developed a new tow-preg filament winding production process to be used in the manufacture of composite tanks aimed for natural gas or hydrogen vehicles.

Partners of the ZEM project addressed the issue of monitoring the structural integrity of composite high-pressure tanks for natural gas or hydrogen. Unlike the currently used costly and labour-intensive inspection techniques, the suggested approach relies on the use of novel fibre optic sensors and their embedding in high-pressure composite tanks.

Special attention was paid to the composite tank manufacturing processes including wet and tow-preg filament winding. Filament winding is a fabrication technique for composite material structures. Most commonly, materials used include carbon and

glass fibre coated with synthetic resins as they mould.

On the one hand, the wet filament winding process involves fibres passing through a resin bath and then winding them onto a rotating mandrel. On the other hand, in the tow-preg winding procedure, the pre-impregnated fibre tows are placed on the rotating mandrel. Compared to the wet filament method, the tow-preg process was tested and found more appropriate in terms of production times, laminate quality and environmental friendliness. The developed process is readily available for production.

Although the wet filament winding is considered less expensive due to the low-cost material used, the continuously increasing carbon fibre prices are expected to reduce the cost difference. Apart from composite tanks, tow-preg produced material is also suitable for large-scale production of carbon-epoxy pressure vessels. The process could also be employed in the manufacture of filament-wound carbon-epoxy drive shafts and carbon-epoxy refuelling booms, for the marine and aerospace industry respectively.

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

Collaboration sought: manufacturing agreement, other.

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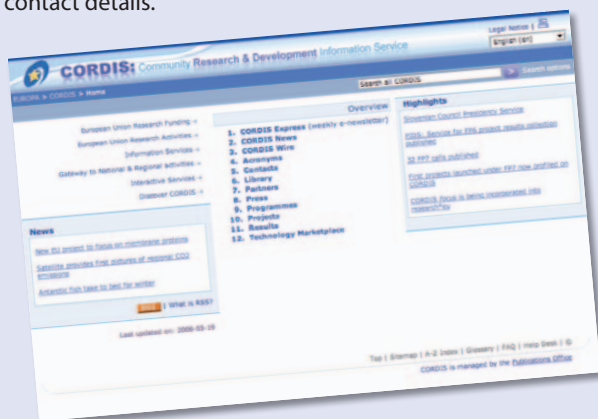
See also page 18 (offers 3713, 3827 and 3708)

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