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Looking beyond Copenhagen

After several days of heavy bargaining, the Copenhagen conference on climate change came to an end shortly before Christmas. Following this important step on the road to reducing human impact on the world's rising temperature levels, our attention now has to focus on what challenges lie ahead.

Indeed, some real progress has been accomplished in the past year. Before the conference, the EU Member States had announced they were going to cut their CO_2 emissions by 30 % in 2020. This goal still stands and could even be increased substantially in the coming years as researchers discover innovative ways to achieve it. More importantly still, the EU's commitment should serve as an example to the world's other large economies: investing into research to curb CO_2 emissions can both be an incredible driver of economic growth and an efficient way to tackle climate change.

In this issue of the Results supplement, *the section on biology and medicine starts with an article on chronic renal failure, a condition that can prove fatal to children. The Escape_trial project has contributed to researching the genetics of the disease, particularly the Uroplakin IIIA gene, a potential source of kidney development problems.*

The energy section displays the achievements of the Big-powa project, which has accomplished substantial progress in the field of superconductive materials. These are able to carry current densities which far exceed the admissible ones of standard metal conductors, such as copper or aluminium. In practice, the project aims to improve the efficiency of electric power transmission.

Airport noise is the topic of the lead article in the environment section. With the expansion of human settlements, airports that were once far from urban areas are now bordering them. In order to monitor airport noise levels, the Monster project has developed a low-cost modular system, which will heighten awareness of noise pollution in support of noise-abatement laws and policies for airports.

The OLP project is highlighted in the opening article of the IT and telecommunications section. The goal of the OLP project was to exploit technology to help those with speech impairments overcome their disability. This was achieved by using algorithms to automate the endpointing and labelling of recordings in automatic speech recognition systems, thereby saving time.

The industrial technologies section opens up with an article on the Bondship project. The idea behind that project was to assess the performance of adhesive bonds, a novel process in shipbuilding that allows for considerable savings in weight and therefore a reduction in fuel consumption through the use of lightweight materials.

Rounding up our news on research and development, the events section presents a choice of forthcoming events for you to flag in your agenda.

We always appreciate receiving your impressions and thoughts about the research*eu *publications. You may send them to: research-eu-supplements@publications.europa.eu*

We would like to wish our readers a successful new year full of opportunities while we look forward to providing you with up-to-date coverage on pioneering EU-funded research projects in 2010.

The editorial team

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TABLE OF CONTENTS

Human renal hypodysplasia gene investigated

Long-term survival rates of children with chronic renal failure are severely compromised by precocious atherosclerosis and excessive cardiac morbidity. Researchers under the umbrella of Escape_trial contributed to genetic studies of renal hypodysplasia, a major cause of this condition.

For adults with chronic renal failure (CRF), medication with angiotensin converting enzyme (ACE) inhibitors is renoprotective. However, its effectiveness is unproven in children with this disease. Lack of effective paediatric therapies provided the aim for project partners in Escape_trial to research the spectrum of factors involved in development and progression of CRF.

One of the main causes of CRF in children is renal hypodysplasia, a syndrome characterised by low number of nephrons and abnormally small kidney size. Consequently, partners at the University Hospital for Pediatric and Adolescent Medicine in Heidelberg elected to research the genetics of this contributory factor.

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Previous animal and human pedigree studies had suggested a substantial genetic input for renal hypodysplasia and the team focused on one gene in particular, Uroplakin IIIA (UPIIIA). Coding for an important membrane protein of urothelial plaques, the UPIIIA gene has also been implicated as a potential source of kidney development problems in mouse models.

Mutation analysis was performed on 170 paediatric patients suffering from severe renal hypodysplasia. Two heterozygous mutations were observed but for the first, a missense mutation, only one family showed results consistent with a disease-causing outcome. Segregation studies indicated that the second mutation was unlikely to cause CRF.

The genetic data accumulated here suggests that mutations of UPIIIA in particular are infrequently a cause of renal hypodysplasia. However, research into genetic variation underlying renal development has other important implications. These include the discovery of polygenic traits for the disease and insights into the spectrum and mechanisms of genetic abnormalities.

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

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

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Dietary influence from conception to old age

Epidemiological studies have strongly indicated that early life events, even as early as the foetal stage, can play a significant role in a range of adult diseases. Scientists have investigated the effect of protein restriction in the maternal diet on the cell mass of the foetal pancreas.

Foetal programming, where the maternal diet during pregnancy affects the chances of development of diseases in the child and into adult life is gaining increasing interest from researchers. Not only does the evidence point to an effect on the incidence of cardiovascular disease and diabetes but to conditions like depression.

Consequently, the European project Nutrix aimed to analyse early cellular events induced by malnutrition and identify their consequences in later life on organs like the heart, liver and pancreas. Partners at the Université catholique de Louvain in Belgium specifically targeted the effects of a protein restricted diet on the cell mass of the pancreas.

The aim was to elucidate the underlying mechanisms responsible for a reduction in beta cells, responsible for insulin production and also release of amylin involved in glycaemic control. Up until weaning, levels of 8 % protein were given to an animal model as opposed to the recommended 20 % during pregnancy. Investigation showed that the offspring had reduced beta cell mass.

The next step in the research involved finding out the biochemical basis for this reduction in endocrine tissue. Other Nutrix studies showed that total food reduction also brings about reduction in beta cell count but this is due to a drop in glucocorticoid level. In the case of protein shortage, these levels were found to be normal.

The answer lay in reduced beta cell multiplication coupled with an increase in programmed cell death or apoptosis. Furthermore, the beta cells seemed to be more prone to toxic aggression, a phenomenon apparent in the pathology of diabetes type 1. What seems more pertinent is that destruction of beta cells by toxic aggression was still evident until adulthood even though a normal diet was given after weaning.

The implication is that the developmental damage inflicted *in utero* is not necessarily reversible. Dietary recommendations for expectant mothers as a result of this research are especially applicable in developing countries. Also, in affluent societies, social norms like vegetarianism and the 'desire to be thin' may be the cause of nutritional imbalance.

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

Physical activity for improved well-being in the elderly

A study addressing the links between physical frailty and psychological well-being in the elderly was conducted in order to help improve the overall quality of life for this population group.

Physical frailty in the elderly is a major limiting factor for independent living for this age group hence leading to risk of falls and injuries as well as to social exclusion. In order for the elderly to have physical mobility both within and outside the home, it is important to better understand and try to improve this phenomenon.

Under these auspices the Better-ageing project undertook a study examining the connection that physical activity, psychological well-being and quality of life has with functionality in people 70 and older. One aspect of the study involved the correlation of daily physical activity and mental health through standardised questionnaires.

Overall, both qualitative and quantitative data indicated that taking part in the standardised exercise training programme improved aspects of mental well-being. However further research is necessary to examine if daily physical activity can lead to greater physical independence for this age population. Results have been summarised and disseminated in a document which is available to organisations involved with the health of elderly individuals.

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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The best care for Europe's elderly

Marginalisation and social exclusion are an increasing reality for elderly people in Europe. An EU-funded survey has provided the basis for social policy on care provision to avoid this unacceptable fate for the more vulnerable in society.

Social marginalisation is a major stumbling block to integration and community cohesion. There are several key risk groups and these include ethnic minorities, single parents and poor elderly people. For the elderly, external circumstances such as provision of day care institutions and level of state pension schemes vary widely according to individual country in Europe. These factors can determine the life courses of the elderly and therefore influence to a large extent the risk of marginalisation.

The main aim of the EU-funded CARMA project was to enhance the well-being of the growing population of aged people within Europe. Consequently, the avoidance of social exclusion and marginalisation of the elderly was a key research area. A survey conducted by the Social Science Center in Berlin gathered information on care arrangement, patterns of social integration, mobility and the psychological situation of the elderly in five European countries.

As a basis for successful strategies to avoid marginalisation, the survey centred on care arrangements and facilities, integration into society and the family. From a psychological point of view, the feeling of belonging was defined and therefore assessed.

Three approaches were evident in the Europe-wide study. Societal responsibility for elderly care as in Northern Ireland was deemed to confer the best situation overall for both the elderly and their caretakers. Moreover, low-income people or those living on their own fared best under this system.

At the other end of the spectrum, the family-oriented approach as in Italy was successful but only with adequate family support. Those managing without sufficient family backup tended to be lonely. In between, the continental approach where both society and the family take responsibility can create problems for risk groups.

The results of the study can be used to formulate care and social policies for the elderly as well as other groups at risk of marginalisation. Dissemination has been widespread with the information appearing in a book, peer-review journal, seminar and an international conference.

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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Factors of early departure from nursing in Poland

A breakthrough study of the nursing community in Poland was conducted as part of a mass effort to examine the causes and implications of premature departure of nursing staff.

In many European countries, nursing labour is in short supply. Moreover it is quite likely that this problem will expand in line with demographic development. Nursing staff often leave their profession before their expected retirement age. The 'Nurses' early exit study' (NEXT) project conducted studies in health institutions of eight European countries to delve into the causes and situations leading to early departure. Risk factors and consequences were also examined.

For example, in Poland, which was one of the countries in the case study, health care systems are threatened with bankruptcy. In turn employment possibilities for the nurses are perceived to be very low resulting in a low intent to leave the profession.

It was found that the majority of nurses did not wish to prematurely leave, but those who did wish to do so were from the two youngest age groups. Besides age, the particular type of workplace was a factor. For example, persons working in intensive care wards exhibited the highest willingness to leave.

Overall it was found that financial reasons were the biggest factor followed by low prestige, lack of opportunities for professional development and for promotion. This part of the study was paramount for the nursing profession in Poland. Results were publicised in nursing and scientific journals as well as conferences.

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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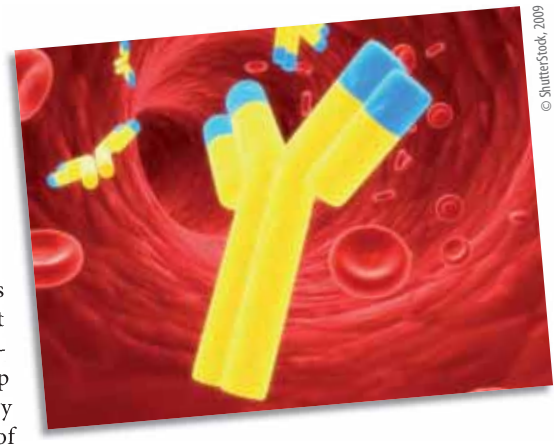
Epitopes hold the key to autoimmune disease therapy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Autoimmune diseases such as type 1 diabetes and arthritis exact a high price in terms of health care costs and social welfare. Scientists have been screening for epitopes that stimulate T cell responses to use in immunotherapy for these debilitating conditions.

Heat shock proteins (HSPs) or stress proteins, as their name suggests, are produced when cells are subjected to a range of environmental stresses such as heat and toxins. One of their functions was pertinent to the research by the members of the HSPfortherapy project. They can act as antigens in immune responses involved in autoimmune diseases like diabetes and arthritis.

There is a huge range of HSPs and there are six major families yielding vast potential for identification of conserved epitopes. These antigenic determinants react with immune cells including macrophage toll-like receptors (TLRs), peripheral blood T cells and monocytes. The researchers used experimental models for arthritis and diabetes type 1 and human patients in clinical HSP trials to isolate potential therapeutic candidates.

The team at the Institute of Infectious Diseases and Immunology in the Netherlands directed their focus on HSP60 epitopes in both the innate and adaptive sectors of the immune system. The T cells that react against HSP60 inhibit immune responses. This mechanism serves as a feedback loop to suppress those inflammatory reactions that are hallmarks of autoimmune diseases. Computer algorithms were developed to identify, by score allocation for ability to interconnect, the most effective pan-DR binding peptides. These epitopes could then stimulate the proliferation of the T cells.

The major strand to this research involved research into juvenile idiopathic arthritis. The scientists isolated a collection of conserved and non-conserved epitopes from both human and bacterial HSP60. Due to the screening algorithms, the novel HSP epitopes have the ability to trigger T cell responses in a wide major histocompatability complex (MHC) background thus expanding the scope of future trials.

Type 1 diabetes is also a candidate for therapy based on epitope peptides. As part of the innate immune system, TLRs are pathogen sensors. Heat shock proteins were screened using reporter systems for their ability to trigger TLR activity. In particular p227, an HSP60 peptide, was found to directly stimulate the action of TLRs. The protein p227 plays a role in the pathology of type I diabetes and signalling through TLRs could therefore contribute to the treatment of this disease.

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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Improved speech therapy online with new language library

Swedish and Greek language libraries have been compiled for application in an internet-based speech therapy program.

Speech therapy involves the rehabilitation of patients addressing both physical and cognitive problems that render communication difficult. An integrated computer system, Ortho-logo-paedia (OLP), was proposed by the EU project of the same name to supplement conventional speech therapy methods.

This integrated computer-based system is designed to provide real-time visual feedback to aid articulation. Automatic speech recognition can then be used to evaluate the improvement. Use of the internet decreases cost and, at the same time increases accessibility for users. Furthermore, overheads at therapeutic centres can be reduced as the cost of any expensive hardware can be shared.

Project partners based at Kungl Tekniska Högskolan, the Royal Institute of Technology in Sweden, aimed to develop Greek and Swedish word list libraries that were phonetically sorted. In compiling the library, the needs and requirements of the clients were taken into full consideration.

Whilst the library is extensive enough to represent the language, the size of the spoken material was limited to accommodate patients with speech difficulties. In order to achieve this reduction, for example, the same words were used to illustrate different phonemes (sounds that distinguish one word from another) and their possible positions.

Both libraries were constructed to incorporate all possible deviations of phonetics and phonology within each language. An indication of the level of ingenuity of design of the library is that only 109 phrases and short sentences are used for the Swedish language which has 18 consonants and no less than 22 long and short vowel sounds.

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

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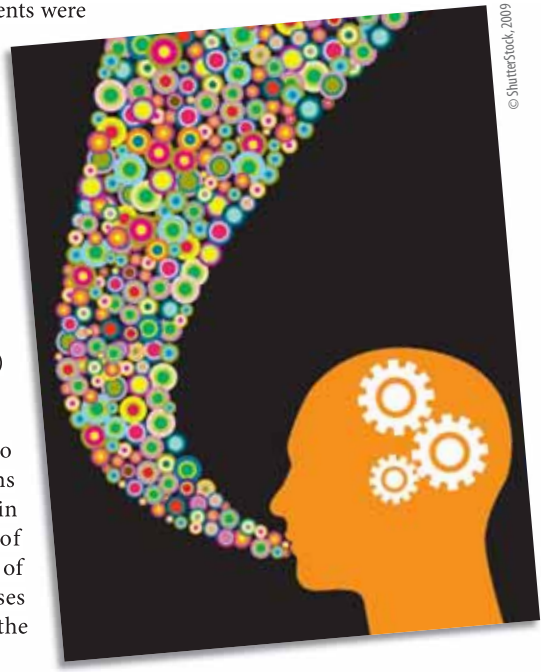
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Guidance on mixture effects of endocrine disruptors

Guidance notes were drawn up for the effect of low doses and mixtures of endocrine disrupting chemicals (EDCs) on testing strategies and risk assessment procedures. The work was part of the EDEN project, an interdisciplinary effort which addressed key issues surrounding the impact of EDCs in the environment.

Knowledge regarding the factors which govern the joint action of similarly acting EDCs was suitably advanced to provide a practical risk assessment approach. As a result, a panel of experts from European environmental agencies and NGOs proposed a methodology for EDC mixtures. This took into account gaps in the data and limited knowledge, which can exist in exposure scenarios.

In situations which are data rich, both information regarding exposure to EDCs and low-dose estimates are known. In these situations it was proposed that the concept of dose addition should be used to achieve a mixture no-observed-effect-level (MNOEL) for endpoints relevant to endocrine disruption. This value can then be combined with a safety factor to give estimates of acceptable human exposure to EDCs.

Poor data conditions may limit the information available with regard to the number of chemicals which feature endocrine activity, and their exposure levels. With the exception of a few prototype chemicals there may also be a lack of information concerning potency and effects at low doses. In such cases a crude estimate of the MNOEL was made by the EDEN team. This was achieved by dividing the individual NOEL of the original prototype chemical by the expected number of relevant similarly acting chemicals.

The estimate was based on chemicals for which there was available information about *in vivo* effects. In those cases where suitable information was not available, additional chemicals were ruled out following results from *in vitro* tests. In those situations where the number of chemicals was not known, a default number between 1 and 20 was chosen until evidence to the contrary was found. The resulting MNOEL was then combined with the usual assessment factor in order to estimate tolerable levels for exposure of humans.

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

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Use of genomic responses in testing guidelines

As part of an EU study into endocrine disruptor chemicals an investigation was carried out into the use of genomic responses for enhancing testing guidelines in fish. A number of recommendations were then made.

The EDEN project studied the exposure of humans and wildlife to endocrine disrupting chemicals (EDCs) in the environment using different techniques, including genomic responses. Genomic responses possess major potential for improving guidelines of toxicity tests. They can help determine whether a chemical's adverse effect on growth, development or reproduction is based on an endocrine mode of action.

Furthermore, genomic responses can be used during the initial testing stages to develop better targeted hazard assessments. In addition genomic tools enable researchers to detect multiple actions not only from one substance, but also as interactions between several substances. The team from the EDEN project concluded that genomic responses increase the ability of scientists to detect those biological and ecological functions which are at risk.

These techniques also support informed testing strategies and make diagnostic and predictive hazard assessments more reliable. At present the greatest challenge facing the implementation of genomic responses is that the technology is still in its early stages. Therefore further research is required before it can be incorporated into standard testing procedures.

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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Accessing information on chromosomal disorders

Studies indicate that within the EU between 2 000 and 4 000 children are born each year suffering from some form of rare chromosomal disorder. A database was developed to allow medical experts to exchange cytogenetic and clinical knowledge while maintaining patient confidentiality.

Advances in medical science have enabled scientists to study chromosomes in greater detail and to detect a larger number of chromosomal abnormalities. However, valuable clinical data about rare genetic disorders remains unavailable because a significant number of cases have not been published. At the same time, parents of sufferers and doctors are increasingly demanding reliable information.

The aim of the Ecaruca project was to collect and disseminate the latest data regarding genetic disorders to medical experts. This information can then be used to support the patient's mental development and to help alleviate physical handicaps. This was achieved using a database accessed through the internet, which was designed and developed by Ecaruca project partners from the University of Middlesex in the United Kingdom.

The database system used a conventional client-server framework and featured four tiers. The data and the middleware tiers used a relational database management system (RDBMS) and software libraries to give a tailor-made application programming interface (API). The API enables individual modules to be developed between the database and the business object that links the user and the data. Bearing in mind the potential volume of data in such a project, the computer scientists used a database management system in the mid-range that can be extended in terms of mass of data stored. Specific to the aims of the project, the Middlesex University team also developed an algorithm for matching chromosome bands.

continued on page 9

Pathways towards more effective chemotherapy

Mechanisms underlying resistance to chemotherapy in cancer cells pose a largely unresolved challenge to researchers. Molecular pathways involved in resistance to oxaliplatin, a commonly used chemotherapeutic agent, have been investigated by an EU-funded project.

Treatment of cancer using radiation and chemotherapy relies on the activation of various molecular cascades and subsequent apoptosis of the target cells. Unfortunately, tumour cells can be resistant to these therapies if the pathways to apoptosis are blocked or undergo change.

As apoptosis is one of the keys to successful treatment, researchers under the wing of the Impaled project aimed to identify molecules associated with programmed cell death. These in turn could then be responsible for therapy resistance. One of the project teams based at the Centre national de la recherche scientifique (CNRS) at Villejuif in France focused on the chemotherapeutic drug oxaliplatin.

In order to delve into the exact molecular chain of events, the researchers studied a cell line sensitive to oxaliplatin that had mutated to give resistant lines. Two resistant clones together with two additional clones derived from the originals that had reverted to the sensitive state, one fully and the other partially, were included in the trials.

The degree of success of oxaliplatin therapy is partly down to the action of the so-called Bax and Bak proteins that control the mitochondrial pathway of apoptosis. Bax induces the release of pro-apoptotic proteins from the mitochondria and disrupts the mitochondrial membrane potential. This then causes a chemical cascade and characteristic morphological changes of apoptosis.

The scientists did find a link with the Bax/Bak complex and resistance to oxaliplatin. A defect in this pair of proteins causes a reduced loss of mitochondrial membrane potential. The researchers also looked for other links including a possible association with the cell nucleus. Experiments involving nuclear depletion and enucleation showed that resistance to oxaliplatin may involve both cytoplasmic and nuclear regions of the cell.

Targeting the molecular directors of a process like apoptosis is a promising route for improved cancer treatment. Once their identity and mode of operation is known, strategies may be devised whereby tumour sensitivity to therapy can be enhanced or reactivated.

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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Barley controls blood sugar levels

European researchers measured the extent of increased glucose tolerance after including fibre and resistant starch in a meal.

The ability to manipulate the glycaemic index (GI) of a meal means diabetics possess a level of control over blood sugar levels and consequently reduce the need for insulin. For the general population, contolling dietary carbohydrates can confer prevention against heart disease, diabetes, obesity and other diet-related diseases.

The GI of a meal is affected by many variables including dietary fibre and fat intake plus individual physiological factors like intestinal bacterial flora and digestion rate. In order to optimise the GI of foods, the appropriately named EU-funded project C13-Starch set about characterising the metabolic quality of carbohydrates using 13C isotopes.

The consortium team based at the University of Lund in Sweden focused on one dietary step away from the GI implications of the meal itself. Instead, they concentrated on the effects of starch content on meals taken subsequently. This so-called 'second-meal effect' was evaluated on healthy subjects using the hydrolysis index.

For a short period between meals, the GI of the starch itself proved to be the important factor. However for a longer stretch, such as that between evening meal and breakfast, other features came into play. Type and amount of indigestible carbohydrates were particularly important variables. Different types of low GI indigestible carbohydrate were tested against the old enemy, white bread, which has a mercilessly high GI.

Whole boiled barley kernels appeared to be particularly effective at improving glucose tolerance in successive meals and the effects lasted all day up to 10 hours. The reason behind this was attributed to the combination of low GI features and colonic fermentation of the barley cereal. Fermentation was reflected in increased hydrogen in the breath and short-chain fatty acid levels.


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Addition of low GI food-like barley fibre can bring about an improvement in the glycaemic responses in subsequent meals throughout the day and even at breakfast the next morning. It would seem the bonus of reducing the associated risk factors of high GI foods would make the necessary advanced planning well worth the trouble.

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 > 5182

continued from page 8 **'Accessing information on chromosomal disorders'**

The first of two client tiers included an administrative program for supervising the inputting, updating and validation of data in standalone mode. The second client tier was a Web-based program which enabled medical experts to register and upload individual case studies via the internet. Similarly, doctors can retrieve clinical information regarding particular chromosomal aberrations.

The Ecaruca database has successfully increased available knowledge and raised awareness of rare chromosomal disorders. It has facilitated collaboration between research centres. The genes responsible for specific congenital abnormalities can be identified by comparing clinical data of overlapping chromosome aberrations. In order to have sufficient information, collaboration between centres is necessary because of the rarity of individual chromosome disorders.

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

Collaboration sought: information exchange/training.

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Software for solving life-threatening medical puzzles

New software is under development that doctors hope will help identify brain tumours in children that will grow aggressively. Some brain tumours in children remain benign and doctors choose not to operate. But a small percentage of those will suddenly start to grow aggressively.

Doctors have not identified what triggers that aggressive tumour growth, despite the vast array of data they hold on their child patients — demographic, environmental, genetic and clinical data, as well as images such as MRI and CAT scans of the developing tumours.

But a new software tool called Aition can integrate all the medical data from a tumour patient and then analyse it to calculate the probable factors that are stimulating tumour development, combining up to 30 correlated variables. Aition provides an overview of the causal relationship across all factors.

Aition's conclusions are displayed as a 'knowledge model', a graphical network of medical factors with links that represent the correlations between them. Strongly interdependent concepts are directly connected, loosely dependent concepts are not connected at all. The patient's doctors can play around with the knowledge model. They can improve the model by adding information they know to be true about the patient. They can use the model to test the likely effects of different types of medication, surgery or treatments on the tumour's growth and the patient's health.

'We have shown the knowledge models to doctors treating brain tumours, juvenile idiopathic arthritis, [as well as] to cardiologists and they have found it quite intuitive,' says Harry Dimitropoulos, one of the researchers from the University of Athens where Aition is being developed as part of the EU-funded 'Health-e-child' project.

'Because of the graphical way it presents the data they have found it easy to click on the links. Some training is required if they want to look in depth at how conclusions were reached, or to modify the statistics or the graph.'

The causal-probabilistic algorithms within Aition are well established, solid and reliable, according to Dr Dimitropoulos. However, because the diseases are rare, data is available on only small numbers of children. An Aition test on juvenile idiopathic arthritis had only 50 patients initially. That has been expanded to 200 and the tool is becoming more stable and more reliable.

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Aition's logic can lead to mistakes. For instance, if most of the patients over 16 years old in a knowledge model are also smokers, Aition may infer that being a smoker causes one's age to be over 16. To try to eliminate that kind of error, Aition uses a priori knowledge encapsulation (grouping variables in hierarchies) to constrict the possible conclusions that can be drawn from the data.

The researchers' next step will be to link Aition to ontologies of medical data (exhaustive databases of facts and concepts on a particular topic) to provide even more context for Aition's probability calculations and predictions.

The team also wants to expand the number of variables that can be considered in Aition's calculations of causal probability. 'In theory, Aition can be expanded to as many features as you want,' says Dimitropoulos. 'We are preparing a mechanism that uses partitioning and parallel processing to create subgraphs that can then be merged. But this is research at an early planning stage.'

The very fact that Aition can model all the factors in a disease to give doctors an overview of the problem is an advantage, stresses Dimitropoulos. Aition has already analysed data to infer likely disease causes or optimal future treatments that match the assessments of the doctors. But it adds even greater value when the models start to generate new knowledge. Already, Aition has identified that one blood test may be unnecessary because the information it provides is available from other sources. It will require results from many more patients to validate this.

The team is also planning to identify unique factors about the tumours that become aggressive by combining genetic markers with clinical and other data in Aition. Identification, followed by early surgical intervention, would be a major medical step forward.

***This is the first of a two-part 'Health-e-child' special. You can read the final part in the next issue of the* research*eu results supplement.**

Promoted through the ICT Results service.

http://cordis.europa.eu/ictresults/index.cfm?section=news&tpl=article&ID=90995

Identifying endemic parasites in bumblebees

Biologists have come to the aid of bumblebees by developing a molecular toolkit that can identify microsporidian parasites with greater accuracy than conventional techniques.

European breeders supply bumblebee colonies throughout the world for pollination purposes. Transporting the insects across international borders entails a risk of non-native parasites being inadvertently introduced into new regions or host species. Bumblebees are known to suffer attacks from microsporidia, an intracellular parasite which causes chronic debilitating disease in the host.

The 'Pollinator parasites' project developed a molecular toolkit for identifying microsporidia in bumblebees. This is based on polymerase chain reaction (PCR), a technique used to make multiple copies of DNA fragments. PCR was adapted to serve the needs of a specific diagnosis of the microsporidia para-

continued on page 11

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Cows grazing fresh pasture produce better milk

Cows grazing on fresh pasture produce milk rich in health promoting nutrients according to the coordinated studies of scientists from five European countries. The Biocla project consortium found that the milk contained significantly higher levels of polyunsaturated fatty acids (PUFAs), which are known for their health benefits.

Whole milk contains a complex group of thousands of polyunsaturated fatty acids. Among polyunsaturated fatty acids found in relative abundance is conjugated linoleic acid (CLA) with anticancer effects, as well as an immune strengthening action. The Biocla project conducted a detailed study on how PUFAs are formed in the rumen of cows, sheep and goats before they become present in milk. The animals' diet was found to influence the action of bacteria on these fatty acids, a process known as microbial biohydrogenation.

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Previous studies revealed the type of volatile organic compounds (VOCs) liberated during the cutting of grass. These compounds, sometimes defined as green odour', are made up of compounds resulting from the enzymatic oxidation of fatty acids by plant lipoxygenases. These enzymes catalyse the oxidation of PUFAs forming a mixture of VOCs, which have antimicrobial properties and can affect lipid metabolism in ruminant animals.

The Biocla project demonstrated the effect of typical fatty acid oxidation products on the biohydrogenation of grass silage when incubated in the laboratory with strained rumen fluid. The increase in the biohydrogenation of isomers of linoleic acid (C18:2, n-3 and C18:3, n-6) were attributed to an increase in biohydrogenating microorganisms.

The increase in such microorganisms is a result of the toxicity of green odour compounds to competing microorganisms, thereby reducing competition. It is also associated with an increase in trans-vaccenic acid (TVA), a compound necessary for the formation of CLA in the mammary gland.

The effect of 'green odour' could explain changes in the fat content of milk, when animals eat fresh pasture rather than conserved forage, such as hay and silage. According to these finding of the Biocla project, pasture-based systems offer the most cost-effective and natural way of producing PUFA-enriched milk.

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 > 5203

Improved genome mapping for dairy cattle

Cattle breeding specialists have tested a new method of fine mapping the cow genome. The novel protocol promises to reduce the high cost of progeny testing in cattle and improve the effectiveness and efficiency of existing test methods overall.

Genomics has created a multidisciplinary revolution where scientific progress has accelerated beyond all expectations. The impact of this relatively new field has also had a marked effect on agriculture in areas including the development of new varieties of plants and animals. Genomics can take the guesswork out of breeding goals by elaborating the function, structure and location of genes.

Within the dairy industry, the bovine mapping initiative of the EU-funded Bovmas project focused on marker assisted selection (MAS) of quantitative trait loci (QTL). Target genes were mainly those affecting the level of milk production in dairy and dual purpose cattle. Specifically, researchers at the Ludwig-Maximilians University in Munich concentrated their effort on finding the most efficient techniques to map QTL for critical traits like milk yield and protein and fat content.

After investigating two methods of reducing the huge genotyping load, the scientists selected fractionated pooling design (FPD) as a cost-effective strategy for fine mapping that determines gene position and effect. Loci were located to a high degree of accuracy. This degree of reliability could not have been achieved through standard selective DNA pooling procedures.

For protein and fat content, the results were promising. Two QTL, one for milk and protein yield and the other for protein and fat percentage were located. Furthermore, a new QTL for protein yield was found on chromosome 26.

Genetic improvement of livestock can undoubtedly be the source of more nutritious meat and milk products. Moreover, land usage in many areas of Europe stands to benefit as large tracts of mountainous area, particularly in the Alps, are conserved due to cattle grazing.

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 > 5172

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continued from page 10 **'Identifying endemic parasites in bumblebees'**

site *Nosema bombi*, which infects bumblebees but also of *Nosema apis* and *Nosema ceranae*, which also infect bumblebees.

Project partners at the Queen's University of Belfast used primer pairs and fragments of amplified ribosomal RNA to distinguish *Nosema bombi* from the other two parasites. The primer pairs were also tested for their sensitivity with a range of *Nosema bombi* spore concentrations. The spores were diluted either in water or homogenised tissue of the host bumblebee in order to simulate natural infection.

A sample of 99 bumblebees was examined for infection by *Nosema bombi* using light microscopy, and PCR with just one primer pair. The PCR technique was found to be much more accurate than light microscopy and was even more sensitive when two primer pairs were used.

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 > 5201

Stopping the pinewood nematode in its tracks

The 'Life quality' programme funded forestry experts to develop tools to address threats to the health of European forests associated with invasive pests.

The pinewood nematode (*Bursaphelenchus xylophilus*), or PWN, has caused significant damage to pine forests in parts of Asia as well as the United States. More recently, the PWN has been identified on the Iberian peninsula in Portugal. Hence, the need to develop effective pest management strategies in Europe has never been greater.


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The Tree Health Division of Forest Research in the United Kingdom coordinated a research project entitled Phrame dedicated to this task. An important component of the work programme involved the creation of a model capable of estimating the risk of lethal wilting associated with PWN infestation.

The scientists integrated a number of sub-models that determine the rate of tree growth according to soil and weather conditions as well as nutrient availability. During Phrame, the new model was used to predict wilting in pine stands in Portugal. The results were highly encouraging, though Forest Research emphasised the need for high quality input data to drive the model.

The Phrame research consortium can provide consulting services to all potential stakeholders. It should also be noted that other invasive tree pests can be treated in a similar fashion.

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

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

http://cordis.europa.eu/marketplace > search > offers > 4730

Mutation risk from wood dust

The risks of long-term heavy exposure to wood dust are well known. Scientists have delved into the genetic mechanisms behind one of the main occupational diseases, sino-nasal cancer.

Despite various studies to ascertain the effects of exposure to wood dust in the workplace, the genetic basis and biochemical mechanisms underlying the resulting pathologies have been largely ignored. To remedy this, with EU funding for the aptly named project Wood-risk, researchers at the Finnish Institute of Occupational Health aimed to identify the molecular changes that actually cause sino-nasal cancer.

Results from a large collection of sino-nasal tumours that had been examined using histopathological techniques were analysed. The tissue had been collected from over 400 patients in Denmark, France and Finland. The samples were taken from workers that had been employed in various sectors of the woodwork industry and had had contact with a variety of hardwoods.

Perhaps as expected, gene tumour protein 53 (TP53) showed a very high frequency of mutations, in up to 80 % of the sino-nasal tumours. Tumour suppressor protein p53 is a potent force preventing the cell from progressing to the cancerous state. The statistics showed that the highest incidence of mutation was found in adenocarcinoma samples where the cancer originates in glandular tissue. From a demographic point of view, the frequencies were found to be different for the three countries.

The team of scientists also performed immunohistochemical analyses on the tumour tissue for further analysis. After allowing for factors involved such as exposure to tobacco smoke and the specific type of occupational exposure, the statistical relationship between contact with wood dust and mutations can be assessed.

Statistical and histopathological studies yielding data from mass studies can be used in many ways. Hazard control and assessment of health risks can be improved. Moreover, the figures can be used as a negotiating tool to reduce exposure limits in the workplace.

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

Collaboration sought: information exchange/training.

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Increased protein, methionine and starch in potatoes

Top European academic and commercial plant research laboratories collaborated to improve the quality of potato crops. This was achieved by increasing the protein, methionine and starch content.

Potatoes are a major crop in the EU. Furthermore, research carried out into potatoes can be readily applied to other crops. Plant scientists from the OPTI-2 project investigated ways of increasing protein, methionine and starch levels in potatoes. Methionine is an essential amino acid which cannot be synthesised by animals and therefore must be gained through the diet. The consortium also studied how to reduce the level of poisonous glycoalkaloids in the crop. The overarching goal of the OPTI-2 project was to enhance free and bound amino acids and improve the nutritional value of potatoes as a food or raw feed material.

A team of researchers from the Institute of Biochemistry and Molecular Biology at the University of Wroclaw undertook an analysis of messenger RNA (mRNA) in transgenic potatoes. Expression studies were performed to determine the function of 14-3-3 protein isoforms. Transgenic plants underexpressing this important regulatory protein were analysed for yield and a number of factors relating to nutritional value. Their findings showed that there was an increase in the size and fresh weight of tubers, but a reduction in the number produced.

In addition, it was observed that those plants which repressed the expression of 14-3-3 had an increase in activity of the enzyme

continued on page 13

Extensive investigation of rust disease in faba beans

Rust epidemics can wreak havoc upon faba beans. In response, the Consejo Superior de Investigaciones Científicas (CSIC) in Spain led a multi-million euro research project aimed at preventing rust in faba beans.

An essential component of the research programme was the development of specific protocols for assessing the susceptibility of the faba bean to rust. The CSIC and its partners in the Eufaba project created three such protocols, namely for field trials, controlled conditions and detached leaf assays.

In the field, CSIC recommended against relying on natural means of disease propagation, suggesting artificially induced epidemics via spraying instead. The inoculation should be timed such that darkness and humidity are optimised in order to promote infection. Plant response is then gauged according to disease severity (DS), which is calculated by estimating the amount of leaf area covered with rust pustules. The severity of necrosis and/or chlorosis, defined as infection type (IT), is also an important indicator.

Experiments in a greenhouse or growth chamber allow for greater control over environmental parameters and are necessary to examine the various growth stages of the faba bean. The CSIC defined a procedure for inoculation involving the use of a spore setting tower followed by incubation under specific light and moisture conditions. Regular monitoring of the number of pustules and pustule sporulation enables the calculation of the latent period (LT), infection frequency (IF), colony size (CS) and the aforementioned IT.

Finally, a new technique for preserving faba bean leaves in Petri dishes was established during Eufaba. Inoculation and monitoring of the spread and severity of rust disease were accomplished in a manner similar to that of the greenhouse trials.

Subsequent evaluation of DS, IT, LT and other data has allowed CSIC and its partners to identify which strains of faba bean possess elevated levels of resistance to rust disease.

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

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

http://cordis.europa.eu/marketplace > search > offers > 4830

Faba bean resistance to Orobanche crenata

Studies were carried out on faba beans to identify and characterise resistance to the parasite crenate broomrape, **Orobanche crenata.**

Faba beans are important to the economy of North Africa as both food for human consumption and for animal feed. In Europe it has helped to overcome a chronic lack of home-produced plant protein to supply the EU's animal feed industry. The Eufaba project developed faba bean genotypes resistant to disease, parasites, frost and drought and free of anti-nutritional factors.

The project consortium screened faba beans under field conditions for resistance to the parasitic herbaceous plant *Orobanche crenata (O. crenata)*. Researchers carried out field trials in Egypt and Spain in order to compile the Eufaba-broomrape-ringtest. They tested 41 accessions under field conditions together with a local variety in soils naturally infested with *O. crenata* seeds. The Eufaba-broomrape-ring test was also used in Tunisia for soils infested with *O. foetida.*

Resistance to *Orobanche* could take place during any phase of the infection process. These included germination of the parasite, penetration/establishment and the development of tubercles. Resistant plants could prevent parasite growth during at least one of these stages. The main resistance response was to stop penetration of host tissues by the parasite and hamper tubercle development.

Histochemical studies confirmed that intrusive parasitic cells were unable to penetrate the host's central cylinder and were stopped in both the cortex and the epidermis. The percentage of germinated *O. crenata* seeds developing a tubercle was 30 times higher in the susceptible Prothabon cultivar than the resistant Baraca. Furthermore, the number of established tubercles was 127 per plant for Prothabon compared to 3.4 for Baraca.

An accumulation of dark blue stained material was observed around the penetration pathway and found to be heterogeneous in nature. Use of aniline blue fluorochrome revealed the accumulation of callose, a plant polysaccharide, around the penetration pathway of the parasite. This appeared to be the mechanism responsible for stopping penetration of the host cortex by the parasite. In those cases where the parasite was not stopped in the cortex, lignification of endothermal cell walls in contact with parasitic tissue was found to take place.

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 > 5184

continued from page 12 **'Increased protein, methionine and starch in potatoes'**

nitrate reductase (NR). This was reflected in reduced levels of nitrate and an increase in the protein content. The OPTI-2 team also noted a significant increase in the activity of the enzymes sucrose phosphate synthase and starch synthase accompanied by respective changes in sucrose and starch levels.

These findings were contrasted by decreased levels of certain physiologically active molecules. These included the key enzymes necessary for the metabolism of tyrosine, a non-essential amino acid involved in the synthesis of proteins. This caused a decrease in the catecholamine content of the tubers, which in turn could be responsible for the increase of starch in the transgenic potatoes. Researchers also discovered a significant increase in ethylene content, which was mirrored by a rise in the level of the essential amino acid methionine. This increase in level of ethylene could explain why the vegetative period of the analysed transgenic potatoes was considerably shortened.

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 > 5193

Non-invasive test for endocrine disruptors in fish

A new non-invasive method was developed for monitoring endocrine disruptors in the aquatic environment. A major strength of the new technique was that it is non-destructive and harmless to fish, thereby reducing fatality risk factors in laboratory testing.

The Easyring project produced new methods for detecting biomarkers of endocrine disruptors in the skin of aquatic organisms. Endocrine disruptors are synthetic chemicals which can interfere with an organism's hormonal system, adversely affecting the development of its vital organs. Project partners at the National Research Council of Italy developed a dipstick (or chip-based) assay for the rapid detection of vitellogenin (Vtg), a biomarker of endocrine disruption, in the skin mucus of carp.

The production of Vtg depends upon oestrogen and is normally active in mature female fish. However, it can also be detected in immature female and male fish as a result of their exposure to oestrogens and chemicals that mimic them. Because it is found in the skin mucus of fish, as well as their plasma, Vtg is considered as a suitable non-destructive biomarker for exposure to oestrogens.

The new system was tested on laboratory fish and on fish taken from seven sampling sites in the River Po basin. The carp taken from the wild suffered from different levels of contamination. The dipstick prototype was simple and quick to use with the presence of Vtg being indicated by the appearance of a coloured line.

The Easyring scientists then used an enzyme-linked immunosorbent assay (ELISA) to compare levels of Vtg in blood plasma and skin mucus from the same fish. The results showed a positive correlation for most of the groups of sampled fish from the River Po basin and groups exposed to tamoxifen, but not all.

The lack of correlation between Vtg levels in plasma and in mucus indicated different rates of turnover for Vtg in the two samples. A certain amount of caution should therefore be applied when using the dipstick assay for field sampling. The anti-oestrogen properties of tamoxifen could influence the Vtg turnover, so that the levels of Vtg in the mucus are not analogous to those in blood. This challenge can be addressed by taking a blood sample for on-site analysis using a lateral flow immunoassay (LFIA).

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 > 5213

Oxygen supply for fish in northern European waters

The incidence of particulate matter, eutrophication and resulting hypoxic conditions within our aquatic ecosystems is increasing. The oxygen binding properties of blood in four different types of marine fish have been studied to determine how fish could adapt to the effects of this type of pollution.

Human activity in coastal areas is having a devastating effect on marine waters. Among the factors affected are turbidity and oxygen levels, both of which can radically affect fish behaviour. Overall, these changes in behavioural patterns that include schooling, predator-prey reactions, habitat selection and perception of the environment can change the whole nature of the ecosystem.

In response to this cry for help from marine ecosystems, the EU-funded project Ethofish aimed to determine experimentally the thresholds beyond which hypoxia and turbidity affect fish physiology and behaviour. At the University of Copenhagen, researchers compared the blood oxygen binding affinity properties of four unrelated fish species that occupy different habitats in temperate to cold marine waters.

Blood oxygen affinity in vertebrates can display the phenomenon of cooperativity where the attraction of the haemoglobin unit for the gas increases as more oxygen binds. The scientists also researched the pH-dependent or Bohr effect where a rightward shift of the affinity curve occurs with increasing carbon dioxide. There is therefore a consequent decrease of affinity on acidification. They also investigated the Root effect which causes very low blood oxygen binding at low pH.

Under standardised conditions, blood oxygen affinity of cod, herring, mackerel and plaice were compared. Independent of their vastly different swimming performances, herring haemoglobin showed the highest oxygen affinity with cod the least. Plaice and mackerel scored in between, in that order.

The results proved to be contrary to previous findings where there was a general correlation between oxygen affinity and pH-dependent binding. Implications of this study are that the adaptive properties of haemoglobin in hypoxic conditions cannot be assumed across all species. Using the data amassed, the project was able to develop conceptual models linking changing distribution patterns of key species to disturbances in the ecosystem.

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 > 5173

Polymerase chain reaction for parasite identification

Mariculture stocks are frequently under threat from parasites due to their rearing conditions — high density monoculture. European research has contributed to protection against enteromyxosis, a parasitic disease common in gilthead sea bream.

For fish farmers of the gilthead sea bream in the Mediterranean, enteromyxosis is a particularly serious disease. Caused by the protozoan *Enteromyxum leei (E. leei)*, it causes significant stock losses. Despite the economic importance of the disease, there are large gaps in the knowledge about the pathology of this parasite which the EU-funded project MyXfishcontrol aimed to elucidate.

Project partners at Consejo Superior de Investigaciones Científicas in Spain used the polymerase chain reaction (PCR) technique in two main research areas, both affecting the spread of the parasite. Firstly, it is highly important to diagnose if the disease is present in stocks. An infection means that husbandry must be changed to avoid stress such as handling. Also, all infected brood stock must be removed.

The scientists found that for both lethal and non-lethal PCR, L-PCR and NL-PCR respectively, the sensitivity and specificity were outstanding. Furthermore, they outperformed the gold standard histology diagnosis. It was therefore recommended that the NL-PCR be applied as a routine

continued on page 15

Maintaining stock health in aquaculture

Based on the results of an extensive study of aquaculture in south-east Asia, researchers with Universiti Putra Malaysia recommend avoiding the use of chloramphenicol as an antimicrobial agent.


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Like their livestock counterparts, operators of fish and shrimp farms use antimicrobials to keep their stocks free of disease caused by bacteria, viruses and other microorganisms. However, bacteria in the water near the farms can develop resistance to the antimicrobials. This is a problem not only for the fish and shrimp, but also for humans that come into contact with these ecosystems.

An international research effort entitled Asiaresist investigated the extent of this phenomenon in south-east Asia. Scientists with the Faculty of Veterinary Medicine at Universiti Putra Malaysia focused their attention on chloramphenicol. Chloramphenicol is one of the most widely used antimicrobials since it is very effective as well as cost efficient.

Water and sediment samples were collected over a period of eight weeks from two fish farms and one shrimp farm, all in Malaysia. Water temperature, salinity, pH, sediment type and a number of other parameters were recorded for each sample. Application of the standard operating procedure (SOP) developed during Asiaresist led to the isolation of an alarming number of chloramphenicol-resistant strains of bacteria — 166 in total.

The threat of human infection should not be underestimated and the Malaysian scientists therefore proposed a number of possible substitutes for chloramphenicol. These include the use of probiotics and vaccines in combination with best practices for sustainable aquaculture related to stock health management.

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

Collaboration sought: further research or development support.

http://cordis.europa.eu/marketplace > search > offers > 5223

Assessing the impact of fish biomass export

The export of fish biomass from marine protected to surrounding areas has been evaluated in order to formulate a common management strategy for coastal fisheries.

The decline in Mediterranean coastal fisheries in recent decades has posed socioeconomic consequences on rural employment. A significant way to enhance the development of coastal fisheries in terms of producing bigger and more fish is through the proper management of marine protected areas (MPAs). This allows local fisheries to keep their usual methods while producing higher market value and better quality fish.

In light of this, the Biomex-01 project conducted a novel study to arrive at MPA export estimates. The significance of export in this area is that it is representative of valuable production that does not harm MPAs. Methods were tested and developed in order to arrive at an estimate of fish biomass from MPAs to the adjacent areas. Such results can provide a foundation for the development of common management strategies for European MPAs.

A multidisciplinary approach which combined biological and fisheries variables was used and it targeted numerous commercial fish species. The potential biomass export of adult fish, the pelagic export as a result of the dispersal of eggs and larvae and the likely contribution of adult fish export to fisheries were evaluated. Underwater visual and video consensus was used for the evaluation of adult fish whereas for eggs and larvae, distribution surveys were utilised. A detailed evaluation of the findings was provided in a final report.


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

Collaboration sought: further research or development support.

http://cordis.europa.eu/marketplace > search > offers > 5192

continued from page 14 **'Polymerase chain reaction for parasite identification'**

test for monitoring the infectivity status for enteromyxosis.

The other strand to the research involved the life cycle of the protozoan and the possibility of an intermediate invertebrate host. The scientists screened 350 invertebrate samples from around infected farms using PCR. These included sea anemones, corals, polychaete worms and crustaceans. Just over one percent of the samples were positive for *E. leei* indicating that there is no intermediate invertebrate host.

Valuable information regarding the spread and diagnosis of this parasite is good news for the mariculture industry. As the disease is transmissible to various wild species, commercially important fish in marine ecosystems can be protected also. Fast accurate diagnosis also means that areas free of the parasite can be designated for the benefit of consumer and farmer.

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 > 5176

Wine making process reduces ochratoxin A content

The effect of wine making on levels of the fungal toxin ochratoxin A (OTA) was studied by researchers from the 'Wine-ochra risk' project. The project was a European-wide initiative set up to minimise the amount of OTA entering the animal and human food chain.

Grapes and their products are the second most important source of OTA after cereals. Contamination by OTA can result in adverse effects on human health including cancers and kidney disorders. Scientists from the Minho University in Portugal were therefore interested in discovering how the winemaking process causes a reduction in OTA levels.

The team found that greatest decrease occurs during malolactic fermentation, which represents a secondary fermentation in wines by lactic acid bacteria where malic acid is converted to lactic acid. For those wines that do not undergo malolactic fermentation, levels of OTA can be controlled through the use of a charcoal-based adjuvant. Wines possessing only a slight OTA contamination can add the adjuvant to the end product at a relatively low concentration of ten grams per hundred litres. This reduces OTA concentration without affecting the colour of the wine.

In those cases where the wine had high levels of OTA, charcoal-based adjuvants were used on the must before maceration. Must is freshly pressed grape juice and includes the skins, seeds and stalks and maceration involves the grape skins being in contact with the must during fermentation. The addition of the adjuvant in this way allows higher levels to be used without the risk of impairing the wine's colour or quality. In those instances where OTA occurred in grapes, precautions were taken to prevent the resulting wine becoming contaminated. The 'Wine-ochra risk' project recommended that the OTA levels in must should be determined in every case.


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Researchers also recommended that in the event of significant OTA contamination, a number of procedures should be assessed including reducing skin maceration or avoiding it altogether. The project partners also proposed that filtration or centrifuges should be used to aid clarification of the wine rather than employing pectic enzyme treatment. Use should also be made of fining agents, which remove suspended material, yeast and bacteria and are also effective against OTA.

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 > 5191

Iron overload and heart disease

Statistics have suggested that an iron overload can predispose individuals to an increased risk of heart disease. A large study of post-menopausal women has been conducted in the Netherlands to collate valuable data for further analysis.

For patients with the genetic disease hereditary haemochromatosis (HH), even normal dietary levels of iron can cause damage to organs. In the heterozygous state of the condition, early cardiovascular death is a risk factor. During the project 'Nutrient iron toxicity', although the emphasis rested on HH studies, project partners also investigated the possibility that high iron levels were linked to coronary heart disease in the general public.

Previous epidemiological studies had not established a clear link between elevated levels of iron stored and heart disease. In order to supply data to elucidate the potential correlation, scientists at UMC in the Netherlands undertook a study comprising almost 11 500 post-menopausal women.


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Statistically, the design of the study maximised the benefits of the large cohort. First, the study was lengthy, running for seven years including the follow-up period for cardiovascular events. Secondly, case cohort sampling was used to both reduce costs and to save valuable biological material.

An initial investigation to see if there was any link between serum ferritin and coronary heart disease (CHD) and acute myocardial infarction (AMI) did not support an association. However, only a small fraction of iron in the body is carried in the serum bound to transferrin. The scientists therefore also investigated the health implications of excess non-transferrin-bound iron (NTBI).

Adjusted hazard ratios for the iron parameters were estimated using the Cox proportional hazards model. The analysis showed no excess risk of CHD or AMI for the women in the top tertile for NTBI as compared with the lowest. In fact, a decreased risk may be evident. Further investigation is still needed to clarify whether indeed there is a correlation between high iron in the body in any of its forms and CHD or AMI.

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 > 5226

Superconductive wires for electric power delivery

Remarkable progress in the development of materials has led to a continuous increase in the current capacity of superconductive tapes and wires. To further aid the design of superconductive wires for specific applications, a novel technique has been proposed by the Big-powa project to allow the quantification of their benefits.

The idea of lossless transmission of electricity was inspired from the discovery of superconductivity in the 20th century. In addition to zero resistance, superconductive materials are able to carry current densities which far exceed the admissible ones of standard metal conductors, such as copper or aluminium.

One of the most promising applications of superconductive materials is their usage in electric power distribution grids, where the existing copper overhead lines will be replaced by underground wires. The overall objective of the Big-powa project was to provide the research and development base for the fabrication of superconductive wires that will improve the efficiency of electric power transmission.

Before the Big-powa project there were some overwhelming considerations for large-scale industrial applications of high temperature superconductive materials. The issue of electrical losses when alternating current (AC) flows through them was of primary importance, since their magnitudes were above the desired application levels.


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Over the course of the four-year project, deformation procedures were developed to fabricate superconductive materials with more appropriate configurations than existing flat tapes for cables and coils. The expected level of AC losses needed to be evaluated at the design stage. For this purpose, the Big-powa project partners employed the Hall-probe experimental technique.

More specifically, the magnetic field profile on the surface of sample high temperature superconducting tapes was measured with the use of Hall-probe sensors. When compared to magneto-optical measurements, Hall-probe sensors are easier to calibrate, even if they do not produce a high-resolution map. On the other hand, an array of seven sensors connected to a multiple channel amplifier, which is programmed for fast and synchronous data acquisition measurements, provided for real-time measurements.

The speed of the system is high enough to measure the magnetic field profile on the sample's surface, while the frequency of the electric current that produces it reaches 50 Hz. To obtain the map of the current density corresponding to the measured field profile, the inverse problem was solved using certain assumptions for the current density distribution and Ampere's law.

Knowledge of the current distribution, obtained with this experimental technique can be used for understanding the superconductors' properties and for quality control purposes.

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

Collaboration sought: further research or development support.

http://cordis.europa.eu/marketplace > search > offers > 5211

See also page 43 (Alloy replaces silver in superconducting tape)

Studying sea gas hydrates with X-ray computed tomography

A new device assembled by engineers with the Technical University of Clausthal in Germany could help unravel the mystery behind sea gas hydrate formation.

Gas hydrates, composed primarily of methane, form in cold, high-pressure environments at several different locations in the Earth's oceans. While our knowledge of these unusual hydrocarbon reserves is limited, there is growing interest in their possible exploitation.

Europe's research community is actively participating in the study of sea gas hydrates through projects such as Anaximander. The investigation, funded by the EU, focussed on the eastern Mediterranean. Participants from the Technical University of Clausthal developed a technique to simulate and analyse gas hydrate formation in the laboratory.

The method was based on X-ray computed tomography (CT), which proved capable of providing feedback on gas hydrate behaviour in three dimensions. It was designed to provide both high resolution and excellent contrast. An air bath helped maintain low temperatures for long periods of time that were necessary to induce precipitation. Furthermore, a special peripheral device was incorporated to facilitate fluid injection into the experimental core. The team at the Technical University of Clausthal also came up with an innovative way to create voids in the test sandpacks using salt crystals.

The subsequent simulations revealed that gas hydrate formation occurred on relatively short time scales. The resulting hydrate layers impeded transport within the sandpack, which was often compounded by pore collapse. As a result it was possible to isolate the gas within the structure for a significant length of time.

In addition to providing insight into sea gas hydrates, the flexible experimental set-up may also be used to study other phenomenon in porous media.

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

Collaboration sought: information exchange/training.

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Maximising energy output from wood waste

Woody biomass can be used in almost any energy production setting, from domestic to commercial as well as the heat and power sector. The Echaine project has produced a comprehensive report on energy wood with a view to fully utilising this biomass energy source.

Increasing energy production from renewable sources is top priority in Europe. Energy from wood biomass holds considerable potential for increased production but this is in part dependent on impact on the environment and acceptability to the public. Wood is also highly variable in its energy content and there are large discrepancies in supply from different regions and accessibility.

In order to meet Europe's goals to increase energy produced from renewable sources in line with the Kyoto protocol, more energy could be derived from biomass. If the biomass were wood, not all this can be obtained by felling forest from an environmental point of view. An appealing alternative is to use wood residue from forestry waste and processing industries.

In response to the demand to optimise the use of energy wood, the EU-funded project Echaine aimed to compile comprehensive data on energy production chains throughout Europe. The main issues covered were the identification of economic sources of wood supply, methods of production, costs and use potential.

The project identified no fewer than 10 energy wood production chains in use in Europe. The methodologies within each chain varied widely even down to the terminology used. Moreover, large differences in availability within Europe due to seasonal and other regional factors such as harvesting methods had a significant impact.

Ecologically and economically sound aspects of energy wood include obtaining wood from logging residues. Branches and tops can be used, mainly from regeneration fellings. To reduce overheads, successful techniques used in Finland and Sweden included multi-tree handling for cost-effective felling and bundling of logging residues to reduce haulage costs.

Scale of production was deemed to be an important factor in maximising energy output per unit of wood. Large scale enables the use of capital intensive systems and full efficiency in chipping plants. Full operation of machinery and constant availability of wood were two of the most important factors.

The findings of the Echaine project have been widely disseminated through the internet, seminars and international workshops. Elucidation of energy wood variations and consequent adaptation of processing systems should ensure that energy wood is a viable form of biomass energy.

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 > 5188

Improved energy efficiency in the grinding process

A study was carried out to reduce the amount of energy lost during the grinding process. The improvements made resulted in greater efficiency and new techniques which can enhance the competitiveness of European industry.

Grinding is a machining process used in precision manufacturing to enhance the quality of finished parts for the automotive, aeronautics and other important industries. The process has a high environmental impact, consuming large amounts of energy and producing waste. Energy in the form of heat is dissipated during the grinding process. The ENGY project was established to address these issues by improving the energy efficiency of the grinding process and shortening the production chain.

Project partner Danobat S. Coop based in Elgoibar, Spain, studied ways of reducing the amount of energy used by grinding machines. These included greater energy efficiency and the development of new technology including environmentally friendly lubrication. Researchers investigated conventional methods for guide systems that did not employ lubrication and the use of coated tools for reducing friction and wear.

The Danobat team also analysed changes to the grind hardening process, which is used as a means to surface harden the workpiece. A system was developed which cooled and dried the grinding wheel simultaneously. The result was that the grinding wheel remained cool but the contact point with the workpiece became heated. Thermal imaging was used to show that the improved method was successful.

The results achieved by the ENGY project will enable manufacturers and the machine tool industry to become more competitive through the development of energy efficient systems. This will help to reverse the apparent decline in employment by European machine tool builders by creating new jobs. Improvements in energy consumption during the grinding process can also be applied to other machining procedures, enabling them also to become more efficient and cost-effective.

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

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

http://cordis.europa.eu/marketplace > search > offers > 5198

A Monster system for managing airport noise

Noisy airports can affect both the employees who work there and the people living nearby. An EU-funded project developed a prototype system that enabled stakeholders to effectively manage airport noise.

Noise pollution from flight operations is a major environmental problem which can have a serious impact both on airport workers and surrounding communities. The Monster project was an EU-funded initiative which developed a low-cost modular system for evaluating the noise effects associated with an operational airport. A consortium comprising research institutes and SMEs from four European countries produced a prototype system based on a software module and a hardware network of sensors.

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Researchers from the Naples-based company Air Support S.R.L. optimised the layout for the network of sensors and determined the accuracy of the system. The Monster system prototype was field trialled at the sites of the end-users who included Naples international airport and Trieste airport.

The prototype complied with all the required evaluation criteria and European standards. Its development has heightened awareness of the problem of noise pollution and supports noise-abatement laws and policies for airports. A reduction in the level of noise from these sites will improve the quality of life of workers and local residents.

The noise monitoring and control system sector was previously dominated by a small number of non-EU countries. Thanks to the Monster project, European industry has been able to establish a presence in this highly technological field. The result will be greater employment opportunities in SMEs developing, installing and maintaining the Monster system and other related activities. There will also be an increase in the number of skilled workers operating in the field of noise control.

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

Collaboration sought: further research or development support.

http://cordis.europa.eu/marketplace > search > offers > 5169

New concept reduces city centre traffic in Bristol

The city of Bristol in the United Kingdom participated in the Vivaldi project and developed a wide range of innovative and integrated sustainable measures for urban transport. These measures included the city 'Clear zone' which minimised the environmental impact of transport by reducing levels of polluting emissions.

The Vivaldi project was coordinated by the city of Bristol, which successfully implemented a wide range of innovative transport activities throughout the city. These included the 'Clear zone' concept, which employed a variety of transport and land use measures in order to improve the local environment of the city centre. The designation of an air quality management area also reflected the need to reduce traffic-related air pollution in the centre of the city.

Innovative measures included the purchase of environmentally friendly vehicles and the retrofitting of exhaust treatment equipment to over 60 diesel buses. A new orbital bus service was also established and trials conducted for prohibiting other traffic from bus lanes. A cycle resource centre was set up to encourage people to cycle to work by providing high-quality facilities including secure parking, changing rooms and bicycle maintenance services. Centres were also established for providing transport information and tickets for commercial bus services.

The freight consolidation service (FCS) was the first of its kind in the United Kingdom to focus on a city centre. By streamlining deliveries and cutting the number of delivery vehicles entering the central shopping district, pollution and congestion were significantly reduced. Furthermore, retailers were able to benefit from an improved delivery service. Support tools for the FCS were developed, which included preferential access and loading arrangements. The efficiency of the road network was also maximised through the introduction of road signs at key points, enabling the appropriate routing of freight vehicles.

The 'Clear zone' strategy helped in the implementation of new measures by providing the necessary policy framework. Stakeholders were engaged early on in the process and their continual inclusion throughout the development and operation of the different schemes was important to its success. One of the main barriers to the development of the FCS, however, was the absence of a model in the United Kingdom to base it on. This initially led to a degree of scepticism and a lack of understanding among retailers and other stakeholders during the early stages of the scheme.

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

Collaboration sought: information exchange/training.

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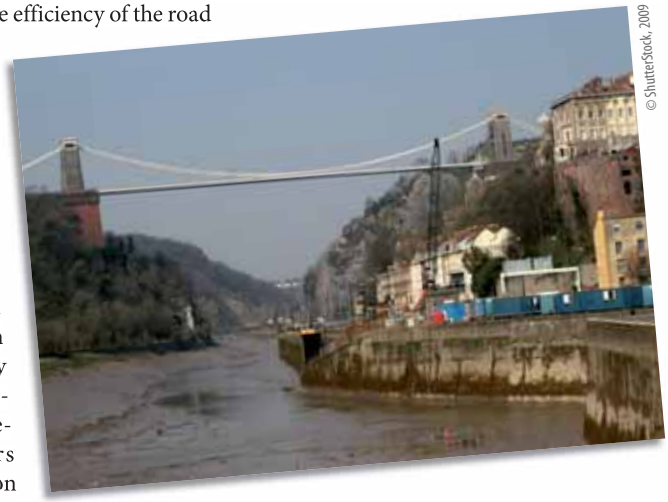

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Car-sharing for the edge of Bremen

In an effort to increase demand for car-sharing in areas around Bremen, Germany, initiatives were developed that are aimed at new target groups.

Clean, energy-efficient urban transport is one of the main objectives of the Civitas initiative aiming to foster integrated sustainable transport strategies in European cities. In the case of Bremen there were no car sharing stations in the city centre. Furthermore there were no products or services that catered specifically for business clients.

Although car sharing efforts for peri-urban areas were attempted, they did not succeed due to low demand. This was the case even after the car sharing demand was raised through the installation of high-quality stations in two districts at the edge of Bremen.

Therefore an alternative plan was needed aiming at new target groups such as business people, cyclists and commuters. More specifically addressed were companies with vehicle fleets, service providers who need to contact their customers in person such as company representatives and residents commuting from peripheral areas to central public transport stations.

Car-sharing membership in Bremen has expanded; yet, further growth and a more even use of vehicles over time is needed for new target groups to be added. Further plans for car-sharing growth involve the expansion toward more car dependent suburban areas, mainly focusing on families.

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

Collaboration sought: information exchange/training.

http://cordis.europa.eu/marketplace > search > offers > 5197

Counteracting inherited inequalities at local government level

Policy at EU level in many cases tries to counteract inequalities which exist at the community level. In order for this to be in any way effective, certain inbuilt restrictive factors need to be overcome. This research provides a strategy for how this could be achieved.

The Profit project is concerned with breaking down the restrictive factors which inhibit the achievement of EU policy objectives. It begins from the understanding that social inequalities and some more general problems are inherited. That is, in communities, some inequalities, in particular those that the EU seeks to counteract are transmitted from the family, community and society at large. Logically, until this stops happening, policy which seeks to break down such inequalities cannot be effective.

Social scientists researching this phenomenon put together an action plan for studying the problem. Their analysis sought to identify the institutions and relevant bodies which can help to strengthen the improvement of social mobility mechanisms. The researchers began a multidisciplinary comparative study of policies and practices across the EU.

One part of the study indicated that integration of statistical data is needed to support local policy. Local governments suffer from scarcity of statistical data on incidence of social problems and quality of life of their citizens. This makes municipalities 'blind' and forces them to act intuitively, which is sometimes counterproductive.

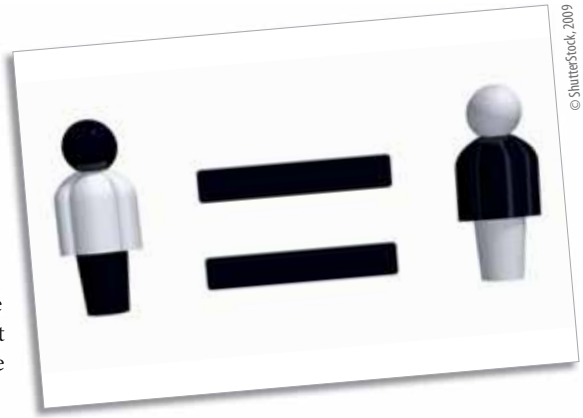
The research findings demonstrated that no common indicators existed that could serve as a basis for developing indexes measuring social deprivation. This makes comparisons between municipalities within the same country quite impossible. International surveys, such as those compiled by Eurostat, were not found to be conducted on the community level.

The exceptional case was the United Kingdom. The British way of collecting data in small, newly created statistical units, which includes an index of multiple deprivation, was put forward as an example case. The researchers suggested that this approach should be promoted by the EU as an example for countries lagging behind in applying social reforms. From this start point, it would be possible to develop strategies to counteract social problems.

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

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

http://cordis.europa.eu/marketplace > search > offers > 4855



Knowledgeable solutions to societal inequalities

Improved coordination and knowledge distribution between national and local levels of administration has been highlighted as a holistic approach to counteract the transfer of poverty and social inequality.

A knowledge-based society is essentially one which considers knowledge as the primary source of production rather than that of capital and labour. Given this premise, it stresses the fact that society's most valuable assets are its investment in intangible, human and social capital which is propelled by knowledge and creativity. In this way, knowledge is used and shared for people's benefit and prosperity.

'Citizens and governance in a knowledge-based society', thematic priority 7 of the Sixth Framework Programme (FP6), provided a solid foundation for handling the shift of European society becoming more knowledge-based. This transition was influenced by national, regional and local policies, programmes and actions as well as by informed decision-making of individual citizens, families and other societal sectors.

Under the auspices of this programme came the Profit project which was specifically designed to pinpoint the challenges to society brought about by intergenerational inheritance of inequalities (II of I). The project is based on the notion that the spread of inequalities acts as a resistance to the attainment of the strategic objectives of

continued on page 21

Social policy needed to curb inherited inequalities

Looking at the micro, meso and macro level, social researchers focused their attentions to achieve a better understanding of the existence of intergenerational inheritance of inequalities. Overall the project shed light on policy responses which can be employed to overcome this social phenomenon.

The alleviation of inequalities is at the forefront of most social policy concerns in Europe. This is why the EU funded a research team made up of participants from eight European countries, to study the social inheritance of inequalities.

The Profit project aimed to identify the factors which arise once inequalities are transmitted through the generations. This, the researchers claimed, is a result of influences coming from the family, community and society as a whole.

Part of the research involved conducting interviews with top-level policy-makers. They concurred that inequality reproduction tends to be more 'private' in its nature than previously assumed. That is, it is concentrated in the relationship between parents and their children.

In response, society and social policy should not neglect this issue but react with the appropriate social mechanisms, claimed the researchers. Educational policy is one of these social mechanisms. The researchers found out from their interviews, that educational policy can be both decisive and divisive in alleviating intergenerational inequality barriers. It can create equality of opportunity but can also worsen mobility chances of people originating from low-status families, in the cases where they are expelled rather than supported.

The researchers also pointed out the reasons why it is difficult to counteract this phenomenon effectively. They stressed that this was in part due to the fragmentation of policies and the lack of long-term programs, which in turn is the result of an insufficient diagnosis of the social problem.

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

Collaboration sought: information exchange/training.

http://cordis.europa.eu/marketplace > search > offers > 4654

Groundwork for human biomonitoring in Europe

A questionnaire which looked at domains such as food and lifestyle habits was designed and used as part of a European study on human biomonitoring, which focused on how the environment can affect the health of a child.

The ESBIO project dealt with the subject of human biomonitoring, monitoring environmental and health factors in relation to child development. In order to make assessments, the scientists developed a coordinated approach in order to overcome deficiencies. They achieved this by ensuring that relevant stakeholders were integrated in the project, that guidelines for ethical practices were developed and that socioeconomic consequences were assessed. Much importance was also put on communicating the results and a strategy for this was drawn up.

One research team involved in the project conducted a preliminary study to examine potential exposure pathways, behaviour and social demography. A suitable questionnaire was therefore developed. The questionnaire addressed willingness to participate, demography, environment and food and basic health related matters.

Mothers were the key participants. Their responses helped to shape an understanding of child exposure to certain domains such as food and lifestyle habits, which are of relevance to human biomonitoring. Health officials were involved in the questionnaire, in particular they handled the admission and sampling section which dealt with very basic health related matters and documentation of specimen collection.

The design and undertaking of the questionnaire formed a very important preliminary stage in the EU human biomonitoring pilot study, as it was essential that this additional information was available to the scientists.

Funded under the FP6 cross-cutting activity
'Research for policy support'.

Collaboration sought: information exchange/training.

http://cordis.europa.eu/marketplace > search > offers > 4897

continued from page 20 **'Knowledgeable solutions to societal inequalities'**

the EU. The inequalities could stem from a variety of crossing sources such as family of origin, community and society.

One way in which the influence of II of I could be lessened is through social policy. Therefore analysis was carried out in order to discover institutions and related bodies that can enhance social mobility mechanisms. The work involved a multidisciplinary comparative study with an educational focus. Policies and practices were examined across eight countries possessing different socio-economic cultural make up. The interrelation of policies and practices carried out at the national and the local level, which spur social mobility, were highlighted.

It was found that better synchronisation between national and local levels of administration as well as between sectors is a useful means for subverting II of I. It would be deemed more efficient to allow municipalities to establish their own eligibility criteria most suitable to their local requirements. If social policy measures are to be implemented more effectively, the cooperation between national and local levels operating in various spheres needs to be improved.

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

Collaboration sought: information exchange/training.

http://cordis.europa.eu/marketplace > search > offers > 4464

Resolving land and water conflicts in Latin America

The International and Water Sanitation Centre has designed a computerised training session to teach negotiation skills over land and water conflicts.

Land and water conflict can be a highly charged topic, particularly in Latin America. These scarce resources such as access to safe water become more contentious in urban areas, where competition is greatest. The aim of the Negowat project is to facilitate the negotiation process that takes place over land and water in this region. This has been achieved by providing training through modelling negotiation situations and role playing.

The International Water and Sanitation Centre based in Delft, has tested and produced a series of training materials including a PowerPoint presentation, supporting documents and academic papers. A course has been designed to be taught at the University of San Simon to teach this methodology, with formal recognition as part of the degree programme.

A computerised tool which has been designed by the research team will also be incorporated into the training. The benefits of this training to stakeholders are that this tool provides them with an understanding about the different interests, constraints and value systems of other interested parties. This in turn produces more cooperative results as participants learn diplomacy skills and are able to tackle problems more objectively. Furthermore, it opens up new discussion parameters as it facilitates an understanding of the complex dynamics involved in negotiation.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In Brazil, this tool has already been tested in different local government training courses.

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

Collaboration sought: further research or development support.

http://cordis.europa.eu/marketplace > search > offers > 4174

Estimating carbon fluxes between the land and atmosphere

More accurate estimates of carbon sequestration over land produced during the Camels project will be invaluable to EU Member States working to meet their Kyoto emissions targets.

Carbon accounting for the Kyoto protocol involves estimating not only emissions of carbon dioxide (CO_2), but also sinks, namely forests and other types of land use that absorb carbon from the atmosphere. The Camels project, funded in part by the Fifth Framework Programme (FP5), sought to reduce the uncertainty associated with carbon sink assessments. The task involved incorporating data from a variety of sources into a number of computer-based models simulating different aspects of the carbon cycle.

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The input data included biomass maps derived from European forest inventories as well as remote measurements of the fraction of absorbed photosynthetically active radiation (FAPAR), which indicate plant productivity. In addition, field measurements of CO_2 fluxes between the atmosphere and plant canopy were collected from more than 100 sites across Europe outfitted with eddy covariance instrumentation.

The data was then fed to the organising carbon and hydrology in dynamic ecosystems (Orchidee) model to reproduce the effect of the growing season. The important biological aspects of carbon assimilation and release were treated with the Met Office surface exchange scheme (MOSES) model. Using climate data, atmospheric CO_2 measurements and land use data, MOSES was capable of modelling carbon sources and sinks throughout Europe.

Finally, the results of the Camels research were incorporated into a carbon cycle data assimilation system (CCDAS). Analysis of the findings revealed significant progress in reducing the uncertainty associated with a number of key parameters. Furthermore, looking at the past 20 years, the influence of the El Niño-southern oscillation phenomenon was clearly evident. In particular, El Niño events were associated with enhanced CO_2 uptake in the northern hemisphere.

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

Collaboration sought: information exchange/training.

http://cordis.europa.eu/marketplace > search > offers > 5210

Mapping greenveins in Europe's agricultural zones

A database containing landscape metrics produced during the EU-funded Greenveins project may provide important insight into the vulnerability of biodiversity in agricultural regions.

The existence of natural habitats interspersed among farmlands helps sustain greater levels of biodiversity. A Europe-wide research project, entitled Greenveins, sought to systematically map these areas across the continent.

Scientists with the University of Rennes 1 in France developed a protocol to assess the 25 Greenveins landscape test sites (LTSs), each of which covered an area of 25 km^2. Aerial photographs were analysed and classified according to codes established by the European nature information system (EUNIS). The results were then verified against field data.

The next phase of the protocol entailed converting the maps into both vector and raster format to be compatible with geographic information system (GIS) applications such as ArcView®. By maintaining high resolution during rasterisation,

continued on page 23

Applying actor network theory to organic farming

Researchers with the University of Aberystwyth in Wales analysed the results of several different schemes designed to promote organic agriculture in Europe. A number of recommendations were made in order to optimise future rural development programmes.

It has been demonstrated that organic farming can deliver significant economic, social and environmental benefits to local communities. To encourage growth in this sector, a number of organic marketing initiatives (OMIs) have been implemented throughout Europe with varying degrees of success.

The University of Aberystwyth led a group of nine universities and research institutes in an investigation of four different OMIs from France, Italy, Austria and the United Kingdom. Feedback was gathered not only from the farmers themselves, but also from other stakeholders, such as the local, regional and national authorities.

While increases in income and job creation were observed following the introduction of OMIs, the more substantial rewards were less tangible, such as raising awareness about the region as a whole. In general, proper marketing campaigns were identified as an important driver.

A key facet of the research entailed the application of actor network theory (ANT) in order to better understand the relationship between the OMIs and actors in rural networks. The need for OMIs to engage governmental institutions in an open dialogue was identified. Flexibility was also crucial in helping attract and retain new organic farmers. Furthermore, all OMIs stand to benefit from a coordinated effort to raise consumer awareness concerning the multiple benefits of organic methods and products. On the other hand, national governments can contribute to the success of OMIs by providing the transportation infrastructure and additional funding necessary to help organic farmers in peripheral regions expand beyond niche markets.

Finally, the University of Aberystwyth and its partners recommend the creation of a European network to facilitate communication and sharing of best practice between the different OMIs.

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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Molecular response of poplar trees to salt stress

Research performed under the aegis of FP5 sought to discover why poplar trees can flourish in salty soils when other species perish.

Chronic misuse of land and water resources, climate change and a number of other factors are accelerating the rate of desertification and salinisation across the planet. Reclamation, in particular reforestation, efforts will rely upon species capable of surviving in drought-like conditions in salt-enriched soils.

A multinational research consortium received funding from the EU to investigate stress resistance in poplar trees. Scientists with the Hebrew University of Jerusalem in Israel, participants in the Establish project, examined the trees' response at the molecular level when subjected to salt stress.

Populus euphratica and *Populus tremula* specimens raised in greenhouses and using hydroponic methods were exposed to high concentrations of salt. The researchers focused their attention on the expression of stable protein 1 (SP1). Sequencing indicated high levels of homology between the SP1 proteins extracted from the leaves of both species.

Additional experiments were performed during which the amount of salt was increased and the cellular response was closely monitored using advanced techniques such as western blot analysis. The results indicated a strong SP1 response, particularly in *P. euphratica*, underlining its potential role in helping the plant adapt to salt stress. Finally, the regulation of specific stress-related genes was analysed using RNA hybridisation. The genes that exhibited up-regulation during this phase have been targeted for further study in future research projects.

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 > 5222

continued from page 22 **'Mapping greenveins in Europe's agricultural zones'**

it was possible to preserve important map features.

Special software, including Fragstat®, was subsequently used to produce various landscape metrics for the LTSs. The researchers used a buffer zone along the perimeter of each LTS to eliminate possible edge effects. During the subsequent analysis, the composition of the 25 LTSs was compared and contrasted. In addition, the role of greenveining in the survival and spread of species with diverse needs was investigated.

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

Collaboration sought: information exchange/training.

http://cordis.europa.eu/marketplace > search > offers > 5199

Finding methods which induce flowering in ash trees

The overall aim of this project was to promote the improvement of genetic resources of the ash tree. Trials carried out focused on withholding water and applying growth retardants to control shoot growth and promote flower bud formation.

The EU-funded RAP project set out to achieve the ambitious task of improving the productivity of the ash tree (*Fraxinus*). This was achieved through testing, selection, propagation and promotion of improved genetic resources. It began with the design of a trial of material from the European natural range. A provenance trial was established in six European countries. Once this was set up, the best populations and provenances were identified and selected. Following this, physiological, biochemical and physical treatments were optimised in order to positively affect micro propagation, flower induction and propagation by cuttings.

As part of the project, scientists set to work to develop methods which could induce flowering in potted plants of ash trees. Firstly, withholding water and applying growth retardants including paclobutrazol were tested. It was discovered that a system of imposing regulated deficit irrigation on young seedling trees caused root drying which in turn affected shoot growth and flower bud formation.

Various tests were carried out. One of the treatments applied to pot trees of seedlings in their sixth growing season was to apply water at the rates of 110 %, 66 % and 33 % of their needs of total potential evapotranspiration. Secondly, flowering was also assessed in grafted plants in pots for 63 clones. Further tests included the application of growth retardants in five different concentrations.

This study showed that potted ash trees produced flowers and viable seeds. The methods developed to induce flowering therefore have important applications in breeding programmes.

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 > 5194

Estimating methane fluxes from oceanic seeps

The aim of the Metrol project was to gain a better understanding of the contribution of methanotrophic microorganisms to methane fluxes at the bottom of the sea.

Seeps are regions of the seafloor where methane and other gases escape from the Earth's crust to the overlying ocean. Not only have unique ecosystems developed in these regions, but the resulting methane fluxes may possibly play an important role in the global methane cycle and therefore climate change.

The Metrol research consortium was granted funding from the EU to study seeps located in the central and northern reaches of the North Sea. Scientists with the Alfred Wegener Institute (AWI) in Bremen, Germany, led two dedicated research cruises.

The first visit targeted the Gullfaks seeps, which sit on top of highly permeable sediments at a depth of approximately 150 m. Evidence of methane gas flares was uncovered with the help of a sediment echo sounder (SES) system. Images of rising gas bubbles were also caught on camera. Importantly, the results of radioactive tracer experiments revealed that the methane gas was oxidised anaerobically. Large populations of *Beggiatoa* bacteria subsequently fed upon the sulphide produced by this reaction.

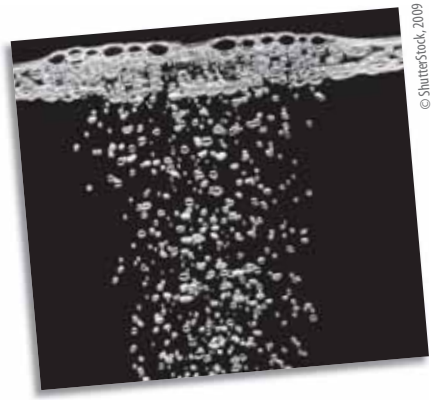
In contrast to the Gullfaks seeps, the methane flux at the Tommeliten seeps was inhibited by the local bedrock — marl. Hydro-acoustic sediment echosounding was used to show that methane plumes erupted in areas where the depth of the marl was shallower. Once again, sulphide-oxidising bacteria were detected as well as a type of anaerobic methane-oxidising microorganism, specifically ANME-1. In addition, reef-like structures were discovered that were formed from carbonates originating from the gassy sub-surface sediments. The AWI researchers believe that another archaeon, ANME-2, was likely to be instrumental in the formation of these reefs.

The Metrol findings have provided important insight into the relationships that make these special ecosystems possible and the fate of the methane gas escaping from the seeps.

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 > 5186



Seamounts — an OASIS in the Atlantic

Seamounts are rich in biological diversity and can provide a valuable resource if protected. A report was produced outlining how these sites can be correctly managed and how the wider marine ecosystem may respond to natural and man-made changes.

The OASIS project and the World Wide Fund for Nature (WWF) produced a joint report reviewing the current state of knowledge for seamounts in the north-east Atlantic. Seamounts are mountains of volcanic origin which rise up from the seafloor but remain below the surface of the water. They often reach the photosynthetic zone, enabling them to become a haven for biological activity and biodiversity. Shallow seamounts act as stepping stones, enabling species to disperse across the Atlantic.

The rock which forms seamounts is much harder than the sediment of the surrounding ocean floor. The steep slopes of the seamount deflect ocean currents creating an upwelling, which brings valuable nutrients. The hard substrate and abundant nutrients provide ideal conditions for suspension feeders. Compared to the surrounding ocean, these sites contain great numbers of plankton which attract fish and squid and in turn, draw predators such as sharks, tuna and swordfish.

Some of the fish species found in this environment are exceptionally long-lived and

continued on page 25

Measuring Arctic fresh water in the North Atlantic

An increase of fresh water from the Arctic entering the North Atlantic may have consequences for the climate of north-west Europe. Therefore, the ASOF-W project measured changes in salinity and temperature on the south-east Greenland shelf and applied the results to sophisticated models.

Monitoring and understanding climate change enables scientists to develop accurate and reliable models that allow them to predict what sort of climate we will experience over the coming decades. This information can help scientists and policy-makers to prepare for disruptions to weather patterns as a result of global warming.

The EU-funded ASOF-W project was established to record and model exchanges between the Arctic Ocean and subarctic seas and their effect on the climate. The influx of fresh water from Arctic ice into the North Atlantic can have a significant impact on ocean currents which influence European weather conditions. The climate of Scandinavia and north-west Europe, which is abnormally warm for its latitude, is particularly sensitive to any perturbations to the factors which maintain it. Possible changes in climate to this region are predicted to be sudden and far-reaching.

Fresh water fluxes into northern seas are best monitored at the continental shelf off south-east Greenland, a key point for exchanges between the waters of the Arctic and North Atlantic. A joint effort by five European marine research institutes enabled scientists from the University of Hamburg to establish scientific instruments in the area of the south-east Greenland shelf. Two arrays of moored sensors protected by buoyant tubes continuously measured changes in salinity and temperature beneath the cover of seasonal sea ice.

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Researchers used the findings from the ASOF-W project to ascertain the freshwater flux over the south-east Greenland shelf. The result was applied to a map of freshwater fluxes for the Arctic and subarctic seas. The data from these activities can be used to create a model of changes to the European climate, linking the respective roles of the ocean, ice and atmosphere.

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 > 5206

Tools for monitoring illicit marine oil discharges

Thanks to important advances in satellite image processing techniques, it will be increasingly difficult for ships to illegally discharge oil at sea.

It is against the law for ships to dump oil, but unfortunately this practice is more commonplace than one might think. The oil wreaks havoc upon the marine ecosystem, in particular birds. Patrolling the seas with aircraft is not feasible, so alternative methods of monitoring need to be developed.

The participants in the EU-funded RTD project entitled Oceanides took up this challenge. The approach involved the development of novel algorithms to process images produced by synthetic aperture radar (SAR) equipment aboard satellites.

Scientists with the Federal Institute of Hydrology in Germany, an Oceanides partner, were responsible for evaluating the accuracy of the algorithms. Two campaigns were carried out during which Radarsat and Envisat images were analysed in near real-time. Verification of oil slicks was provided by research aircraft.

The performance of the algorithms was gauged by the number of false positives and negatives. As it turns out, the correct prediction of a spill was positively correlated with the confidence level of the system's operator. In fact, when specific slick features were present, the frequency of false positives was practically negligible.

Another valuable contribution of the German researchers was the identification of conditions, both weather- and instrument-related, that increased the chances of a false negative. Finally, it should be noted that the position of the oil slick was pinpointed relatively quickly, often within one hour of receiving the satellite data.

Consequently, the Oceanides participants have recommended the adoption and systematic application of the algorithms in an effort to better manage illegal oil discharges at sea.

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 > 5216

continued from page 24 **'Seamounts — an oasis in the Atlantic'**

slow to mature, making them highly vulnerable to overexploitation. In the majority of cases commercial fishing has taken place before the biology and life history of the target species could be understood. In the absence of proper assessment and quotas some stocks have crashed. Commercially important species are caught using longline fishing, mid-water trawling and bottom trawling to a depth of 1 500 m. Drift nets and purse seines are also used. Unfortunately, commercial fishing has resulted in the deaths of non-target species including thousands of seabirds, dolphins and sea turtles.

Political initiatives at the international, north-east Atlantic, regional and national level have been undertaken to address the environmental impact of human activity on seamounts. These have included a call by the United Nations to improve the management of these sites and the establishment of marine protected areas (MPAs) acknowledged by assemblies such as the Convention on Biodiversity. A seamount in the Azores was the first to be protected under the EUs Natura 2000 network of protected areas. The OASIS and WWF report will help policy-makers and stakeholders to draft suitable measures for the conservation and sustainable management of these biodiversity hot spots.

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 > 5168

Automating endpointing and labelling of recorded speech

Advances made by computer scientists at the University of Sheffield in the United Kingdom will significantly streamline automatic speech recognition.

The goal of the OLP project was to exploit technology to help those with speech impairments overcome their disability. Funding for the eight members of the research consortium was provided in part by the EU.

Experts with the University of Sheffield made an important contribution to the development of the OLP software. Automatic speech recognition (ASR) systems must be trained on samples of recorded speech. It is necessary to identify and remove background noise and any sounds that are not words from these recordings. This is accomplished by determining the start and end points of words. This procedure, known as endpointing, is complemented by labelling, which links the spoken sounds to phones or words in the ASR database.

To reduce the time required to manually endpoint and label recordings, the computer scientists at the University of Sheffield designed algorithms to automate this process. By analysing energy levels in the recordings, appropriate thresholds were established to differentiate between speech and non-speech. Optimal microphone placement during recordings helped facilitate this step.

The algorithms were put to the test during OLP and, further to the encouraging results, subsequently incorporated into the STAPTK software package. It should be noted that the code can also be implemented in a separate, dedicated application.

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 > 5215

Supporting group communication applications

In the framework of the Mobileman project, the viability of developing group communication applications on real ad hoc networks was explored. The limitations of legacy peer-to-peer (P2P) systems on mobile ad hoc networks were highlighted, as well as the advantages of an innovative solution based on cross-layer optimisations.

The Mobileman project aimed to develop a communication network that is mobile and ad hoc — that is to say entirely made of users' devices. In such a network, users' devices are not only the 'clients', but also act as 'servers' and 'routers' in order to provide services.

By enhancing the distributed and self-organising nature of mobile ad hoc networks (MANETs), group communication applications represent a good incentive for users to adopt this technology. For example, users entering a shopping centre and running a distributed whiteboard application on their mobile device can get in touch with other people sharing common interests.

The use of a P2P overlay network can make the development of such group communication applications relatively straightforward. The Mobileman project partners with the Institute of Informatics and Telematics of the Italian National Research Council developed Crossroad, a P2P system suitable for MANETs, and compared it with traditional solutions.

Originally, group communication applications were developed for wired networks where the P2P substrate was a structured overlay network based on the Pastry distributed hash table. By design, they exploited a subject-based multicast protocol to build groups and disseminate data to the group members.

Crossroad presents exactly the same interface and functionalities to higher levels as provided by Pastry. However, unlike legacy P2P systems, it is able to support group communication applications by exploiting cross-layer interactions with the optimised link-state routing (OLSR) protocol.

More specifically, each network node running Crossroad sends advertisements of its presence in the overlay network through routing messages periodically sent by OLSR. This mechanism allows each network node to become aware of other peers in the overlay network. More importantly, it reduces the overhead required to build and maintain distributed hash tables in legacy systems, such as Pastry.

In a nutshell, the main idea behind Crossroad was to build a network and overlay planes by exploiting the routing traffic, rather than generating separate management traffic. Real-world experimental studies have shown that it is able to overcome many of the problems experienced by Pastry.

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

Collaboration sought: further research or development support.

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P2P comes to the aid of audiovisual search

Current methods of searching audiovisual content can be a hit-and-miss affair. Manually tagging online media content is time consuming, and costly. But new 'query by example' methods, built on peer-to-peer (P2P) architectures, could provide the way forward for such data-intensive content searches, say European researchers.

A team of researchers have turned to P2P technology, in which data is distributed and shared directly between computers, to power potent yet data-intensive audiovisual search technology. The technique, known as query by example, uses content, rather than text, to search for similar content, providing more accurate search results and reducing or even eliminating the need for pictures, videos and audio recordings to be laboriously annotated manually. However, effectively implementing content-based search on a large scale requires a fundamentally different approach to the text-based search technology running on the centralised systems of the likes of Google, Yahoo! and MSN.

'Because we're dealing with images, video and audio, content-based search is very data-intensive. Comparing two images is not a problem, but comparing hundreds of thousands of images is not practical using a centralised system,' says Yosi Mass, an expert on audiovisual search technology at IBM Research in Haifa, Israel. 'A P2P architecture offers a scalable solution by distributing the data across different peers in a network and ensuring there is no central point of failure.'

Currently, when you search for photos on Flickr or videos on YouTube, for example, the keywords you type are compared against the metadata tags that the person who uploaded the content manually added. By comparison, in a content-based search, you upload a picture or video (or part of it) and software automatically analyses and compares it against other content analysed previously.

Working in the EU-funded SAPIR project, Mass led a team of researchers in developing a powerful content-based search system implemented on the back of a P2P architecture. The software they developed automatically analyses a photo, video or audio recording, extracts certain features to identify it, and uses these unique descriptors to search for similar content stored across different peers, such as computers or databases, on a network.

'In the case of a photograph, five different features are used, such as the colour distribution, texture and the number of horizontal, vertical and diagonal edges that appear in it,' Mass explains.

In the case of videos, different frames are captured and analysed much like a photograph to build up a unique descriptor. Audio is converted into text using speech-to-text software, while music is analysed by its melody. The extracted features are represented in standard formats such as XML, MPEG7, MPEG21, MXF and PMETA, allowing complex queries from multiple media types.

Processing and data transmission demands are kept in check by ensuring that searches target specific groups of peers on the network. 'When someone initiates a search, the system will analyse their content and compare it to other content across specific peers rather than across the entire network. For example, if an image has a lot of red in it, the system will search the subset of peers that host a lot of images in which the dominant colour is red,' Mass notes. 'This helps ensure the search is faster and more accurate.'

In the network, each peer — be it a home user's personal computer or a media group database — can be both a consumer and producer of content. All push data for indexing by the P2P network and make it searchable.

To further enhance the search capabilities, the SAPIR team developed software that compares a newly uploaded image to similar images and then automatically tags it with keywords based on the most popular descriptions for the similar images in the database. This automated tagging technique, based on metadata generated by the 'wisdom of the crowd,' is being further researched by IBM and may find its way into commercial applications, Mass says. It could, for example, automatically and accurately tag photos uploaded to Flickr from a mobile phone, eliminating the need for users to battle a small screen and keypad in order to do so manually.

Mass sees additional applications in security and surveillance by incorporating face recognition and identification into the image and video analysis system, as well as, evidently, for media companies looking for a better way to organise and retrieve content from large audio, video and image collections.

'IBM and the other project partners are looking at a variety of uses for the technology,' Mass notes. Project partners Telefónica and Telenor are also looking to use the audiovisual search commercially.

One scenario envisaged by the SAPIR researchers is that of a tourist visiting a European city. They could, for example, take a photo of a historic monument with their mobile phone, upload it to the network and use it to search for similar content. The city's municipal authorities and local content providers, meanwhile, could also act as peers, providing search functionality and distributing content to visitors. Combined with GPS location data, user preferences and data from social networking applications, the SAPIR system could constitute the basis for an innovative, content-based tourist information platform.

Promoted through the ICT Results service.

http://cordis.europa.eu/ictresults/index.cfm?section=news&tpl=article&ID=91007

VoIP application for multi-hop ad hoc networks

A new voice application has been developed at the Helsinki University of Technology in Finland that takes advantage of a novel low-cost network paradigm.

The organisations involved in the Mobileman project sought to establish an alternative network in order to reduce the cost of providing services to its users. The users themselves would constitute the network infrastructure. Partial funding was provided by the EU.

Researchers at the Helsinki University of Technology (HUT) were in charge of designing a voice over internet protocol (VoIP) application compatible with the new network architecture. The solution was to divide the software into two separate modules.

To reduce the amount of resources required, the signalling module employs the session initiation protocol (SIP) to establish a connection between the two peers. Communication is further streamlined by restricting the transport protocol to the user datagram protocol (UDP) and using a single codec, the global system for mobile communications (GSM).

Once the session has been initiated, the data transport module handles the exchange of voice packets. The real-time transport protocol (RTP) was incorporated to facilitate the acquisition, encoding and transmission of audio packets. It should be noted that, where possible, publicly available source code was utilised.

In the course of the three-year project, the HUT engineers had the opportunity to test the VoIP application on an ad hoc network where it successfully completed up to three hops. Further to these encouraging results, the VoIP application has been copyrighted.

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

Collaboration sought: further research or development support.

http://cordis.europa.eu/marketplace > search > offers > 5167

A viable communication alternative for city taxis

An innovative ad hoc network has been proposed as an alternative dispatch system for city cabs in order to determine its innovative and economic potential.

Network infrastructure requires communication costs on behalf of the user. In an effort to alleviate this, the Mobileman project has developed a completely wireless ad hoc network which requires no infrastructure while at the same time increases society communication. The new paradigm was designed for a metropolitan area and the research spanned all layers of network hierarchy and involved the implementation, integration and validation of its architecture.

It was evident that traditional approaches were insufficient for testing the full potential of this new paradigm. In light of this, a new application was sought and identified. A good candidate was the city cab scenario in which ad hoc networks were proposed as a replacement for radio dispatch systems which taxi companies traditionally use.

A dispatch unit is one of the most important functions for a taxi company. This is because it relays information regarding picking up and assigning passengers accordingly as well as providing directions and weather and traffic conditions. Unlike radio dispatch systems, the Mobile ad hoc network would not require installation, operation and maintenance costs or a licence. It is therefore quite likely that the ad hoc system could provide a more economically and technically feasible means of communication for city cabs.

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

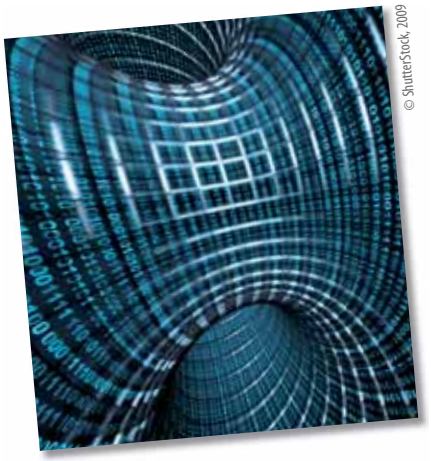
Collaboration sought: further research or development support.

http://cordis.europa.eu/marketplace > search > offers > 5179

Ad hoc network based on cross-layer architecture

A state-of-the-art facility for ad hoc networks in Italy received funding from the EU to assess the potential of cross-layer architectures.

The proliferation of powerful mobile devices has opened up new horizons for ad hoc networks, which seek to lower user costs without sacrificing their quality of service. Software engineers from six different institutes joined forces to design and test the 'Mobile metropolitan ad hoc network' (Mobileman). The lead organisation was the Institute of Informatics and Telematics (IIT) of the National Research Council in Italy.



The Mobileman trials involved two prototypes: the first built around traditional communication protocols, namely TCP/IP, while the second was based on an innovative cross-layer architecture. Existing hardware and software were complemented by new code written to facilitate vertical interactions in the network stack.

The project participants evaluated the relative performance characteristics of various routing protocols, such as optimised link state routing (OLSR) and ad hoc on-demand distance vector (AODV) routing. They also experimented with different middleware solutions, including Pastry and Crossroad.

During the project, the viability of the prototypes was demonstrated by successfully completing up to eight hops on an ad hoc network comprising just over 20 nodes. This inspired the IIT engineers and the other members of the Mobileman consortium to copyright the results.

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

Collaboration sought: further research or development support.

http://cordis.europa.eu/marketplace > search > offers > 5217

Trust Linux!

A team of researchers has implemented support for 'trusted computing' in a commercially available version of the open source operating system Linux, breaking new ground in the global drive toward more secure computing environments.

The latest release of openSUSE, a Linux version sponsored by software maker Novell, comes packaged with software that allows users to set up a trusted computing (TC) environment on their computer, enhancing security beyond the antivirus programs and firewalls that frequently prove inadequate at keeping bugs, viruses and spyware at bay.

Promoted and developed by major chipmakers and software companies in the international Trusted Computing Group, trusted computing uses both hardware and software to create a trusted and secure environment, whether on a home PC, a Web server, in a data centre or over a corporate network. At the core of the technology is the trusted platform module (TPM), which is a chip that, among other security-boosting features, generates and manages cryptographic keys, verifies the identity of the computer on a network and protects software and data from malicious changes.

Many new laptops and increasing numbers of desktop PCs and servers already have TPM chips as standard, while chipmakers such as Intel and AMD have started incorporating the technology directly into their latest generation of processors. However, most TPM chips are currently lying dormant, awaiting activation with the arrival of software that can make use of their enhanced security features.

'The hardware is there… what is needed are operating systems and software to exploit it,' says Herbert Petautschnig, a researcher at Austrian technology group Technikon. Technikon led a consortium of 23 research and business partners, including AMD, IBM, HP, Infineon and Novell, in developing open source software and applications for TC environments as part of the EU-funded OpenTC project. The group's implementation of TC support in openSUSE version 11.2 involved building a trusted software stack (TSS) for Linux, developing universal virtualisation layers (including improvements to the Xen hypervisor virtual machine monitor) and creating TC and TPM management software. It constitutes a pioneering implementation of TC technology.

'openSUSE is now the first operating system to offer full TC support,' Petautschnig notes. 'Until now, TC had been implemented for specific applications, such as Microsoft's BitLocker hard drive encryption in Windows Vista and Windows 7 or the fingerprint reader on some HP laptops… With the OpenTC platform we are extending the TC environment to the full operating system and beyond,' the project manager adds.

Unlike traditional security technology that operates only at the software level and only starts protecting a computer after it is loaded, TC technology provides security from the moment the power button is pressed. As the system boots and runs, the OpenTC platform continually monitors the computer for changes and ensures that only trusted, verified software is functioning. In a networked environment, it verifies the identity and integrity of the computer. And it allows different pieces of software and data to be 'compartmentalised' so there is no exchange between them even as they share the same computing and/or network resources.

OpenTC developed several proof-of-concept applications for the technology. In one, called private electronic transaction (PET), the team showed how it can verify and secure online transactions, such as accessing a bank account. In another, they showed how TC compartments can provide secure remote access to corporate networks, both keeping company information safe on an employee's home PC and ensuring that the employee's personal information, photos and games are not visible to their employer.

The ability of TC technology to keep data and processes safely isolated from each other can be extended to enable virtual data centres. As demonstrated by IBM in the OpenTC project, TC software could be used by data centre operators to provide virtualised resources to different clients while sharing the underlying physical infrastructure, thereby ensuring different companies' data remain separate and secure.

The logical next step, which members of the OpenTC consortium plan to explore in a new project, is to extend TC to cloud computing to enhance the security of services and computational resources provided over the internet. Another project, TECOM, a follow-up initiative to OpenTC that has also received EU funding, will aim to develop TC solutions for embedded platforms, focusing particularly on smart phones and mobile computing applications.

Several of the project partners are commercially exploiting the results of the OpenTC project internally. Petautschnig says they are also open to investor interest to support further development of TC technology. Consortium members are also active in standardisation efforts, helping to extend trusted computing to mobile platforms and the Java programming language, for example.

In the past, TC technology has stirred controversy, not least over its potential for abuse by software and hardware makers to restrict what computer users can do and its applications for digital rights management. However, Petautschnig believes the future for trusted computing systems is bright as the technology starts to be seen as an essential tool in the fight against an intensifying onslaught of hack attacks, viruses and spyware bombarding the world's computer users.

'Most people will not know that TC components are running on their computers keeping them safe. Conversely, at present most do not know what information is being leaked and stolen by spyware and viruses running on their machines,' Petautschnig notes.

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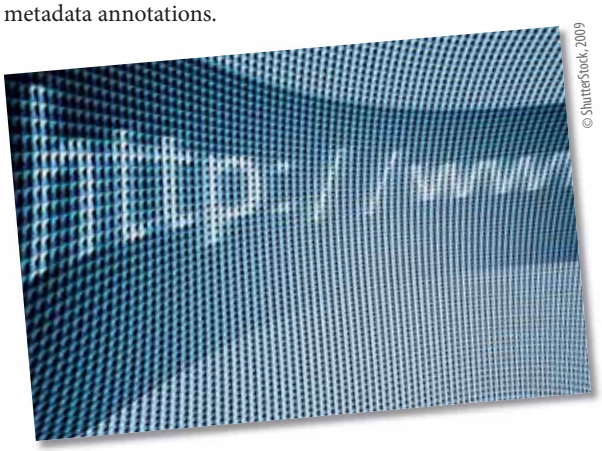
http://cordis.europa.eu/ictresults/index.cfm?section=news&tpl=article&ID=91011

Reasoning with description logics

The vision of the new generation of World Wide Web includes distributed content which can be shared among numerous users and processed by automated tools, such as search engines. To make sure that all have a common understanding of information found on the Web, the Wonderweb project has developed the infrastructure needed to describe it with precisely defined terms.

The current Web consists mainly of hand-written or machine-generated HTML pages primarily intended to be read and browsed. On the other hand, the ultimate aim of the so-called semantic Web is to make Web resources readily accessible to automated processes by adding information that describes their content. Ontologies will be used as a source of shared and precisely defined terms that can be used in such metadata annotations.



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The wide use of ontologies, along with their increased size and complexity has brought with it the need for efficient reasoning in description logics-based systems. Description logics (DL) provide a family of formalisms for representing data and knowledge concerning objects that may be grouped into classes and are interconnected with binary relationships. When a list of objects is provided as input, DL-based systems will verify if objects are consistent with each other and organise classes of objects.

FACT++ is a new DL reasoner designed by researchers at the University of Manchester to provide a platform for experimenting with new decision support algorithms. It employs a wide range of performance enhancing optimisations, including those introduced in the previous FACT system along with newly developed ones.

For example, a new 'to do' list is employed, instead of the usual top-down approach, to sort entries according to some order and to give access to the first element in the list. A tableaux-based reasoning algorithm — similar to those used to reason with OWL ontology language — can then repeatedly process the list entries until the list becomes empty.

FACT++ is released under a GNU public license and is made available for download from http://owl.man.ac.uk/factplusplus. A C++ language compiler will be needed to build FACT++ from the source code.

Through the DIG interface, a lightweight XML over HTTP-based protocol, ontologies can be fed into the reasoner and then queried. Queries can often take the form of simple questions about the structure of the ontologies built in the Web ontology language (OWL).

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

Collaboration sought: further research or development support.

http://cordis.europa.eu/marketplace > search > offers > 5170

Intelligent service convergence

Convergence of wireless communications networks with digital broadcasting systems is a vision for mobile services beyond the third generation (3G) investigated within the FLOWS project.

The worldwide convergence of broadcasting, telecommunications and internet has created many opportunities to provide new services to consumers by combining existing networks into a seamless entity. The research efforts of the FLOWS project to converge multiple wireless standards added up to an emerging vision for enhanced mobile services.

The main concept adopted by the FLOWS project was a common access network based on the internet protocol (IP). Onto this common network, a user with a single mobile terminal would be connected through access points based on the most suitable of available wireless standards, depending on the user's location and mobility.

This will not only provide access to enhanced voice services, but will also augment them with entertainment and information services. As a means to achieve flexible convergence of multiple wireless standards, the FLOWS project partners designed and demonstrated multiple input-multiple output (MIMO) antenna arrays to be used in the wireless terminals.

The number of antenna elements in a single terminal may range from two in a small handset, to four in a personal digital assistant (PDA), and up to 16 or even more in a laptop. However, spacing between antenna elements is conditioned by their mutual coupling, which ideally should be as low as possible to ensure the effectiveness of the MIMO antenna system.

Researchers at the University of York investigated issues related to the multi-element antenna configuration that affects the performance of MIMO signal processing system. In addition to the directional response of the antenna elements, the effect of mutual antenna coupling on the information capacity of a MIMO channel was simulated with the use of a finite scatterers model.

It was well known that mutual antenna coupling can be compensated for while the MIMO signal is being processed. Nonetheless, the FLOWS project partners elucidated any controversy that persisted regarding the possibility of mutual antenna coupling having a positive effect on the MIMO channel capacity. This was an essential step before new antenna configurations could be proposed for integration into multi-mode user terminals.

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

Collaboration sought: further research or development support.

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New software to simulate future financial crises


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Can economics better predict how banks will react to future credit crunches and their impact on the wider economy? Breakthrough simulation software by European researchers could hold the answers to this question and more.

How will economic policies adapt in 2020 when a quarter of the EU population is over 65 and natural resources are dwindling? Can economists better predict future banking crises or economic turmoil?

Produced by the EU-funded Eurace research project that came to a successful end in November 2009, the software applies simulation technology also used for computer generated images (CGI) in movies. The Eurace software platform runs on simulation technology called flexible large-scale agent modelling environment (FLAME).

The simulation software predicts the interaction between large populations of different economic actors, like households and companies, banks and borrowers or employers and jobseekers who trade and compete like real people.

By giving each simulated agent individual and realistic behaviour and interactions that show how markets will evolve, these massive-scale simulations can better test new policies tackling future societal challenges.

'This first class European research can help us make the move from the economics of pen and paper to the economics of supercomputers,' said Viviane Reding, EU Commissioner for Information Society and Media.

'The results of this research project will complement traditional economic statistics and assumptions about how economic actors react by enabling better testing of a policy's effects on people while still on the drawing board. I expect government researchers and national research institutes will act quickly to put this tool at the disposal of decision-makers as soon as possible,' noted the Commissioner.

This simulation technology uses computer-based experiments to focus on the relationship between large populations of different economic actors across many interconnected markets. It is the first time this sort of technology is applied on such a big scale using high-powered computing.

Each simulated household (or business, or bank) will make different decisions in reaction to various monetary, fiscal or pro-innovation policies including, for example, whether to remain in a job or seek a new one, how much of a wage is saved, spent or invested. This means that the impact of one policy in one market at one point in time is no longer assessed in isolation from other factors.

Traditional economics failed to predict the scale of the knock-on effect of the credit crunch on the world economy. The new software shows how banks react in different ways by looking at a wide range of factors like how much reserves they must keep compared to investments, their savers' consumption/investment and saving patterns, and psychological factors like confidence in the market. It can then give policy-makers — who want to know how fiscal and monetary reforms will affect banks and customers — a better warning of the scale of a financial crisis' impact on the real economy. The software can also simulate the same scenario with an older demographic to help plan for an older Europe, or with limited energy supplies.

Designed to run on supercomputers that allow simulation to be carried out on a massive scale but accessible to any connected desktop PC, the software can be used by economists and policy-makers with no knowledge of computer programming. By connecting hundreds of thousands of small simulated actions and reactions across the economy, the software can give policy-makers better and bigger pictures of their policy impact on people's life and work.

The three-year project was carried out by economists and computer scientists from eight universities (in France, Germany, Italy, Turkey and the United Kingdom), brought together by the EU and financed from the European Commission's technology research budget.

The EUR 2.5 million project which started in 2006 was cofunded with EUR 2.1 million under FP6. It was part of the European Commission's initiative to boost high-risk research in future and emerging information technologies.

The Commission recently called on EU Member States to increase high-risk research investment to catch up with China, Japan and the United States. The Commission will lead by example, boosting the current EUR 100 million annual funding by 70 % in 2013.

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Adaptive negotiations with Gorgias' style of argumentation


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Innovative research into the use of formal logic for communication between computing entities has provided a solid scientific foundation for the design of global computing systems.

Central control of all the computing entities composing contemporary software applications, particularly those involving the internet, is not always possible or at times, not practical. With this in mind, a new technology vision was pursued by the SOCS project whereby entities would be capable of interacting without all the information about their dynamically changing environment.

In trying to achieve this vision for a global computing environment, the concept of autonomous agents was employed as a useful abstraction for describing computing entities. Agents are autonomous in the sense that their activities are not centrally controlled. Larger structures composed of multiple agents would be characterised by 'social rules' governing their operation in the presence of each other.

Project partners at the University of Cyprus were charged with the task of developing a framework to support agents in making decisions under a given preference policy. In general, preference policies have a dynamic nature and are influenced by the particular state of the environment in which the agent finds himself. The agent needs to be able to compare different alternatives and arrive at a conclusion that reflects the new input from the current environment.

The proposed argumentation framework helps to capture the agent's social dimension and how this can vary depending on the external environment. In addition, Gorgias, named after the famous Sicilian rhetorician, encompasses the relative roles of agents. The role of each agent is expressed directly by means of priority rules, which themselves form arguments to be used in the decision-making process. This allows for a higher degree of flexibility in agents' argumentative reasoning on their preferences.

Moreover, Gorgias effectively deals with the incompleteness of agents' knowledge of the external environment and illustrates how an agent's self-deliberation can affect its interaction with other agents. Researchers at the University of Cyprus are currently studying how to combine the proposed argumentation framework with work from cognitive psychology and through this, define different agent personalities.

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

Collaboration sought: information exchange/training.

http://cordis.europa.eu/marketplace > search > offers > 5120

Monitoring concepts from document collections

European researchers developed a novel framework for managing and analysing both conventional and Web-based content. This was achieved using existing methods of information extraction, data mining and Web mining.

Effective knowledge management is now more crucial than ever to an organisation's success in the highly competitive world of business. Nowadays, companies must be able to deal with structured and unstructured information from a wide range of sources across both internal and external sites.


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The Parmenides project has come to the aid of the European business community by developing a unified framework which can support organisational knowledge management. Researchers created a systematic ontology-driven approach, which successfully integrated the entire procedure of information gathering, processing and analysis.

The project team employed the Parmenides concept monitor module to examine the usage of application-specific concepts from a documents collection. This was carried out as the collection was amassed and altered over time. The module initially received a series of concepts collated by the Relfin-learner text mining suite from an appropriate document collection. The concepts used represented document fragments, which matched topics found within individual documents, rather than characterising the whole collection.

The second set of input data involved a growing collection of documents, divided up into intervals of time. This information highlighted the popularity of different topics contained within and the level of correlation between them. The concept monitor included a range of criteria for identifying change together with an alert mechanism. The module also contained an application programming interface (API) with the Relfin-learner for reading input concepts.

The system developed by the Parmenides project allows knowledge workers to extract valuable information from both Web-based and conventional sources. This can help in the development of online business intelligence for the life science sector. Extracted data and reports can also be studied for possible trends that can be utilised by the consumer food industry.

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

Collaboration sought: further research or development support.

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Software development: speeding from sketchpad to smooth code

Creating error-free software remains time consuming and labour intensive. A major European research effort has developed a system that speeds software development from the drawing board to high-quality, platform-independent code.

According to Piotr Habela, technical coordinator of the 'Visualize all model driven programming' (VIDE) project, software developers have many good ideas about how to visualise, develop, debug and modify software, plus standards to guide them. The problem is that the design and development process has always been fragmented.

He explains that methods for visualising or flowcharting how a program should work do not lead directly to computer code. Software written in one programming language may be difficult to translate into another. No matter how carefully programmers work, complex software almost always includes errors that are difficult to diagnose and fix. Because of the lack of precise links between a program's features and the software that implements them, updating or modifying a program often turns out to be time-consuming and costly.

'What we attempted that was quite distinct,' says Habela, 'was to make the development of executable software a single process, a single toolchain, rather than a sequence of separate activities.'

It took two and a half years of intensive effort by VIDE's ten academic and industrial research partners, funded by the EU, but the result is a software design and development toolkit that promises to make creating well-functioning, easily-modified software — for example for small businesses — significantly smoother, faster, and less expensive.

A key part of VIDE's approach was to build on the idea of model driven architecture, a programming methodology developed by an international consortium, the Object Management Group.

The idea is that each stage of software development requires its own formal model. The VIDE team realised that by creating and linking those models in a rigorous way, they could automate many of the steps of software development.

A software developer might start by working with a domain expert — for example a business owner — to determine what a new program needs to do. Those inputs, outputs and procedures would be formalised in what is called a computation independent model (CIM), a model that does not specify what kinds of computation might be used to carry it out — it lays out what the program will do rather than how it will do it.

'Models are usually considered just documents,' says Habela. 'Our goal was to make the models serve as production tools.' In the case of VIDE, much of that modeling is visual, in the form of flowcharts and other diagrams that are intuitive enough for the domain expert to understand, but which are sufficiently formalised to serve as the inputs to the next stage of the software development process.

To carry out these first modeling steps, the researchers created a domain analysis tool and a programming language called VIDE CIM level language (VCLL). Once they have produced a formal CIM of the program they want to implement, it's time to move a step closer to a functioning program by translating it into a platform-independent model, or PIM.

For the VIDE team, a PIM is a model that specifies precisely what a program needs to do, but at an abstract level that does not depend on any particular programming language. The researchers developed several software tools to produce a usable, error-free PIM. These include an executable modelling language and environment, a defect-detection tool, and finally a program that translates their final model into an executable Java program.

Luckily, the researchers did not have to build their system from the ground up. They were able to rely to a large extent on a pre-existing modelling language called unified modeling language (UML). UML provides a systematic way to visualise and describe a software system.

'We now have a kind of prototyping capability built into the development process,' says Habela. 'You can design a model, specify its behavioural details, run it with sample data to see how it behaves, and then check with the domain expert to see if it is in fact the behaviour they expected.'

Several of the consortium members are implementing the VIDE toolkit in specific areas, for example Web services, database management, and a variety of business processes. Habela cautions that reaching VIDE's goal of smoothly automating the entire software design and development process requires more work. Because of the broad scope of the project and the fundamental changes they are making, they are not yet ready to deploy the complete system.

However, he says, they have gone a long way towards clearing up 'the muddy path from requirements to design.'

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Novel, efficient and compact package of laser diodes

A novel concept for the monolithic integration of an optical isolator with the laser source of optical telecommunications links has been demonstrated within the framework of the Isolaser project.

In optical telecommunications links, electronic data signals are converted into light signals which are emitted through optical isolators into an optical fibre. These non-reciprocal optical devices stabilise and protect laser diodes and semiconductor optical amplifiers by allowing light to pass in one direction, but not in the opposite direction.

Current commercial isolators are bulk components requiring collimating lenses and expensive alignment techniques when included in a laser diode package. Developing a planar waveguide-based optical isolator — in the form of a chip — was therefore a long-sought goal in photonics.

Until recently, all research in this domain concentrated on designing an isolator with waveguide structures of ferromagnetic garnets to induce non-reciprocity. The integration with semiconductor host material, however, remained an issue, as it was possible only by direct wafer bonding without significant cost reduction.

The Isolaser project partners explored a different research approach. This was based on the requirement that for monolithic integration the isolator structure should be very similar to that of the laser it was to be integrated with. More specifically, in a standard semiconductor optical amplifier an adequately magnetised ferromagnetic metal was placed very close to the guiding region.

The result was a component which, being transparent or amplifying in only one direction, was isolating. Moreover, it could be monolithically integrated with other active photonic devices. Such a device would greatly reduce the manufacturing costs of laser diode packages by reducing the number of stand-alone optical components needed. Moreover, the need to accurately align the laser beam when using an external isolator in the package would be eliminated.

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

Collaboration sought: information exchange/training.

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Facilitating human-machine interaction

Since the introduction of machines, including robots, to the human environment, a great deal of attention has been focused on how humans and machines interact. Looking to improve upon the current state of the art in this field, the EU funded a pioneering RTD project entitled Pelote.

Robotics experts with the Helsinki University of Technology (HUT) in Finland, a Pelote participant, investigated ways to extend human presence in systems composed of both humans and robots. The ambitious scope of the research called for moving beyond basic teleoperation and virtual reality applications to complex systems involving multiple entities.

One of the keys to successfully managing such a system was to adopt an exocentric frame of reference. This approach allows the human user to simply coordinate the actions of semi-autonomous entities rather than having to manually operate each individual entity. Incoming system data is received, processed and prioritised so that the most urgent issues get resolved first.

The HUT researchers formulated the concept of common presence, a model adapted specifically to controlling multiple hybrid telematic entities. All entities are treated equally and have the ability to modify the common environment in which they all reside and communicate. This inherent flexibility ensures that the common presence is suitable for a wide range of applications.

Together with its Pelote partners, HUT has communicated the project results to the research community through a number of international scientific conferences.

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

Collaboration sought: further research or development support.

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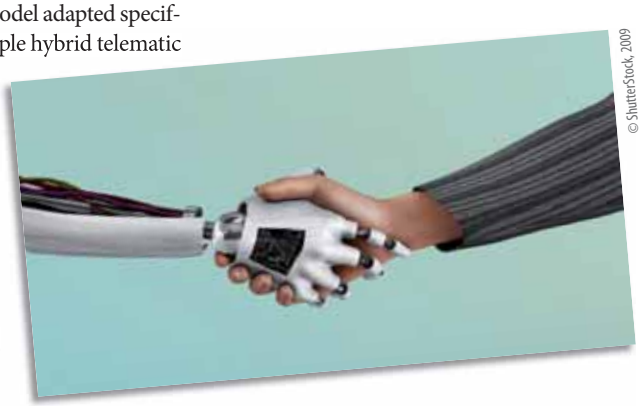

Human-robot collaboration

A novel method for the autonomous, cooperative and coordinated collaboration of humans and robots towards a shared task via teleoperation has been developed at the global level.

Integrating the capabilities of humans with those of semi-autonomous robots can bring cooperative levels to new heights. This is because one entity can pick up where the other leaves off, creating a complementary exchange of activity in order to accomplish a specific task.

This was the aim of the Pelote project: to create a breakthrough unifying means for global integration between humans and robots. The research and development efforts brought forth a telematic application at the remote end which can recover telepresence through autonomous navigation. Furthermore knowledge is able to be reused via a common reference model and the concepts can be applied in a telepresence task along with practical experiment.

Actual applications for these concepts may include rescue missions in large public buildings such as skyscrapers which have a very complex internal structure. Additional applications may include a search and rescue mission in a mine as well as repair tasks in a factory production line.

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

Collaboration sought: further research or development support.

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Ultra-wideband radio rides a beam of light

Multiple high-definition videos and other data-rich services may soon stream through homes, offices, ships and planes via new hybrid optical/ultra-wideband-radio systems developed by European researchers.


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Moshe Ran, coordinator of the EU-funded project, 'Photonic components for ultra-wideband radio over optical fiber' (UROOF), has a vision. He wants to see streams of high-definition video and other high-bandwidth services flowing through homes, office buildings, and even ships and planes, through a happy marriage of optical and ultra-wideband (UWB) radio technologies. 'It's a natural combination that can bring a lot of advantages to the world,' says Ran.

The wireless signals that feed your Bluetooth earbud or let you surf the Web from the corner coffee shop fade into the electronic background after 10 m or so. Starting in mid-2006, UROOF researchers set out to find an inexpensive way to stretch that range to hundreds or thousands of metres.

The researchers envisioned a hybrid system, in which UWB radio signals could be transformed into light beams, relayed over long distances via inexpensive optical fibres, and then transformed back to radio again.

'You can't extend the range over the air,' says Ran. 'So if you want to overcome the limitations of the short range, using optical fibre is a very elegant way of doing it.' The UROOF researchers decided to focus on UWB signals because they can carry a lot of data — some 480 megabits per second, or 20 times faster than DSL.

UROOF technology has the potential to increase broadband capacity by two or three orders of magnitude while at the same time addressing health and safety concerns by reducing signal intensity by a comparable amount.

The first device the UROOF team set out to build was an access node that would efficiently transform UWB to optical, and optical to UWB. After trying a variety of approaches, the team homed in on silicon-germanium (SiGe) phototransistors, which currently can process 10 GHz signals, and have the potential to handle much higher bandwidths.

They coupled the SiGe phototransistors to new low-cost, off-the-shelf, vertical-cavity surface-emitting lasers (VCSELs). A VCSEL is a type of diode that emits a laser beam perpendicular to its top surface.

'Right now we are using a state-of-the-art VCSEL that was not available at the start of the project,' says Ran. 'We're using it to show that this technology is viable and available.'

The researchers found that the strength of a UWB signal changes markedly as a user moves toward or away from an antenna. As a result, they had to develop gain-control circuitry to stabilise the input signal.

They have now demonstrated an integrated transceiver, dubbed Access Node 1, at several international forums, most recently at the 'International conference on ultra-wideband', which met in Hanover, Germany, in September 2009.


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'We showed that with Access Node 1 we can transmit three streams of 480 megabits per second on the same fibre with negligible distortion,' says Ran. 'That's enough to transmit at least three streams of compressed high-definition television.'

Access Node 1 costs less than its developers expected — under USD 100 (around EUR 74) per unit. The UROOF team has also fabricated an even faster transceiver, not surprisingly called Access Node 2, which uses a different device, called an electroabsorbtion transceiver (EAT) in which an optical signal is directly modulated by a radio signal.

The UROOF EAT system starts with a central laser that generates an unmodulated optical signal and sends it through a single optical fibre to remote units. In its downlink mode, the central unit receives a UWB radio signal, modulates the optical carrier, and beams it to the remote units. In the uplink mode, a remote EAT modulates the optical signal and sends it back to the central station.

The EAT based Access Node 2 has the potential to carry far more information than Access Node 1, but there is a catch. 'With EAT you can approach 60 GHz,' says Ran, 'but it is expensive.' The UROOF team is actively working to increase the bandwidth of Access Node 2 and reduce its cost.

Ran is encouraged by the progress UROOF has made. They have shown that UWB signals can be beamed over hundreds of metres using inexpensive optical technology, with greater bandwidth and longer distances in sight.

'As UWB technology penetrates the mass market — within the next two years — it will be possible to manufacture an access node that will meet the demand very nicely,' says Ran.

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Video fingerprinting offers search solution

The explosive growth of video on the internet calls for new ways of sorting and searching audiovisual content. A team of European researchers has developed a groundbreaking solution that is finding commercial applications.

Most video search technologies currently rely on semantic annotation in which videos have to be manually tagged with keywords so they can be found via a text-based search. As most YouTube users will attest, tagging one or two videos in this way is not particularly problematic. However, manually annotating thousands of clips, as content providers and media libraries regularly do, can be extremely time consuming and costly.

A faster alternative is to use software to automatically extract snippets of a video and create a unique identifier based on a variety of audiovisual features, such as scene, motion and music changes. These so-called digital media fingerprints can then be used to index and search full audio/video content. The technology works well for uncompressed, raw audio and video, but it has not been used effectively with the far more common, space-saving compressed files that stream from websites, are stored in media libraries or are broadcast by TV stations. Until now, that is.

'We wanted to develop a way of indexing and searching compressed video files quickly and easily regardless of their compression format or how or where they are stored,' says Nick Achilleopoulos who oversaw development of the technology as manager of the EU-funded DIVAS project.

To achieve that goal, the DIVAS researchers developed two advanced software engines: one to create fingerprints from compressed audio and/or video and another to use these unique identifiers to carry out content-based searches of audiovisual material.

Unlike most digital fingerprinting systems, the DIVAS indexing software does not require video to be uncompressed, reducing the need for computer processing power and storage space, while greatly accelerating the indexing process. For example, whereas other systems would have to generate a fingerprint from 60 gigabytes of raw video, the DIVAS technology can create a fingerprint from the 4 GB DVD-quality compressed version. Crucially, it works across most popular video formats, from the DVD and TV broadcast MPEG standard to Microsoft's WMV and also with standalone audio files in formats such as MP3 and AAC.

'The fingerprint extraction software defines audio and video features much as a human viewer perceives audiovisual elements... It builds the fingerprint based on visual features, such as scene changes, the way the camera cuts and moves, the brightness level, and the movement of people and objects,' the project manager explains.

Audio features such as speech and music also form part of the fingerprint — providing crucial additional information to differentiate between visually similar video content like lectures or music concerts.

The audiovisual fingerprints, each just a tiny fraction of the size of original content, are stored in the XML file format in combination with the MPEG 7 multimedia content description standard, creating an easily accessible and rapidly searchable video index.

'Say you saw a short clip of a TV series and wanted to see more of it but did not know the name. You could easily upload the clip to a DIVAS search engine and then use this to find not only the series, but also the season, episode and the exact minute of a scene the clip is from,' Achilleopoulos explains.

One caveat, however, is that the searcher would have to have an indexed database of video content to compare the fingerprinted clip to. That would prove useful to someone with a lot of digital movies to help them find videos in their collection from trailers on the internet — indeed, the DIVAS team developed an experimental plug-in for the Firefox Web browser to that effect.

However, the key commercial market for the technology consists of media companies and internet search providers seeking faster methods of indexing and searching video, production companies scouring the internet for pirated versions of copyrighted works, as well as, interestingly, TV advertisers.

'A lot of companies are interested in monitoring broadcasts to make sure TV stations are airing their adverts in the time slots and with the frequency they pay for. Currently, they do this by recording broadcasts on expensive equipment and even have people watch the TV, but a much cheaper alternative would be to record compressed files and have software automatically creating fingerprints of the content. These could then be matched with the advertiser's content, letting them know precisely when and how often their adverts are shown,' Achilleopoulos says.

Members of the DIVAS consortium are currently in talks with a large advertising firm with a view to deploying the technology commercially to monitor TV broadcasts. They have also been approached by companies looking to use their technology to improve internet searches of their video databases.

Israeli project partner Optibase, meanwhile, has integrated the DIVAS technology into its EZTV internet video delivery system for corporate, government and educational users in local and wide area network environments.

Achilleopoulos notes that the partners are looking for investors to help develop or support additional commercial applications for the DIVAS technology, which, as a modular system, is easy to integrate with existing systems and can be expanded to offer additional functionality.

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Adhesive bonding — the future of shipbuilding in Europe

Proven methods for assessing the performance of adhesive bonds developed during the Bondship project will be of significant value to naval architects and other members of the shipbuilding industry.

Considerable savings in weight can be achieved through the use of lightweight materials in ship construction. This reduces fuel consumption which generates both economic and environmental benefits. However, the reliability of lightweight models has been called into question, particularly the sections where different components are joined to one another.

Looking to support the European shipbuilding industry, the EU funded an extensive investigation into the potential of adhesive bonding. Engineers with the University of Southampton in the United Kingdom participated in the research project, which was entitled Bondship. Their focus was numerical modelling.

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Hot spots were identified with a superstructure model that calculated load levels based on the worst-case scenario. With respect to modelling the response of the adhesive itself, the multi-linear option of the ANSYS finite element modelling software package provided the best agreement between experimental and modelled results.

The University of Southampton engineers also evaluated a number of different methods for predicting stress levels within the adhesive. They discovered that finite element techniques were more accurate, though more cumbersome, than their analytical counterparts.

Finally, the behaviour of structures that had developed cracks was studied in detail. For instance, the relationship between load and crack size was examined both in the laboratory and via simulations. The preliminary results indicate that the actual energy required to induce a fracture was greater than that expected based on the modelling results, though further testing has been recommended.

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

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Ensuring the long-term performance of bonded joints

Most designers, builders and owners of ships are not aware of the possibilities that adhesive bonding offers, or the limitations encountered when used for joining lightweight materials. The Bondship project aimed to show how to safely introduce bonded joints in critical areas as service experience is gained and confidence in their long term performance is built up.

Structural adhesives are currently used in a number of offshore applications with significant advantages, including minimisation of galvanic corrosion induced by electrical isolation between dissimilar materials. In addition, the use of adhesives may lead to design improvements that can reduce the overall weight of passenger ships and high-speed crafts, as well as the manufacturing costs.

For the application of adhesives to adjoining workpieces to provide a long-lasting bond however, sound know-how in joint design is required. The careful selection of adhesive materials is an issue of central importance and an adequate surface preparation has to be guaranteed. In light of this, a benchmark study on numerical methods for the design of bonded joints for ship structures was conducted by the Bondship project with the Fraunhofer-Gesellschaft.

Finite element methods were found to provide versatile tools for the investigation of the behaviour of bonded joints under different operational loadings. For the design of large structures, modelling a substitute system of spring elements which are subjected to loads along an axial direction is necessary. On the other hand, non-linear finite element methods and hyperelastic material models should be used for a detailed analysis and optimisation of the joint geometry.

Advances were made in modelling the response of bonded joints with not only rigid, but also flexible adhesives and the structures with such joints. Guidance and examples of how to design, produce, inspect and repair joints bonded with adhesives have been made available to the public through the Bondship project guidelines. This document describes a general framework for the safe use of adhesive bonding in shipbuilding.

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

Collaboration sought: information exchange/training.

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Manufacturing reinvented

European researchers have created the architecture, hardware and software that will enable super-agile distributed corporations capable of reconfiguring themselves on the fly. It promises to make 'made to order' a reality for consumers.


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European researchers have created hardware and software that will enable companies to fundamentally revolutionise the way they manage and run their organisation, moving manufacturing from hierarchical divisions to an increasingly distributed collection of resources and production units.

It will ultimately mean that customers, whether other businesses or consumers, can choose the exact product they want, tailored to their precise requirements. It will mean that orders can be changed up to the moment before they are manufactured and it will mean production lines can adapt to changes in fashion or design, almost instantly.

More than made to order, this is bespoke or custom manufacturing for mass markets, a seeming paradox that is resolved by the agility and adaptability of a new business architecture designed by the European project, 'Pabadis promise'.

It is no longer about what is obvious, but what is possible, and the concept goes way beyond specifying five types of upholstery, one for each seat in you car, for instance. It could even completely reinvent product engineering. Currently, designers choose the type of product they want, design it, and then adapt the production line to the product.

But in a 'Pabadis promise'-enabled enterprise, engineers could reverse that concept by looking at the resources and production facilities they have and figuring out what different types of product those machines can make.

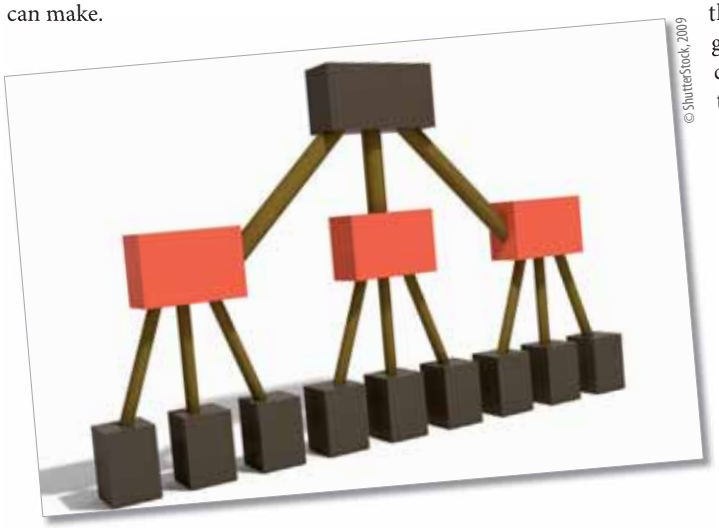
When a company is so flexible that it can reconfigure its production on the fly, it does not matter what it makes as long as it is profitable. 'Obviously, there are limits,' explains Arndt Lüder. 'You are not going to get pasta out of a steel mill.'

And thanks to a combination of simulation software and hardware that the company will be able to develop, production line engineers can test new production configurations to discover which are the most effective, confident that the results are a reliable reflection of the real world.

The EU-funded 'Pabadis promise' is a follow-up project to Pabadis, which conceived the fundamental concept of a highly agile management and production structure. The current project sought to realise the promise of Pabadis, which stands for 'Product-oriented manufacturing systems and reconfigurable enterprises'.

The system has the backing of some of the biggest names in business management and production engineering, world-leading companies like SAP, who produce enterprise resource planning (ERP) software, and Siemens.

It boils down to a combination of software and hardware, to create P2 systems, where P2 is shorthand for the name of the project. Hardware consists primarily of a smart RFID tag, dubbed radio frequency information technology (RFIT). A tiny computer, the RFIT is programmable and it can execute routines locally.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The RFIT can adapt to changing circumstances via interaction with agents — autonomous software routines that can carry out specific functions. Most tasks require several cooperating agents, and it is this capacity to cooperate that makes the system so flexible.

These agents interact with an advanced ERP system, which requires detailed process and product description languages, using semantic technologies based on business and manufacturing ontologies. In a semantic system, ontologies are dictionaries of terms that machines can 'understand', offering the context and how it relates to other elements in the overall system.

The RFIT uses machine-interpretable descriptions of data, services, and processes enabling it to interact autonomously and perform critical functions. Allied to this, the team developed a special simulation that combines real machines with a digital simulation of a given production line. 'This has proven to be a very reliable way of testing how a production line will perform in the real world,' explains Lüder. 'It is a useful result in its own right.'

The team has shown that the technology works and performs as intended, though it will be five years before a full-blown system makes its appearance. In the meantime, companies and academic peers are very interested in the project's work and results, and already a limited version of the technology is working at the Fiat Mirafiori plant in Turin, Italy.

Defi Systems, the partner responsible for the RFIT unit, is already commercialising the technology, and is currently working on its third version, which will be the size of a USB memory stick. SAP is currently introducing part of the project's results into the next version of its world-class ERP system.

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Understanding the origins of polymer processing instabilities

The optimisation of polymer forming processes and the development of new polymer blends are limited by the occurrence of melt instabilities. A series of experiments conducted during the 3PI project will help elucidate the industrial processes in sufficient detail to predict the final product properties.

Polymers have come to play an essential and ubiquitous role in everyday life. One probably cannot imagine a modern society without them, which is quite remarkable considering that they have only been around for a few decades. Nonetheless, irregularities or defects that frequently appear on the surface of the polymer products as a result of melt instabilities render them commercially unacceptable.

At the high rates polymers are processed, instabilities in the extrusion of molten polymers manifest themselves in the form of either small periodic or severe irregular distortions. To increase the production output, melt instabilities must be eliminated or forestalled to higher processing rates. This was precisely the aim of the research project 3PI funded under FP5.

The 3PI project partners conducted a most elaborate and extensive series of experiments using custom-fabricated extruders and different die geometries. Results from various laboratories were then brought together to establish links between the occurrence of melt flow instabilities, processing conditions and the rheological characteristics of the tested polymeric materials.

For example, to characterise elastic surface instabilities, stress distortions within the polymer melt were monitored during extrusion using flow-induced birefringence techniques. The collected data on stress concentrations were used to develop a processing map demonstrating how modifying the flow properties of a polymeric fluid near the die slot can suppress sharkskin texture.

On the other hand, laser-doppler velocimetry (LDV) was used to compile the velocity profile of complex polymer fluids submitted to a shear flow. At shear rates above the sharkskin instability regime, pressure and velocity fluctuations resulted in extrudates characterised by alternating rough and relatively smooth regions. The periodic transitions between weak and strong slip of the capillary wall was considered to be at the origins of this so appropriately named stick-slip instability.

The 3PI project partners hope that these experimental results on failure mechanisms will be progressively translated into advanced numerical models for use in the optimisation of polymer processing conditions.

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

Collaboration sought: information exchange/training.

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Advancing ceramics with low pressure injection moulding

Traditional methods for shaping engineering ceramics entail the deformation of powder slurries containing hazardous organic liquids as suspending media. Aqueous injection moulding has provided the Aquimcer project partners with an environmentally friendly technology that strongly reduces the binder requirements.

Today, injection moulding employing powdered materials is primarily used for the manufacture of complex components for industrial use. However, the fields of application for moulded parts made from non-clay ceramic powder have been progressively extended from within the automotive industry and precision engineering to the porcelain industry.

When utilised with non-clay ceramic materials, low-pressure injection moulding typically involves the successive mixing, evaporation and thermal decomposition of the powder mixture containing small amounts of gelling additives. These non-contaminant additives that can form a consistent gel by cooling the warm ceramic suspension are similar to those used in the food industry.

During the Aquimcer project, significant advances have been made in the preparation of stable aqueous suspensions of non-clay ceramic powders with an unprecedented high content of solid particles. More specifically, the solid loading of aqueous suspensions of aluminium oxide (Al_2O_3) powders was increased to 96 Wt.%.

On the other hand, the use of fine Al_2O_3 powders with particle size of less than a micrometre (µm) reduced wear of mixing and injection equipment during processing of powdered materials. Research conducted by project partner Ceramica Industriale F.E.R. in Italy demonstrated conclusively the potential of aqueous suspensions of colloidal Al_2O_3 to evaporate rapidly, while leaving behind minimal amounts of carbonaceous residues.

Adhesion between the binder additive and powder particles was as high as possible so that centrifugal forces arising during the injection process did not give rise to the separation of the two components. In turn, the low viscosity of these suspensions helped reduce the number and size of defects as well as shape distortion during sintering.

The good injection moulding characteristics and the isotropic sintering achieved for alumina ceramics make this attractive shaping technology highly applicable to non-oxide ceramic powders, such as silicon nitride (Si_3N_4).

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

Collaboration sought: further research or development support.

http://cordis.europa.eu/marketplace > search > offers > 5153

Predictive powers: a robot that reads your intention?

European researchers in robotics, psychology and cognitive sciences have developed a robot that can predict the intentions of its human partner. This ability to anticipate (or question) actions could make human-robot interactions more natural.

The walking, talking, thinking robots of science fiction are far removed from the automated machines of today. Even today's most intelligent robots are little more than slaves — programmed to do our bidding.

Many research groups are trying to build robots that could be less like workers and more like companions. But to play this role, they must be able to interact with people in natural ways, and play a proactive part in joint tasks and decision-making. We need robots that can ask questions, discuss and explore possibilities, assess their companion's ideas and anticipate what their partners might do next.

The EU-funded JAST project brings a multidisciplinary team together to do just this. The project explores ways by which a robot can anticipate/predict the actions and intentions of a human partner as they work collaboratively on a task.

You cannot make human-robot interaction more natural unless you understand what 'natural' actually means. But few studies have investigated the cognitive mechanisms that are the basis of joint activity (i.e. where two people are working together to achieve a common goal).

A major element of the JAST project, therefore, was to conduct studies of human-human collaboration. These experiments and observations could feed into the development of more natural robotic behaviour.

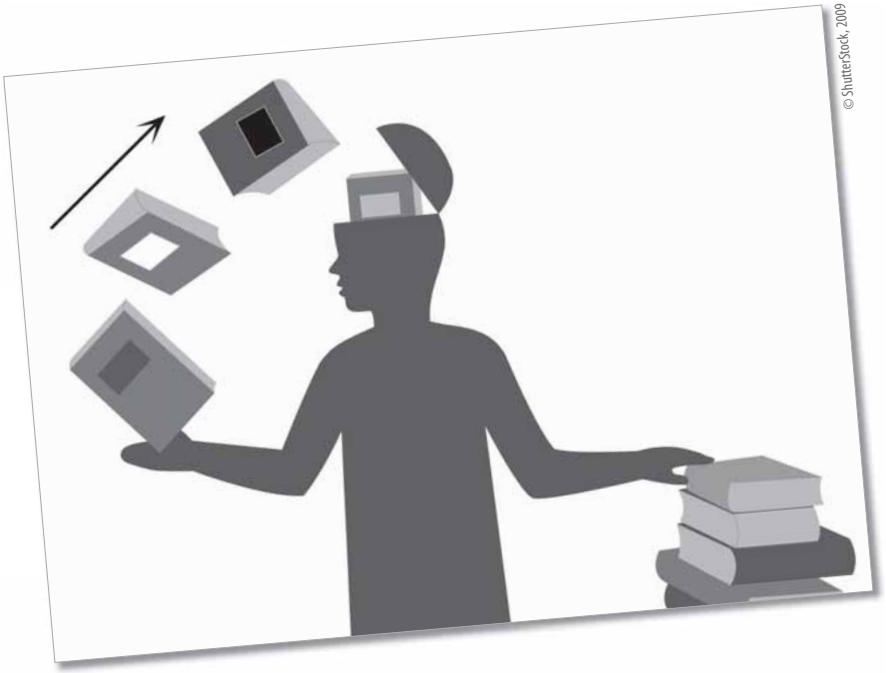
The researchers participating in JAST are at the forefront of their discipline and have made some significant discoveries about the cognitive processes involved in joint action and decision-making. Most importantly, they scrutinised the ways in which observation plays an important part in joint activity.

Scientists have already shown that a set of 'mirror neurons' are activated when people observe an activity. These neurons resonate as if they were mimicking the activity; the brain learns about an activity by effectively copying what is going on. In the JAST project, a similar resonance was discovered during joint tasks: people observe their partners and the brain copies their action to try and make sense of it.

In other words, the brain processes the observed actions (and errors, it turns out) as if it is doing them itself. The brain mirrors what the other person is doing either for motor-simulation purposes or to select the most adequate complementary action.

The JAST robotics partners have built a system that incorporates this capacity for observation and mirroring (resonance).

'In our experiments the robot is not observing to learn a task,' explains Wolfram Erlhagen from the University of Minho and one of the project consortium's research partners. 'The JAST robots already know the task, but they observe behaviour, map it against the task, and quickly learn to anticipate [partner actions] or spot errors when the partner does not follow the correct or expected procedure.'



The robot was tested in a variety of settings. In one scenario, the robot was the 'teacher' — guiding and collaborating with human partners to build a complicated model toy. In another test the robot and the human were on equal terms. 'Our tests were to see whether the human and robot could coordinate their work,' Erlhagen continues. 'Would the robot know what to do next without being told?'

By observing how its human partner grasped a tool or model part, for example, the robot was able to predict how its partner intended to use it. Clues like these helped the robot to anticipate what its partner might need next. 'Anticipation permits fluid interaction,' says Erlhagen. 'The robot does not have to see the outcome of the action before it is able to select the next item.'

The robots were also programmed to deal with suspected errors and seek clarification when their partners' intentions were ambiguous. For example, if one piece could be used to build three different structures, the robot had to ask which object its partner had in mind.

But how is the JAST system different from other experimental robots? 'Our robot has a neural architecture that mimics the resonance processing that our human studies showed take place during joint actions,' says Erlhagen. 'The link between the human psychology, experimentation and the robotics is very close. Joint action has not been addressed by other robotics projects, which may have developed ways to predict motor movements, but not decisions or intentions. JAST deals with prediction at a much higher cognitive level.'

Before robots like this one can be let loose around humans, however, they will have to learn some manners. Humans know how to behave according to the context they are in. This is subtle and would be difficult for a robot to understand. Nevertheless, by refining this ability to anticipate, it should be possible to produce robots that are proactive in what they do.

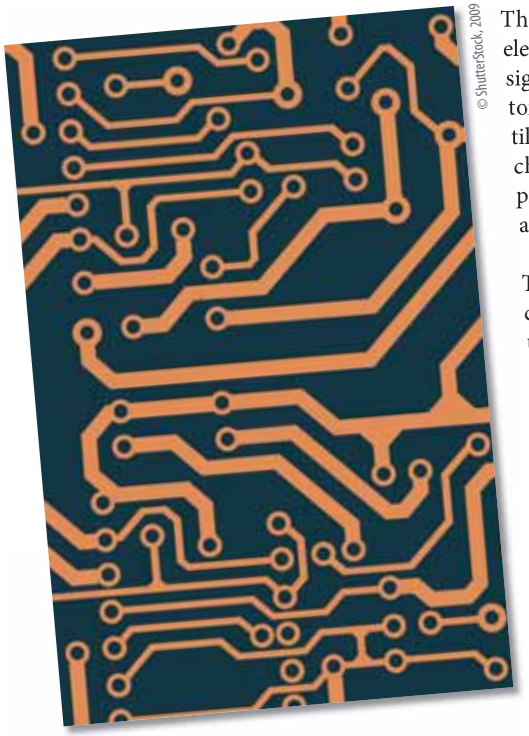
Not waiting to be asked, perhaps one day a robot may use the JAST approach to take initiative and ask: 'Would you care for a cup of tea?'

Promoted through the ICT Results service.

http://cordis.europa.eu/ictresults/index.cfm?section=news&tpl=article&ID=90631

Environment-friendly printed circuit boards

Engineers at a leading Belgian research institute established the benefits of using two different types of adhesives when producing printed circuit boards (PCBs).



The environmental footprint of the electronics industry could be improved significantly by eliminating the use of toxic substances like lead and volatile organic compounds in PCBs. The challenge is to maintain desirable properties such as strength, reliability and low contact resistance.

The nine members of the Imecat consortium took up this challenge under the leadership of IMEC, an eminent Belgian research institute. The work entailed demonstrating the feasibility of an existing adhesive concept for attaching silicon dies to an FR4 PCB, a type of PCB with excellent flame retardant qualities.

The key was proper incorporation of both a non-conductive adhesive (NCA) and an isotropically conductive adhesive (ICA). Initially, the ICA was applied via stencil printing and dried, but not fully cured. Following the addition of the NCA, the chip was then mounted and thermally compressed onto the substrate in a flip-chip configuration.

The chips produced during the project were tested for their ability to withstand storage at very high temperatures (125 °C) and operation in conditions with very high relative humidity (85 %). Measurements confirmed that contact resistance did not deteriorate during these experiments and remained at ideal levels in the order of just a few milliohms.

The IMEC researchers pointed out that the technique can be extrapolated to other types of substrates, including plastic and glass.

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 > 5175

Virtual prototyping produces better circuits in reality

Scientists in France demonstrated the value of virtual prototyping for producing more robust integrated circuits in the context of a research project funded by the EU.

Integrated circuits, which form the heart of computers, mobile phones and a number of other devices, have helped make the information society possible. As engineers continue to push the technology envelope, thermo-mechanical failure remains one of the primary causes of chip malfunction.

The organisations involved in the Mevipro RTD project sought to improve chip reliability through the use of virtual prototyping. Experts with the French firm Thales Microelectronics SA applied the new methodology to a ceramic-based multi chip module (MCM) encapsulated in epoxy.

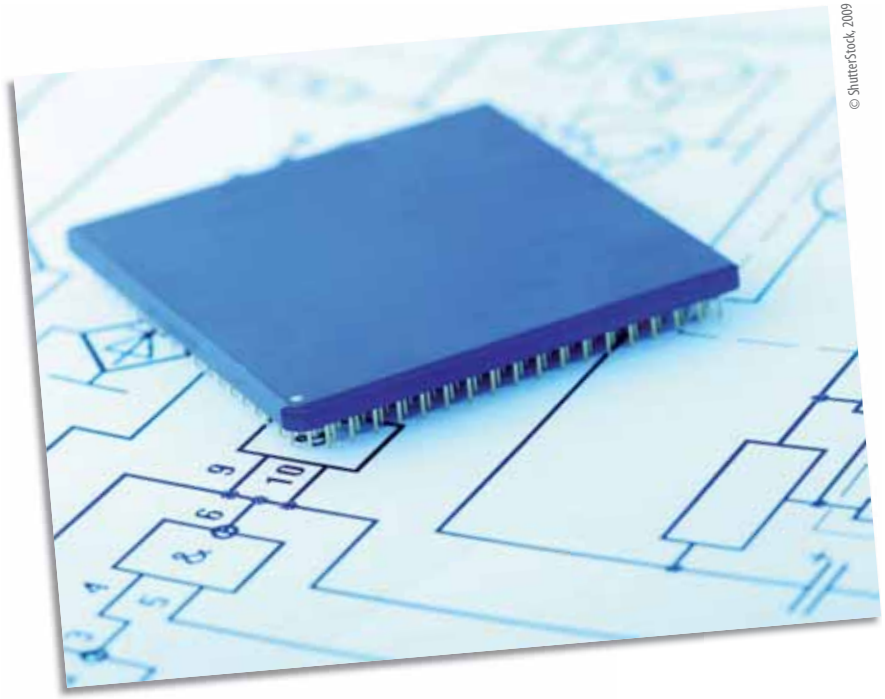
The simulations were performed using finite element method (FEM) techniques. The incorporation of material properties into the model facilitated the identification of optimal materials. Likewise, the inclusion of MCM dimensions provided insight into how to avoid problems such as warping. Finally, it was also possible to improve process parameters, such as curing profiles, based on feedback from the simulations.

An important advantage of the virtual prototyping approach was shorter lead times for the design and manufacture of products with similar configurations. Thales Microelectronics SA and its Mevipro partners are not resting on their laurels. Rather they are planning further improvements to the model to address the effects of adhesion and delamination on chip performance.

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

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

http://cordis.europa.eu/marketplace > search > offers > 5166



Home, James — public transport gets personal

A European research project has developed technologies that pave the way for highly efficient unmanned public transport systems in our cities.

In our congested cities it is hard to imagine that private cars and taxis could ever be replaced by a public transport system that provides a personal, door-to-door service. But this is exactly the long-term vision of Michel Parent who directs the R & D programme into automated transportation at the French National Institute for Research in Computer Science and Control (INRIA).

'At the moment most public transport needs drivers to control the vehicles,' he says, 'and that makes it suitable only for mass transportation. But the more you can automate vehicles and make them work on the existing infrastructure — in other words roads — the more personal, rapid transit becomes feasible.

'Automation offers a massive boost in the efficiency of public transportation and is an ideal solution for our polluted and congested city centres. They can complement mass transportation systems by extending the reach of public transport, taking people from the bus, tram and train stations deeper into the heart of cities or to distant suburbs.'

Parent is the coordinator of Cybercars2, an EU-funded research project that is developing a wide range of technologies that, together, will make road-based automated transport systems a reality.

Cybercars2 builds on the work of two earlier successful projects funded by the EU. The first, Cybercars, developed a number of sense, control and guidance technologies to enable vehicles to navigate roads and avoid obstacles. These technologies were successfully demonstrated by the Cybermove project with a final demonstration in Antibes.

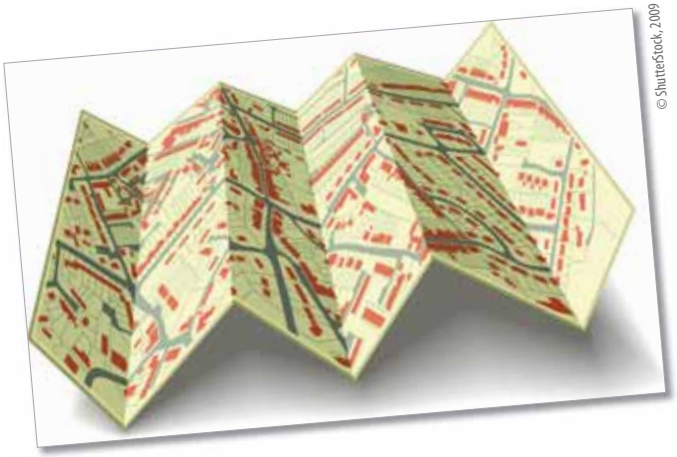
The technology to control single automated vehicles is therefore tried and tested — and is found in automated transport systems, including the ULTRa system under construction at Heathrow Airport and the Cybercab in Masdar, Abu Dhabi.

'The main challenge we wanted to address in the Cybercars2 follow-on project was how to operate and coordinate several different vehicles at high throughput,' explains Parent. 'Efficient transport systems require vehicles to cooperate with each other. [They need] to be able to communicate and negotiate with each other and with the infrastructure itself. We wanted to make this happen automatically, too.'

One of the most important aspects of the project, then, was to work out the best way to route data between vehicles. 'We have developed the routing layer so that vehicles can communicate even when they can't "see" each other. We came up with the routing protocols to make it possible to do "multi-hop" data exchanges between two vehicles on the move, by using a go-between, which could be another vehicle or part of the roadside infrastructure,' he explains.

The project also developed the data exchange mechanisms (based on Web services) and the standards for exchanging data about position and speed. The project team is in discussions with the International Standards Organisation and the European Car-to-Car consortium (a collaboration of stakeholders involved in vehicular communication) about the adoption of its communications layer as a standard for automated vehicle communication.

Having endowed vehicles with an ability to 'talk', Cybercars2 addressed the control software that would allow them to cooperate. The aim was for several different cybercars, using a variety of sense and control technologies, to have the ability to move close to each other, yet remain safe from collisions.



Using computer simulations of intersections and merges, the project partners developed rules for how vehicles must negotiate with each other in close proximity. They also added so-called 'platooning' capabilities to the control software so that vehicles could follow closely behind each other.

The results of the project offered quite a spectacle. A fleet of six cybercars (electric Fiat Pandas and a Citroën Berlingo van) and three unmanned buggies built by INRIA, were let loose on a figure-of-eight circuit in a special test zone in La Rochelle.

The cars successfully navigated the circuit using a wide range of different navigation systems — but that was just the 'old' technology at work. More importantly, the cars would communicate with other vehicles at the four-way crossover and slow down or stop to avoid collisions then safely navigate the junction.

Various project partners are incorporating the results of the project into their own products. Demonstrations also take place in several other European cities as part of the Citymobil project.

'Automated transportation makes a lot of sense to reduce congestion and fumy cars, as a complement to mass transport,' says Parent. 'We've proven that the technology now exists to deploy a fleet and run an efficient and safe system. We expect many cities will start to explore these options.'

This is the first of a two-part 'Cybercars2' special. You can read the final part in the next issue of the research*eu results supplement.

Promoted through the ICT Results service.

http://cordis.europa.eu/ictresults/index.cfm?section=news&tpl=article&ID=90845

Life cycle analysis for mineral extraction

Mining and mineral processing create significant environmental impacts including the contamination of surface water, groundwater and soils. Such problems can be avoided through proper planning and the application of the right technologies during mining and processing operations and, in the closure plan.

The EU-funded Licymin project developed and validated a full life cycle assessment (LCA) for the extraction industry, which involved a 'cradle-to-grave' analysis of all associated mining activities. The project was the first time a holistic LCA for the extractive industries had been developed. The assessment included the exploration of the mineral deposit, its exploitation, the disposal of waste, remediation and the long-term environmental monitoring and control of impacts from mining.

Project partners from the Imperial College London created definitions for the LCA system for mineral extraction. The team began by dividing the study area into two. The first part comprised the system where mining activities take place. The second part was the area surrounding the system, known as the system environment. The mining system was further divided into four main subsystems which included production, processing, waste disposal and rehabilitation and maintenance.

The mining activities of the system were broken down into phases, processes and functional units. Researchers studied the inputs into the system which were energy, materials and costs. Outputs included product, solid waste and discharges to the air, surface and groundwater. Inputs and outputs were identified for each functional unit and the information gained contributed to an LCA model. The model enabled mining activities to be undertaken in a more cost-effective and environmentally responsible way.

The model also allowed industry, local communities and regulating authorities to assess the life cycle impacts of mining activity by identifying particular emissions. This information can be passed to internal or external decision-makers, thereby ensuring the correct action is taken. In this way, the production of waste and the use of resources can be minimised. Furthermore, the modelling tools developed by Licymin can be applied to any mining operation in the world.

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 > 5177

Alloy replaces silver in superconducting tape

The material cost of superconducting tape was reduced by partially replacing the silver sheath with a strong, low-cost alloy. The technique can be successfully applied to conductors produced using conventional methods.

A silver sheath comprises the largest part of bismuth strontium calcium copper oxide (Bi-2223) superconducting tape. The presence of the valuable metal creates difficulties in limiting the conductor's future costs, hindering its wider use in power applications. Therefore, researchers from the Istituto Nazionale per la Fisica della Materia (INFM) in Genoa developed durable low-cost alloys that acted as a partial replacement for the silver sheath used in Bi-2223.

The Italian scientists, working as part of the EU-funded Big-powa project, developed an original technique for replacing a significant proportion of the silver sheath in conductors. This method can be successfully increased in scale and is suitable for conductors produced using the conventional powder-in-tube (PIT) process. The PIT technique is used to produce conductors from brittle super conducting materials.

The INFM team replaced more than half of the silver with the low-cost alloy. The alloy demonstrated higher electrical resistance and lower thermal conductivity than silver. It also possessed sufficient strength to allow sustained handling of the tape. Conductors provided by both industry and academia were used to test the efficacy of the novel process.

The work undertaken by the Big-powa consortium will enable Europe to successfully compete with Japan and the United States in the field of superconducting materials. The new material will result in a wide range of technical, economic, environmental and social benefits. The research can be applied to industrial manufacturers, electric utilities companies, as well as the transport sector and SMEs. The new conductors are also suitable for use as detectors in medical imaging diagnostic tools such as magnetic resonance imaging (MRI).

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

Collaboration sought: information exchange/training.

http://cordis.europa.eu/marketplace > search > offers > 5121

See also page 17 (Superconductive wires for electric power delivery)

Biology knows best — human-like vision lets robots navigate naturally

A robotic vision system that mimics key visual functions of the human brain promises to let robots manoeuvre quickly and safely through cluttered environments, and to help guide the visually impaired.

It's something any toddler can do — cross a cluttered room to find a toy. It's also one of those seemingly trivial skills that have proved to be extremely hard for computers to master. Analysing shifting and often ambiguous visual data to detect objects and separate their movement from one's own has turned out to be an intensely challenging artificial intelligence problem.

Three years ago, researchers at the EU-funded research consortium 'Decisions in motion' decided to look to nature for insights into this challenge.

In a rare collaboration, neuro- and cognitive scientists studied how the visual systems of advanced mammals, primates and people work, while computer scientists and roboticists incorporated their findings into neural networks and mobile robots.

The approach paid off. 'Decisions in motion' has already built and demonstrated a robot that can zip across a crowded room guided only by what it 'sees' through its twin video cameras, and are hard at work on a head-mounted system to help visually impaired people get around.

'Until now, the algorithms that have been used are quite slow and their decisions are not reliable enough to be useful,' says project coordinator Mark Greenlee. 'Our approach allowed us to build algorithms that can do this on the fly that can make all these decisions within a few milliseconds using conventional hardware.'

The 'Decisions in motion' researchers used a wide variety of techniques to learn more about how the brain processes visual information, especially information about movement.

These included recording individual neurons and groups of neurons firing in response to movement signals, functional magnetic resonance imaging to track the moment-by-moment interactions between different brain areas as people performed visual tasks, and neuropsychological studies of people with visual processing problems.

The researchers hoped to learn more about how the visual system scans the environment, detects objects, discerns movement, distinguishes between the independent movement of objects and the organism's own movements, and plans and controls motion towards a goal.

One of their most interesting discoveries was that the primate brain does not just detect and track a moving object; it actually predicts where the object will go. 'When an object moves through a scene, you get a wave of activity as the brain anticipates its trajectory,' says Greenlee. 'It's like feedback signals flowing from the higher areas in the visual cortex back to neurons in the primary visual cortex to give them a sense of what's coming.'

Greenlee compares what an individual visual neuron sees to looking at the world through a peephole. Researchers have known for a long time that high-level processing is needed to build a coherent picture out of a myriad of those tiny glimpses. What's new is the importance of strong anticipatory feedback for perceiving and processing motion.

'This proved to be quite critical for the "Decisions in motion" project,' Greenlee says. 'It solves what is called the "aperture problem", the problem of the neurons in the primary visual cortex looking through those little peepholes.'

Armed with a better understanding of how the human brain deals with movement, the project's computer scientists and roboticists went to work. Using off-the-shelf hardware, they built a neural network with three levels mimicking the brain's primary, mid-level, and higher-level visual subsystems.

They used what they had learned about the flow of information between brain regions to control the flow of information within the robotic 'brain'. 'It's basically a neural network with certain biological characteristics,' says Greenlee. 'The connectivity is dictated by the numbers we have from our physiological studies.'

The computerised brain controls the behaviour of a wheeled robotic platform supporting a moveable head and eyes, in real time. It directs the head and eyes where to look, tracks its own movement, identifies objects, determines if they are moving independently, and directs the platform to speed up, slow down and turn left or right.

Greenlee and his colleagues were intrigued when the robot found its way to its first target — a teddy bear — just like a person would, speeding by objects that were at a safe distance, but passing nearby obstacles at a slower pace. 'That was very exciting,' Greenlee says. 'We didn't program it in — it popped out of the algorithm.'

In addition to improved guidance systems for robots, the consortium envisions a lightweight system that could be worn like eyeglasses by visually or cognitively impaired people to boost their mobility. One of the consortium partners, Cambridge Research Systems, is developing a commercial version of this, called VisGuide.

Promoted through the ICT Results service.

http://cordis.europa.eu/ictresults/index.cfm?section=news&tpl=article&ID=90699

International committee on fire safety in tunnels

The establishment of the Committee on Operational Safety of Underground Facilities (COSUF) heralds a new era in tunnel safety, not only in Europe, but worldwide.

A number of accidents in recent years have highlighted the need to address the issue of fire safety in tunnels in a more effective manner. The EU supported several relevant R & D projects, including a thematic network entitled FIT that was created to facilitate knowledge transfer.

In total over 100 companies, from construction firms to tunnel operators to emergency response services, were involved in FIT. The full range of stakeholders was represented. As FIT drew to a close, it became apparent that significant value could be obtained by extending the constructive collaboration cultivated during the project.

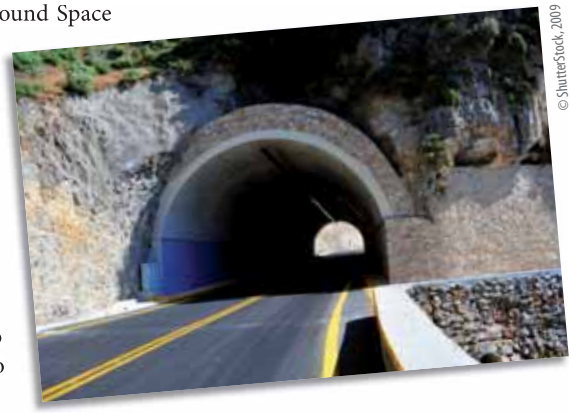
The FIT participants examined several different options and consequently created the COSUF in collaboration with the International Tunnelling and Underground Space Association (ITA). The backing of the World Road Association (PIARC) was also acquired.

COSUF will attempt to extend networking activities from the European to international scale. In addition, teams composed of experts participating in COSUF will tackle specific research agendas. Efforts will be made to elicit the funding necessary to carry out the research. Finally, COSUF will seek to continuously promote fire safety through a variety of educational and awareness initiatives.

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

Collaboration sought: information exchange/training.

http://cordis.europa.eu/marketplace > search > offers > 5219



Addressing amplified spontaneous emission in lasers

Scientists involved in advanced particle physics experiments may benefit from a new laser source with improved contrast developed at the Centre national de la recherche scientifique (CNRS) in France with the use of a nonlinear filter.

A number of projects on the cutting edge of technology have been supported by the EU. In the case of the SHARP project, the research was devoted to eliminating interference associated with amplified spontaneous emission (ASE) in ultra-high intensity laser applications.

The Laboratory of Applied Optics (LOA) coordinated with the SHARP project, which included nine other research institutes hailing from five different EU Member States. LOA and its partners designed and tested a prototype based on two chirped pulse amplification (CPA) laser systems.

The initial CPA module produces femtosecond pulses with millijoule intensity. The pulses are then passed through a special non-linear filter that induces birefringence, which polarises the laser beam. This enables the system to separate out any extraneous ASE, which does not polarise, from the original femtosecond pulse. The resulting beam is subsequently amplified by the second CPA module.

Experiments with different pulse energies, beam diameters and chirp rates led to the identification of the optimal pulse cleaning settings. The result was a significant increase in contrast by three orders of magnitude. Finally, it should be noted that filtering also helped ensure the excellent spatial quality of the beam.

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

Collaboration sought: information exchange/training.

http://cordis.europa.eu/marketplace > search > offers > 5060

Innovation through materials

A new set of polymer waveguides doped with active centres, which are capable of emitting in the visible and the near-infrared, are expected to advance network communications technologies.

In the field of optical telecommunications, lanthanide-doped inorganic devices are routinely employed to overcome losses in optical fibre transmission systems. However, recent developments in the optical characteristics of plastic optical fibres, combined with their relatively low cost and high flexibility, have made this alternative option particularly attractive.

Urged on by this, the OPAMD project partners explored their design and fabrication to develop plastic optical fibre amplifiers for signal regeneration within data communications networks. More specifically, they were interested in replacing the traditional inorganic optoelectronic components in optical amplifiers with organic molecular materials.

To incorporate an amplification function into polymer channel waveguide devices fabricated by hot embossing, doping of polymer materials with active centres was proposed. These included luminescent quantum dots, rare earth-doped nanocrystals and lanthanide ions.

For example, complexes of neodymium (Nd) and europium (Eu) were particularly interesting, because of their infrared luminescence and because they can be used for the fabrication of light emitting diodes (LEDs). Furthermore, Nd- or Eu-doped organic films not only act as LEDs, but also as colour filters improving the LED emission spectrum.

The final integrated optical devices were extensively tested at the laboratories of the Tyndall National Institute in Ireland and shown to be capable of out-coupling the visible and infrared light emission.

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

Collaboration sought: further research or development support.

http://cordis.europa.eu/marketplace > search > offers > 5218

The following upcoming events were selected from the event diary of the Directorate-General for Research and from the CORDIS event calendar. For further information on past and upcoming events, please visit:

http://ec.europa.eu/research/events
http://cordis.europa.eu/events

Building industry matchmaking event

A matchmaking event for the building industry is being organised on 3 February 2010 in Reims, France.

This event focuses on innovative technologies in the sustainable construction sector (materials, products, processes, etc.) It aims to bring together small and medium-sized enterprises (SMEs), technological centres and research institutes looking for or offering innovative solutions and products. All actors involved in the process are welcome, in particular those in heating and cooling technologies, building materials, exterior and interior fittings, technical equipments, passive house technologies.

Event participants will have the opportunity to:

- meet foreign partners during prescheduled one-on-one meetings;
- find out about the latest technological trends during conferences and workshops;
- initiate discussions to develop technological and commercial partnerships;
- visit Champagne-Ardenne research actors and local companies during a study tour.

Euro-African cooperation forum on ICT Research

The '2010 Euro-Africa cooperation forum on ICT research' will take place in Addis Ababa, Ethiopia, on 3 February 2010.

The event is being organised by the FP7-funded 'Euroafrica-ICT' project and is supported by the African Union Commission's Human Resources and Science and Technology (AUC-HRST) department and the European Commission. It will follow the African Union summit on 'ICT in Africa: challenges and prospects for development', taking place from 25 January to 2 February 2010.

The forum will bring together sub-Saharan African and European organisations for an interactive and participative event whose objectives include:

- reflecting on progress made and lessons learnt on ICT research and development in Africa and its contribution to economic growth, improved quality of life and efficient service delivery;
- enhancing the development of Euro-Africa collaborative ICT research projects and identifying potential partners;
- networking with key stakeholders in the field (private/public bodies);
- highlighting opportunities for African participation in FP7 projects and results from successful EU-African FP7 cooperation projects and EU-African public-private partnerships (PPP).

For further information, please visit:
http://www.euroafrica-ict.org/forum2.php

Workshop on community reference laboratories

The European Commission's Joint Research Centre (JRC) will hold a workshop on community reference laboratories (CRLs) on 9 and 10 February 2010 in Geel, Belgium.

The event aims to identify approaches being used, general problems faced by CRLs in the scientific part of their work, and priorities for the future. Particular emphasis will be placed on the organisation of proficiency tests, with examples from different types of CRLs. The workshop will also give CRL leaders the opportunity to share experiences and exchange views, with each other and with representatives of the Commission.

Between 2004 and 2006, the European Commission's Directorate-General for Health and Consumers appointed 40 CRLs. These CRLs, together with national reference laboratories, lead harmonisation efforts across the EU for analytical methodology within a given field. The CRLs cover three main areas: feed and food law, animal health and animal welfare rules. While each topic is specific, CRLs do face a number of common issues.

For further information, please visit:
http://irmm.jrc.ec.europa.eu/html/events/events/1002_CRL_forum.htm

Symposium on trace organics in the water cycle

A symposium on trace organics in the water cycle will take place on 10 February 2010 in Berlin, Germany.

Under the title '20 years of research in the field of endocrine disruptors and pharmaceutical compounds — challenges and solutions for the water sector', the symposium is intended for leading international scientists and other interested parties to discuss the status of knowledge regarding the risks of endocrine disruptor compounds, impacts and technical solutions for the water sector.

Research has suggested that several chemical compounds have the ability to disrupt endocrine systems. Endocrine disruptor compounds encompass a variety of chemicals, including anthropogenic substances such as detergent, pesticides, plasticisers, natural and synthetic hormones. Found in the environment even at the low concentrations, they may produce deleterious effects on aquatic organisms.

For further information, please visit:
http://www.kompetenz-wasser.de

Conference on privacy law, technology policy and the Internet

A conference on privacy law, technology policy and the Internet will be held on 25 and 26 February 2010 in Hyderabad, India.

The event, organised in the framework of the EU-funded 'Science, ethics and technological responsibility in developing and emerging countries' (SET-DEV) project, will cover European, Indian and other responses to technology policy, personality rights and privacy and data protection law. The topics will be considered from the point of view of sociologists, political scientists, anthropologists, lawyers, business and information technology specialists.

SET-DEV is funded under FP7 and aims to support research systems and to encourage a socialisation of scientific and technological research (STR) in India and Kenya, enabling it to measure up to greatly changing societies.

For further information, please visit:
http://www.uclan.ac.uk/ahss/lancashire_law_school/clict/national_conference

Fire safety international workshop

An international workshop on fire safety will be held in Belfast, United Kingdom, on 25 and 26 February 2010.

The event aims to inform on the latest developments, strategies and solutions for key fire safety issues, enabling construction professionals to learn more about how to create the safest possible buildings. A panel of expert presentations from around the world will examine issues such as:

- dissemination of structural fire safety engineering knowledge;
- how to create safe innovative buildings by pushing back the boundaries of fire engineering design;
- future changes to fire safety regulations and their impact on the design of residential buildings;
- assess the effectiveness of various new fire prevention and protection products and systems.

The conference is designed for architects, designers, structural engineers, fire service personnel, building control officers, facilities managers, as well as building contractors, developers, manufacturers and public sector representatives who need to be up-to-date on the latest thinking on systems, products and design.

For further information, please visit:
http://www.firesert.ulster.ac.uk/FSIW

Conference on policy, growth and corporate R & D

The second European 'Conference on corporate research and development' ('Concord 2010') will take place in Seville, Spain, from 3 to 4 March 2010.

Entitled 'Corporate R & D: an engine for growth, a challenge for European policy', the event is being organised by the Institute for Prospective Technological Studies (IPTS) of the European Commission's Joint Research Centre (JRC) and the Spanish Centre for Development of Industrial Technology (CDTI).

The conference aims to link science, business and policy-making, and looks to promote understanding of the policy implications of scientific findings. In particular, it will address the dynamics of corporate R & D, innovation, competitiveness and economic growth.

Organisationally, the first day of the event will be a forum for academics and practitioners. The second will be devoted to the policy dimension of corporate R & D, based on the most relevant policy outcomes of debate on the previous day.

For further information, please visit:
http://iri.jrc.ec.europa.eu/concord-2010

Innovation workshop on novel food packaging

An innovation workshop on novel food packaging will be held on 4 March 2010 in Brno, Czech Republic.

The innovation workshop will consist of two sessions: lectures on novel technologies and consumer acceptance in the morning and a brokerage event in the afternoon.

Prior to the event, participants of the workshop and other interested, technology-oriented companies or research institutes are invited to submit cooperation profiles presenting their expertise and know-how, their latest technological developments or technological needs and/or their project ideas. These profiles will be included in an online catalogue. Participants can also select profiles of interest to them from the online catalogue and request bilateral meetings with the organisation/researcher behind these profiles. The organisers will coordinate meeting requests and send individual meeting schedules to all participants.

The brokerage event is organised jointly by the EU-funded 'European network for integrating novel technologies for food processing' ('Hightech Europe') project and the Enterprise Europe Network.

For further information, please visit:
http://www.enterprise-europe-network.ec.europa.eu/public/bemt/home.cfm?EventID=2203

Conference on perceptions of citizen security

The European Security Conference Initiative (ESCI) 2010 will host the final symposium of the 'Changing perceptions of security and interventions' (CPSI) project from 4 to 5 March 2010 in Garmisch-Partenkirchen, Germany.

ESCI is an annual multinational security conference platform, bringing together experts from academia, research, policy-making, business and industry from more than 20 countries. ESCI's thematic structure reflects the principal themes of security research within FP7, focusing on societal vulnerabilities and resilience, along with tangible results of scientific inquiry into main themes of EU-related security research.

The main theme of ESCI 2010 focuses on the change of perception of citizen security and the acceptance of security-enhancing interventions and reflects the work and findings of the CPSI project, which was FP7-funded.

For further information, please visit:
http://www.esci.at

Ministerial conference on environment and health

The 'Fifth ministerial conference on environment and health' will be organised by the World Health Organization Regional Office for Europe (WHO/Europe) in Parma, Italy, from 10 to 12 March 2010.

The conference is the next milestone in the European environment and health process, now in its 20th year. Focused on protecting children's health in a changing environment, it will drive Europe's agenda on emerging environmental health challenges for the years to come.

Well-tested environmental health interventions could reduce total deaths in the WHO European Region by almost 20 %. Since the 'Fourth ministerial conference on environment and health' in 2004, countries in the region have made progress towards four goals:

- protecting health through safe water and adequate sanitation;
- ensuring safety from injuries and better health from adequate physical activity;
- improving respiratory health through clean indoor and outdoor air;
- safeguarding health from chemicals and through strong labour standards.

Yet achievements are uneven across the region. The 'Fifth ministerial conference on environment and health' will review these developments in the context of a broader, evolving scenario that includes socioeconomic and gender inequalities, extreme climate events and recent financial constraints.

For further information, please visit:
http://www.euro.who.int/parma2010

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