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Blooming innovation: interview with Professor Jose Duato of NANOC

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Turning innovation into market-driven technology



Everything starts with an idea. It may begin simply as a couple of pencilled lines on scrap paper, a thought-provoking discussion among peers, or the rarer sudden brilliant insight in the bathtub. But most of the time, ideas and their subsequent development come down to hard work, dedication and the proper support. The way of progress is 'neither swift nor easy' suggested renowned physicist and chemist Marie Curie. But by removing barriers that hinder its development, technological progress can at least be facilitated.

The recent launch of the Europe 2020 flagship initiative, the 'Innovation Union', will aim to be the 'facilitator'. Cutting red tape and boosting collaborative R & D between academic and private-sector researchers will help speed the transfer of knowledge into tangible benefits for society. The end result will hopefully spur new technologies and entrepreneurship.

The focus of this edition of research*eu results supplement *is 'Technology at work: in industry, offices and SMEs'. We look at a cross-section of EU-funded research projects that have successfully transferred knowledge into technology. And, as usual, we go a bit further and share with you the insights of Prof. Jose Duato from the EU-funded project 'Nano-scale silicon-aware network-on-chip design platform' (NANOC). NANOC is developing an innovative design platform for future network-on-chip (NoC) based multi-core systems. And Prof. Duato, who is leading the project with the close collaboration of industry leaders, reveals the necessary steps to convert academic research into a successful product.*

Also in this issue, the biology and medicine section leads with a story about a consortium of international scientists who have identified a new genetic risk factor for Lou Gehrig's disease, a rare brain disorder.

The energy and transport section leads with an article on the best way to implement, promote, and manage public bicycling in European cities. The 10-year project has helped change the way Europeans view cycling by developing action plans tailored to each city's needs.

The top story in the environment section looks at the origins of ground-breaking environmental policy in the 1970s. The ideas that led to such a policy were, according to the researchers, due in part to the informal transnational networks comprising the European Commission, national ministries and the environmental movement.

In our IT and telecommunications section, we look at how one EU-funded project devised an ingenious system to track down and identify one of Earth's more precious resources – wood. The technology will not only boost productivity but also less wood will be wasted; potentially saving the industry EUR 5 billion and Europe 25 million m^3 of wood.

It seems like every other week, hard drive capacity and storage increase. But our lead story in the industrial technologies theme showcases an innovative way to harness the power of nanotechnology that will push digital capacity to the limit.

The issue then ends with a list of exciting events and upcoming conferences in the field of research and technology.

We look forward to receiving your feedback on this issue and on the research*eu *publications in general. Send questions or suggestions to:*
research-eu-supplements@publications.europa.eu

The editorial team

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Thank you to Prof. Jose Duato of the Universidad Politécnica de Valencia for his contribution to the 'special' dossier in this issue

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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

New genetic risk factor for Lou Gehrig's disease discovered

An international team of scientists working at the University of Pennsylvania, US and Goethe University in Germany has identified a new genetic risk factor for amyotrophic lateral sclerosis (ALS), commonly known as Lou Gehrig's disease after the US baseball player who died from the rare brain disorder at only 38.

EU support for the research came from the 'European integrated project on spinocerebellar ataxias' (Eurosca) project, which received over EUR 9 million from the 'Life sciences, genomics and biotechnology for health' (LIFESCIHEALTH) thematic area of the EU's Sixth Framework Programme (FP6). The findings are published in the journal *Nature*.

ALS is one of the most common neuromuscular diseases worldwide, and people of all races and ethnic backgrounds are affected. Experts say 1 or 2 out of 100 000 people develop ALS each year. The disorder most commonly strikes people between 40 and 60 years of age, but younger and older people can also develop it.

ALS generally progresses rapidly and is invariably fatal, attacking the nerve cells responsible for controlling voluntary muscles — the muscles gradually weaken and then waste away. Eventually the brain loses the ability to control voluntary movement and when the muscles in the diaphragm and chest wall fail, sufferers become unable to breathe without ventilator support.

Any progress towards understanding this devastating disease for which there is currently no cure is obviously hugely welcome and scientists, led by Dr Aaron Gitler at Penn's School of Medicine, believe they have done just that.

Using yeast and fruit flies as models before following up with human DNA screening, the team found evidence that mutations in the ataxin 2 gene were a genetic contributor to the disease. In particular, the study showed that repetitions of the amino acid glutamine in ataxin 2 (called expansions) were associated with an increased risk of ALS, with a frequency of 4.7 % of ALS cases examined.

The researchers said the 'identification of interactions between ataxin 2 and TDP-43, another ALS-associated disease protein, together with the strong genetic association of glutamine expansions in ataxin 2 and ALS, should aid in the development of biomarkers and empower the development of new therapies for this disease'.

The team began by identifying genes that could suppress or enhance TDP-43 toxicity in yeast. Among the genes that modified toxicity was the yeast counterpart of ataxin 2. They then transferred the genes to the fruit fly to assess effects of the genes and their interactions in the nervous system.

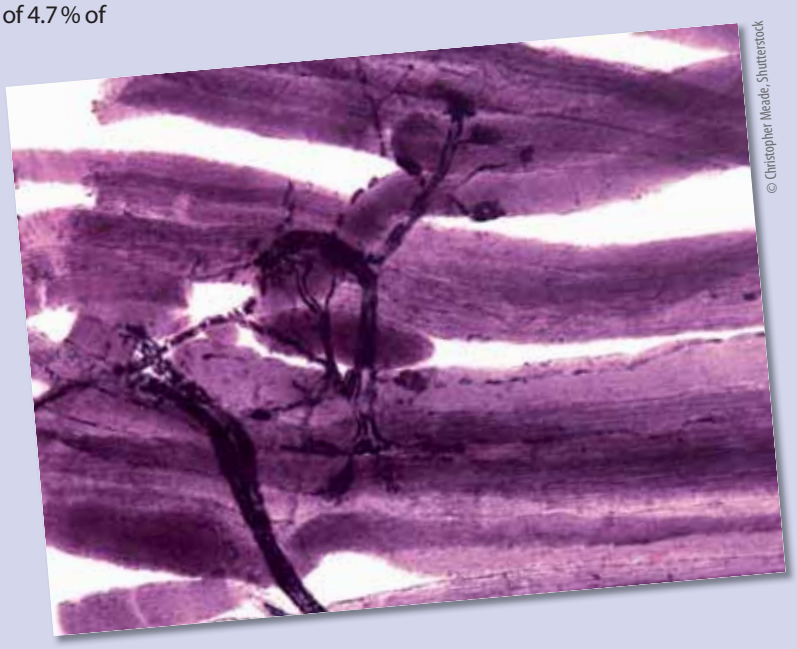
The results indicated a link between the proteins and the disease. For example, when the researchers directed expression of TDP-43 to the eye of the fruit fly, a progressive, age-dependent degeneration began, and when directed to the motor neurons, flies experienced a progressive loss of motility.

The higher the levels of ataxin 2, the greater the toxicity of TDP-43 and the worse the degeneration. 'Because reducing ataxin 2 levels in yeast and flies was able to prevent some of the toxic effects of TDP-43, we think that this might be a novel therapeutic target for ALS,' said Dr Gitler.

The researchers extended these findings to determine whether ataxin 2 showed alterations indicative of an association with ALS. They found that ataxin 2 appeared altered in spinal cord neurons from ALS patients. Following this up with analysis of the type of mutation that is found in ataxin 2 in its other disease, spinocerebellar ataxia 2 (or SCA2, another glutamine expansion), they showed a link between expanded ataxin 2 repeats and risk for ALS.

'There have been previous hints of similarities between ALS and SCA2,' noted Michael Hart, a Penn graduate student in Dr Gitler's laboratory and co-author of the study. 'Our findings suggest a molecular explanation for these similarities and raise the possibility that treatments for one disease might be effective for the other.'

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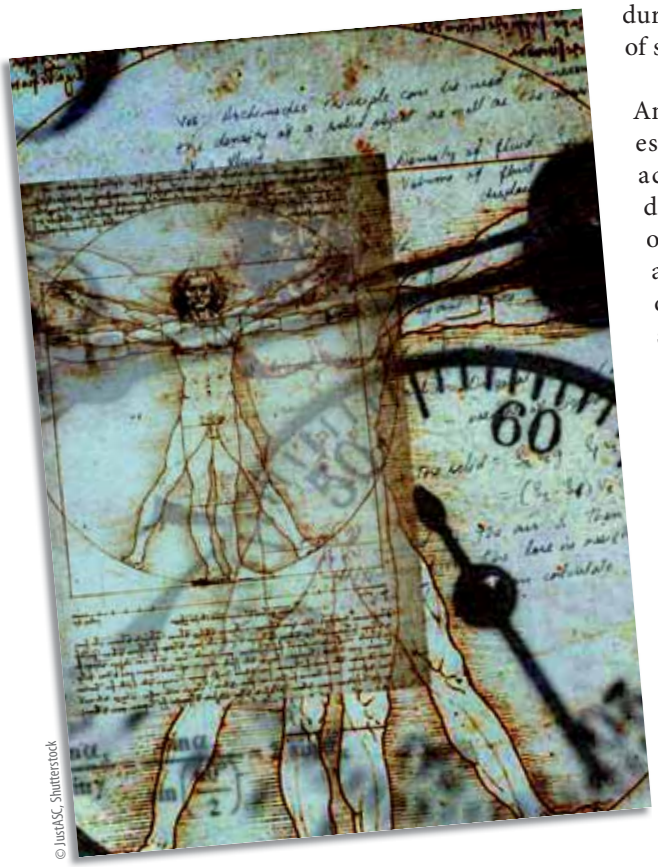
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The genetics of perfect timing

Timing is crucial for survival as well as being able to function in activities such as sport and music. European researchers are uncovering the molecular secrets of the interval timing mechanism, responsible for very basic instincts up to performance of sophisticated tasks.

Time is a fundamental dimension of life. Evolution has selected mechanisms that allow both humans and animals to respond to the time parameters around them. This may mean the difference between survival and success in the animal world.

There are two distinct mechanisms of timing within living organisms. Circadian timing involves events anticipated on a 24-hour basis controlling obvious functions like sleep-wake patterns and appetite. Interval timing on the other hand controls the ability to calculate shorter durations, in the order of seconds to minutes.



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An internal stopwatch estimates timing for activities like ring doves sitting on a nest of eggs when a long absence would mean death for the youngsters before hatching. At the human level, timing in milliseconds is necessary for speech control, playing music and dancing.

The EU-funded project, 'A genetics approach to the interval timing mechanism', or 'Genetics of timing'; for short, aimed to get to the bottom of how these mechanisms work at a molecular level. Researchers worked with mutant strains of mice that have severe memory and learning deficiencies because of the lack of the protein CaMKII.

The molecule CaMKII induces synaptic plasticity in nerve cells. Plasticity is essential so the connections between nerve cells strengthen, which results in learning ability and memory through reinforcement.

Despite their level of forgetfulness, the mutant mice had no problem learning the durations of intervals set up by the scientists that ranged from 3 to 42 seconds. It is therefore unlikely that CaMKII is involved in interval timing.

Project researchers are also investigating the involvement of another signalling protein in the brain, extracellular signal-regulated kinases (ERK). This is thought to be responsible for plasticity within key areas in the brain and may be involved in interval timing.

The complex chemical secrets of memory and learning functions are being exposed. The investigation of two major pathways involved has many medical applications including memory loss as a result of ageing.

Funded under the FP7 specific programme People (Marie-Curie actions).

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Rediscovering the roots of biopolitics

The ability of medicine and biology to intervene in all facets of human life is at the core of an ongoing research and intellectual debate, which is being conducted on an international scale.

The 'The epistemology of biopolitics' (Biopolitics) project under the Seventh Framework Programme (FP7) delves into deeper understanding of this issue, seeking a new theoretical framework to apply to the debate.

A radical idea in the history of human thought concerns the notion that through the dynamic forces of power and knowledge, people have the ability to control and modify the processes of life. Given this, life and the living being enter the realm of the political struggle.

A pressing issue which emerged in the second half of the 20th century centred on this concept: how scientific rationality can intervene in the evolution of human beings. In the mid-1970s, Michel Foucault (1926-84) French philosopher, sociologist and historian defined this concept as 'biopolitics'. Foucault expanded upon the research of his mentor, Georges Canguilhem (1904-95), a French philosopher and physician who specialised in

Through the dynamic forces of power and knowledge, people have the ability to control and modify the processes of life.

the epistemology and the philosophy of science — biology in particular.

Foucault explored the notion of 'resistance' not in the negative sense as it is commonly known, but rather as a way to create and recreate, transform and process. He questioned how resistance impacts new forms of power relations and inclines the power relation to change along with it. The work of Foucault is still at the heart of the debate on biopolitics occurring over the last 15 years, in contrast to Canguilhem's work, which has been neglected.

This is precisely the impetus behind the Biopolitics project: rediscovering Canguilhem's work and its contribution to the contemporary debate on biopolitics. The project was involved in the editorial process of a book of Canguilhem's complete works. The publication of the first volume was set for September 2010. Further, the primary research of the project focused on the unpublished works of the philosopher during the years 1929-43 in order to understand the gradual rate of progression of his philosophical reflection on the epistemology of medicine and biology.

The research is likely to have a significant impact on the current biopolitics debate as well as a long-term societal impact in relation to other areas such as bioethics.



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Seeking optimum care for cancer patients

A multinational interdisciplinary research approach seeks the best palliative care for cancer patients.

Cancer is a word people would prefer not to mention. Yet for patients who have cancer and those closest to them, it is a reality that must be faced. When patients with cancer have reached their last days of life, a particular kind of care is necessary. It is important to help make the most difficult moments more tolerable for the patients and for all who are involved.

Opcare9([1]), a project funded under the Seventh Framework Programme, is a collaborative initiative that gathers and exchanges knowledge and best practise for obtaining optimum care for cancer patients during their last days. Identifying and addressing gaps in knowledge and avoiding duplication of resources and effort are the main aims of the project.

Information was drawn from a wide array of healthcare environments and cultures to ensure the most effective result. This involved representatives from many clinical professions including psychology and social work as well as sciences such as sociology, ethics and law.

The outcomes will benefit health care providers, clinicians, educators and researchers in palliative care and most important of all help reduce suffering for patients and their loved ones.

(1) 'A European collaboration to optimise research for the care of cancer patients in the last days of life'.



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Funded under the FP7 specific programme Cooperation under the theme Health.

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Watch this space!

Coming up in issue 30 of *research*eu results supplement* a special dossier on 'Materials and the nano-revolution', a celebration of the very big European achievements in the realm of the science of the very small.

EU project to determine causes of schizophrenia

Researchers in the EU are attempting to unravel the causes of schizophrenia and related psychotic disorders by examining the role that genes and different environments play in the onset of these conditions.

Epidemiologists, psychologists, psychiatrists, neuroscientists, pharmacologists, biostatisticians, and geneticists will all play a role in this unique large-scale project. EU support for the research came from the project 'European network of national schizophrenia networks studying gene-environment interactions' (EU-GEI), which received EUR 11.62 million under the Health theme of the Seventh Framework Programme (FP7).

The project, involving more than 7 500 patients and their families from 15 countries, is the largest effort to date to understand how gene-environment interactions underlie schizophrenia risk. Partners involved in the project include the nationally funded schizophrenia or mental health networks of France, Germany, the Netherlands, Spain, Turkey and the UK, as well as other research institutes and a number of small and medium-sized (SMEs) in Australia, Austria, Belgium, Hong Kong/China, Ireland, Italy and Switzerland.

The project is designed to focus on the effects of gene-environment interactions on brain pathways and psychological vulnerability, and to elucidate how subtle, but measurable behavioural expressions of vulnerability for psychotic disorder are mediated by cerebral and psychological pathways. Follow-up research in the project is expected to establish why, in some individuals, expression of vulnerability will never progress to overt illness, while in others, schizophrenia will manifest in clinical expression.

Led by Professor Jim van Os from the School for Mental Health and Neuroscience (MHeNS) at the University of Maastricht (MUMC) in the Netherlands, the researchers want to examine behavioural expressions of vulnerability, occasioned by gene-environment interactions, that they say are 'best captured as subtle alterations in mood, perception, volition and thought in response to minor stressors in the flow of daily life'.

However, since no tools currently exist to adequately monitor these alterations, European enterprises and start-ups in the EU-GEI project will develop new technology to make such monitoring possible.

The scientists believe that given the evidence for detrimental effects of big cities on mental health and a wide range of somatic disorders, the impact of increasing urbanisation and other environmental risk factors in European countries, such as migration, should be prioritised in the research. They highlight that growing up in an urban area has been shown to be associated with an increased risk of developing psychotic disorder in later life; children growing up in big cities seemingly have a more than two-fold risk of developing such a disorder compared to children in rural environments.

Migration has likewise been cited as a trigger for psychotic disorders with immigrant populations facing a much higher risk of developing them compared to the risk in both the host country and the country of origin.

Other studies have found that cannabis use, in particular heavy use during adolescence, also increases the risk of developing a psychotic disorder, as does childhood trauma.

The researchers hope that the development of new tools during this project will allow them not only to actually measure vulnerability to psychotic disorders caused by gene-environment interaction, but also to monitor, and possibly even modify, vulnerability at the behavioural level. The project is due to end in May 2015.

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Human behaviour in crisis situations

Despite society's best efforts, catastrophes will happen. How people from different cultures and in different settings react to these disasters, manmade and natural, is the thesis of a pan-European study.

Disaster is usually never too far away, and Europe is no exception. Manmade catastrophes like the Madrid and London bombings in 2004 and 2005 respectively, the Danube floods of 2006 and the omnipresent risk of earthquakes around the Mediterranean are a constant reminder of the need for better security and safety measures to cope when disaster strikes.

The European-funded 'Behaviour, security and culture' (Besecu) project asks the question: does culture play a role in determining how people respond to such disasters? The eight partners in the Seventh Framework Programme (FP7) Security theme project are investigating the cross-cultural and ethnic differences of human behaviour in crisis situations.

The three-year project is due for completion next year. Its findings are intended to help first responders, building designers and those involved in the development of emergency operating procedures better tailor security related communication and procedures with a view to improving evacuation and protection measures.

Besecu's cross-cultural survey of individual experiences identifies inter-individual differences in people who have experienced real evacuation situations, fire disaster survivors and survivors of similar crisis situations, as well as workers and first responders and those affected in the community.

Members of the team have also conducted real-time evacuation simulations in standard settings, observing response times and collecting videotape evidence for further analysis.

To date, interviews with some 144 survivors of manmade and natural disasters were conducted across all participating countries. Analysis revealed that it is possible to cross-culturally assess different types of incidents with the same set of psychological instruments, according to the team.

It was also shown that the type of event survivors have experienced influences the later psychological impact. Fire in public buildings and the collapse of a building caused the highest post-traumatic stress symptoms, the researchers noted, while floods had the lowest impact.

In turn, those with high post-traumatic stress reported higher risk perception, levels of dissociation, panic and physiological reactions. The faster the emergency unfolded, the more 'instinctive' and 'automatic' the reactions, and the less time to plan evasive action. Many survivors reported the importance of helping others in danger and the desire to share and support others.

Based on the reports of survivors ('S'), the team developed a standardised psychological instrument, the so-called Besecu-S, to assess cognitive, behavioural and emotional responses to fire, terrorist attacks, flood and earthquake on a cross-cultural level.

A standardised psychological instrument for first responders, the Besecu-FR was also designed based on the 67 interviews conducted with emergency personnel in all participating national centres. In this part of the field study, some 300 fire fighters per country offered their professional experiences in crisis settings also with establishing cross-cultural strategies to cope with these tragedies.

The results of the study should help by providing an evidence base that will enable designers of buildings to develop culturally appropriate emergency operating procedures, as well as evidence of inter-individual differences that can be employed to improve communication in emergency interventions.

Funded under the FP7 specific programme Cooperation under the theme Security.

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Potential link between depressed women and low birth weight babies in Bangladesh

New EU-funded research shows that women who suffer from clinical depression and anxiety during pregnancy are more likely to give birth to smaller babies, who have a higher risk of dying in infancy.

The findings were made by researchers at the Karolinska Instituet in Sweden and the Bangladesh Rural Advancement Committee (BRAC) after studying women in rural Bangladesh. They claim this is the first time such conclusions have been drawn from a non-Western population. EU support for the research, presented in the *BMC Public Health* journal, came from the EU Asia Link programme with more than EUR 60 000.

The scientists studied the mental health of 720 women in the third trimester of pregnancy from two rural sub-districts of Bangladesh for symptoms of antepartum depression and antepartum anxiety, and then followed them until six to eight months postpartum. They found that mental health issues were likely to be a primary contributor to infant mortality and poor child health, above poverty, malnutrition or low socioeconomic status.

In Bangladesh the estimated point prevalence of antepartum depression is as high as 33 % and low birth weight (LBW) is estimated to stand at 36 %. This means that every year more than 1 million babies are born with LBW in the country.

'Eighteen percent of the women … were diagnosed as having depression and one quarter as having anxiety during pregnancy, and these women were much more likely to give birth to very small babies,' explained lead researcher Dr Hashima-E Nasreen from BRAC, a national non-government development organisation that provides services for social and economic development. She insisted that 'this is a worrying problem, since low birth weight is strongly associated with infant death, which may in turn perpetuate the cycle of mental health problems and underdevelopment'.

Dr Nasreen and her colleagues pointed out that LBW remains a major problem in low-income countries, affecting over 90 % of the world's total number of infants, and is associated with increased risk of infant mortality and morbidity.

➔

They also highlighted that babies with a LBW suffer an increased risk of neurodevelopmental outcome, cardiovascular disease, diabetes, emotional problems, and psychotic illness in later life.

However, they admitted that evidence linking maternal depressive and anxiety symptoms with infant LBW is conflicting with studies from Brazil, India and Pakistan, finding an association between antepartum mental disorders and LBW.

On the other hand, studies from the China, Ethiopia, Sweden and the US have shown no significant association between LBW and maternal depressive symptoms. But the researchers insisted that the comparability of study results is complicated by the diversity of definitions, the measurement of prenatal maternal depressive symptoms, and the time points of assessment.

This latest study was carried out as part of a prospective longitudinal study of perinatal depressive and anxiety symptoms among women in two subdistricts of the Mymensingh district, situated 120 kilometres north of the capital city of Bangladesh, Dhaka. As is typical of rural Bangladesh, the economy is agrarian and approximately 50 % of the population lives below the poverty level. The majority of women are involved in household work and childcare.

The researchers said the study raised awareness of the significance of depression and anxiety leading to poor health in south Asian countries and suggested that one way to reach the internationally agreed United Nations (UN) Millennium Development Goal to reduce child mortality in the developing world would be to invest in mental health support services in this area.

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Bitter taste of grapefruit could offer sweet relief for diabetics

EU-funded scientists have discovered that the antioxidant naringenin derived from the bitter flavour of grapefruits and other citrus fruits could potentially help diabetes sufferers. They claim it may cause the liver to break down fat while increasing insulin sensitivity.

EU support for the research, presented in the journal *Public Library of Science (PLoS) ONE*, came from the TMI-HCV([1]) project, which received just under EUR 2 million from the Ideas programme of the Seventh Framework Programme (FP7).

Researchers from Hebrew University of Jerusalem in Israel and Massachusetts General Hospital (MGH) in the US found that naringenin activates a family of small proteins, called nuclear receptors, which cause the liver to break down fatty acids and seemingly mimic the actions of drugs, such as the lipid-lowering fenofibrate and the anti-diabetic rosiglitazone.


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They admitted that the results of the study need to be extended to human patients, but insisted that if similar results arose, naringenin as a dietary supplement could become a staple in the treatment of hyperlipidemia, type 2 diabetes, and perhaps metabolic syndrome.

'It is a fascinating find,' said Dr Yaakov Nahmias from Hebrew University and the paper's senior author. 'We show the mechanism by which naringenin increases two important pharmaceutical targets, PPAR-alpha and PPAR-gamma, while blocking a third, LXR-alpha'. He added that 'the results are similar to those induced by long periods of fasting'.

The liver is the main organ responsible for the regulation of carbohydrate and lipid levels in the blood. After a meal, the blood is flushed with sugars that activate LXR-alpha, causing the liver to create fatty acids for long-term storage. During fasting, the process is reversed; fatty acids are released by fat cells, activating PPAR-alpha in the liver and are then broken down to ketones (soluble compounds). A similar process, involving PPAR-gamma, increases sensitivity to insulin.

'It is a process which is similar to the [low-carbohydrate] Atkins diet, without many of the side effects,' explained Dr Martin L. Yarmush, Director of the MGH's Center for Engineering in Medicine and one of the paper's authors.

'Dual PPAR-alpha and PPAR-gamma agonists, like naringenin, were long sought after by the pharmaceutical industry, but their development was plagued by safety concerns,' said Dr Nahmias. 'Remarkably naringenin is a dietary supplement with a clear safety record. Evidence suggests it might actually protect the liver from damage'.

The discovery is particularly interesting given the surging costs associated with metabolic conditions such as insulin resistance that may be partly attributable to Western-style diets. According to the researchers, such illnesses are associated with medical expenditures and lost productivity totalling over USD 130 billion (EUR 103 billion) annually in the US, while cardiovascular care is estimated by the American Heart Association (AHA) to rise above USD 500 billion (EUR 395 billion) this year.

Costs are similarly elevated in the EU. The British Heart Foundation, for example, estimates that coronary heart disease, one of the main components of cardiovascular disease, costs the UK healthcare system around GBP 3.2 billion (EUR 3.9 billion) a year and costs the economy an extra GBP 5.8 billion (EUR 7.1 billion) because of days lost due to death, illness and informal care of people with the disease.

Drugs or dietary supplements that could potentially reduce insulin dependence and regulate dyslipidemia could therefore have a dramatic effect on healthcare expenditures and public health. 'The potential of using a naturally occurring dietary supplement to regulate lipid metabolism is appealing as this by-product of the grapefruit juice industry is non-toxic, cheap, and has demonstrated anti-inflammatory properties,' concluded the researchers.

However, Dr Iain Frame, Director of Research for Diabetes UK, suggested that while these results were encouraging, eating large amounts of grapefruit would not be the magic bullet for diabetes sufferers.

(1) 'Microfabrication-based rational design of transcriptional-metabolic intervention for the treatment of Hepatitis C virus (HCV) infection'.

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Food exposure risk: flavour of things to come

'You are what you eat,' they say. European efforts to better understand the ingredients and handling of food for human consumption are an important safeguard in the food production system.

Flavours, additives and packaging are a major part of the modern food production chain. Exposure to chemicals added to food, such as flavour enhancers and contact with packaging, have become the focus of food safety research among European scientists.

However, according to the research project 'Flavours, additives and food contact material exposure task' (FACET), bottlenecks exist in exposure assessment. These include access to national food consumption databases, difficulty with food categorisation, limited knowledge on food chemical occurrence, and lack of data on food chemical concentration and packaging substances. The 20-partner FACET project is tackling these shortcomings through the creation of a food chemical exposure surveillance system, focusing on flavourings, food additives and food contact materials.

The consortium, made up of academia, industry, SMEs and national governmental agencies, is working on a database of targeted food chemical concentrations and their intake, as well as creating publicly available software with the data already integrated to help with exposure risk modelling.

Work to date on the food additives side has focused on evaluating high-risk candidates (where the theoretical estimated intake is higher than the acceptable daily intake). But it will also illustrate different situations for additives authorised in the EU for future exposure assessments. Linking these additives with foods consumed in representative regions of the EU, and with concentration data is underway, according to the FACET team.

As for flavourings, data for both added and natural substances are being analysed for a limited number of target substances. Classification of foods according to a hierarchical system, which meets the needs of the three chemical groups, has been completed, the consortium confirms. Database managers from eight countries (France, Ireland, Italy, Hungary, Poland, Portugal, Finland and the UK) are coding their national consumption surveys according to this tiered system.

A targeted survey of the occurrence of food additives, flavourings and food contact materials available in each of the eight countries is nearing the end of the planning phase (minimum of 3 000 products). A database for logging information contained on these product labels is well underway, say the researchers. And cluster analysis of consumption patterns in EU countries has been completed using available data. This technique provides a method for identifying countries with similar food consumption profiles.

Development of the exposure model is well advanced, including an investigation of techniques to improve the treatment of uncertainty in the modelling. The first prototype of the software was released in January 2010, and the feedback collected will guide subsequent versions. Work on model validation and testing begins in earnest once adequate data comes on-stream.

At the end of the four-year project, the FACET team expects its scientific approach will help boost consumer protection efforts in Europe while fostering innovation in the food chain. Through a focused risk management approach, their results should also inform international food regulatory affairs.

Funded under the FP7 programme Cooperation under the theme 'Knowledge based bio-economy'.
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Extending the bicycle life cycle for Europe

What can you do to raise your fitness, save money and reduce global warming? The answer is simple enough: get pedalling! A European research project is making sure that incentives and standards for cyclists when they answer the call to get on their bike are guaranteed.


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So if the advantages are so compelling and attractive, why doesn't everyone ride a bike, at least a little in their leisure time? It seems that people don't always do what is good for them. But with the right carrots or sticks in place that could change.

Carrots are sweeter when it comes to inducing lifestyle changes, so what the punter needs, and likes, must be at the forefront of promotional schemes from government bodies, charities or private enterprise.

The EU-funded project 'BYPAD platform' has taken just this approach and, in the process, changed the behaviour of hordes of Europeans. It has made cycling more attractive and available by asking, and responding, to questions in a specially-tailored questionnaire for local and regional authorities.

'BYPAD platform' has come a long way since its birth almost 10 years ago as the 'Bicycle policy audit' (BYPAD). Funded by the EU's Sixth Framework Programme (FP6) and the 'Intelligent energy Europe initiative' (IEE) to further improve cycling audits, it has evolved into the accepted auditing tool that fits the cycling context of all European countries.

Thirty-five pertinent questions are geared to respondents' country, region, city or town. 'How good is the cycling policy in your town, city or region? Is it effective and efficient? How can it be improved?' BYPAD's auditors look for ways to convert the data collected in the questionnaires into workable solutions to improve biking conditions on the ground.

The auditors are keen to ensure that the information obtained — on or off-line — doesn't gather proverbial dust on the shelf. They are consultants or staff members from organisations who know the cycling context of their country. It is up to these cycling enthusiasts to guide cities and regions to implement BYPAD and develop action plans. More than 80 auditors in 100 cities, regions and towns have been trained and certified to implement progressive change in the cycling world.

'BYPAD platform' considers cycling policy as a dynamic process. The BYPAD quality circle (visit the www.bypad.org website to see more) sums up the system and is divided into monitoring, planning and actions.

A growing concern

Europe has expanded geographically and politically over the past decade and six new countries have been added since the early days of BYPAD including Estonia and Kosovo. 'BYPAD platform' has made sure that language is not a barrier. At present, the questionnaire is available online and in hard copy in no less than 17 languages throughout 21 countries.

Filling in a questionnaire has unexpected spin-offs as well, according to Peter Weiss, bicycle traffic coordinator in Salzburg, Austria: 'Dealing with the questionnaire made me look at our activities from a different point of view. The contents of the questions provided me with many ideas for the future.'

Completed audits can be revealing in other ways as well. For instance, questions that score poorly can be singled out for special treatment — such as recommendations to improve the situation on a certain timescale.

The audit summary includes target scores, the identity of possible funding sources and useful synergies between stakeholders. The main actors responsible for making sure the goals are put into action are then identified. More negative, but essential, is a list of possible objections to the proposals.

Europe is a mixed bag socially and politically, even within regions, but some features of the cycling initiative are common to all areas. Cycling enthusiasts are united by best practices and the existing BYPAD website has been expanded to include a good practice database which also feeds the European Local Transport Information Service (ELTIS) database with up-to-date information on cycle policy.

In the past couple of years alone, the ELTIS website has dealt with cycling in schools in Spain and the UK, and how to establish a cycling culture in Denmark and Germany. Belgium's 'Safe and healthy on the bike' scheme promoted cycling to the elderly as a way of keeping in touch with the local community and staying healthy at the same time.

Steering change

BYPAD is not only spreading the cycling word where it is most needed but it is also stimulating new ideas and approaches in established cycling countries, such as the Netherlands.

The electronic or e-bike is a good example. Aimed initially at cyclists over 60 for making life easier, this hybrid vehicle takes the effort out of pedal power. The compact chargeable lithium battery is discretely housed within the frame or on the rack at the back.

Martijn van de Leur, 'BYPAD platform' consultant in the Netherlands sums up what this cycle means to the user. 'The e-bike is like cycling with the wind always behind you,' he says. 'With the help of an e-bike, a 7 km journey can be raised to 15 km with the same effort from the cyclist.'

Mr van de Leur is keen to extend e-bike use beyond older cyclists. 'We originally aimed at making life easier for the elderly and the disabled,' he explains, 'but the scope is widening and we are promoting the high-tech aspect to attract younger age groups.'

'BYPAD platform' can also boost services generally for the cycling public. 'In the Netherlands, we are constantly improving and upgrading facilities such as parking and charging points for e-bikes,' he points out. The Dutch city of Rotterdam is installing charging points for the e-bike in public cycle parks.

For the many BYPAD stakeholders, including auditors and the public, news of the complementary efforts of other projects is welcome. A good example is in Rotterdam, where companies in the area can test an e-bike and feel the benefits for themselves.

'BYPAD platform' campaigns for all kinds of bikes, not just the e-bike. 'Appealing to other target groups is the way forward in a country like the Netherlands where cycling is already popular,' Mr van de Leur points out. 'Another popular cycle is the cargo bike for the family with small kids.' The cargo bike is equipped with a tough wooden box at the front where the children sit and the bike has a low centre of gravity for safety. The small passengers are even strapped in with three-point harnesses.

A stamp of success

'BYPAD platform' is always looking to expand auditor experience and disseminate information using the internet, conferences and congresses. The latest attended by project auditors was Velo-city Global 2010 held in the Danish capital Copenhagen. The project has established a massive network of both information and representatives and its growth looks set to continue.

The success of BYPAD is evident in virtually all bicycle circles throughout Europe. Different national and regional authorities — for example, the Czech Republic, Germany and Austria — advocate use of the project as a quality management tool.

Little wonder then that BYPAD has the reputation of being the quality standard for cycling policy throughout Europe.

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Imminent success for the e-bike

The advantages of the electric bicycle are undeniable but public uptake has so far been disappointing. Research by the European project E-tour is pointing the e-bike in the right direction so it can take the position it deserves in the alternative green vehicle market.

Traffic congestion and pollution in European cities are damaging to infrastructure, the population and its heritage. Furthermore they are a disincentive to businesses that are a city's life blood. Most journeys within cities are very short in terms of distance but of course take a disproportionate amount of time.

Two-wheeled hybrid electric vehicles would appear to be the answer to these problems and the 'Electric two-wheelers on urban roads' (E-tour) project investigated their commercial viability. During trials in 10 centres throughout Europe, they also gauged level of public acceptability for the bicycle with power.

More than 700 e-bikes and 600 e-scooters were put on trial and feedback was collected from the public, local authorities and users. Overall there were no objections against using the e-vehicles. In fact, the local environmental benefits are enough to pave the way to promotion of the many advantages of the bikes.

E-tour researchers highlighted obstacles which may hamper the electronic bike's uptake which mainly revolve around the power supply. The price of the battery is unacceptably high, inflating the overall price. Secondly, the design of the bicycle needs to be more attractive to appeal to a wider market.

The researchers suggest that all key players can help solve these potential problems. Dealers can provide a competitive price structure, manufacturers can improve battery technology and design and public authorities can introduce incentives for the use of these clean, silent vehicles.

The e-bike seems to have a future in the market for short urban journeys or on small islands where use of cars is restricted or banned altogether. With a concerted effort on behalf of all interested parties, the e-bike could join the ranks of the greener vehicle in tomorrow's clean cities.

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 > 5643


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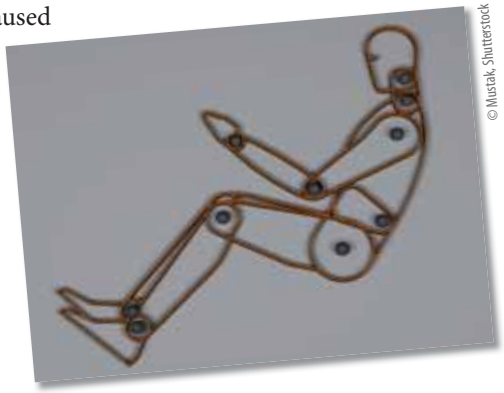
Taking advanced driver systems a step further

Advanced driver assistance systems (ADAS) have progressed in terms of becoming more applicable and efficient thanks to an assessment method a European project has developed to optimise these technologies.

With so many lives lost each year on European roads, improving road safety is of paramount importance. Special systems which can assist drivers such as ADAS to provide a solution. Beyond supporting drivers, ADAS can help increase road capacity while also lessening the environmental problems caused by traffic.

With such systems entering the market for commercial use, it is important that their implementation, impact and acceptance are assessed. The EU-funded Advisors([1]) project set out to do just that. The project investigated the potential of ADAS in terms of market conditions as well as the impacts on driving behaviour, road safety and the environment.

By creating a common assessment methodology to cover all these areas of investigation, Advisors achieved several objectives. For example, assessments of road safety, driver comfort, network efficiency and environmental impacts are now possible. End-users are now aware of ADAS implementation problems that may stem from legal, institutional, socio-economic, financial, organisational and user-acceptance issues.



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An appealing aspect of this assessment methodology is that it may be applied to other innovative technology fields due to its comprehensiveness. However in terms of the effects of ADAS deployment, further research is required, particularly in terms of safety implications.

(1) 'Action for advanced drivers assistance and vehicle control system implementation, standardisation, optimum use of road network and safety'.

Funded under the FP5 programme Growth (Competitive and sustainable growth).
Collaboration sought: further research or development support.
http://cordis.europa.eu/marketplace > search > offers > 5654

Pricing reform for sustainable transport

The Imprint-net([1]) project provided a forum for policy makers, researchers and other stakeholders to discuss the implementation of a new pricing regime for transport tariffs. Charging according to infrastructure use can form a significant part of a sustainable transport policy.

The work of the consortium built on the experience gained from previous projects and cooperated closely with other relevant pricing research initiatives. Researchers disseminated results to policy makers and key players involved in transport pricing reforms. Particular attention was paid to air and waterborne modes of transport where the available information was less developed.

The project studied links between infrastructure charging and investment requirements, and pricing reform in light of European Union enlargement. Results included achieving consensus among stakeholders on the best way to carry out pricing reforms in the transport sector. An impact analysis of pricing policies showed the need for further research, particularly with regard to waterborne transport.

Analysis of the road sector showed that the best course of action was to charge heavy goods vehicles rather than passenger cars. According to the rail sector, the fairest system is infrastructure charges based on gross tonne per kilometre to reflect the cost of wear and tear. Prices can also be applied according to the type of track employed, such as high speed or low density lines.



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Findings showed that a cost-benefit analysis should be applied to the maritime sector, together with regional impact and socio-economic impact analyses. The studies can determine whether the introduction of pricing is necessary. The air sector should find better ways of evaluating the impact assessment of the external costs of air transport; with particular focus on global warming, noise, and congestion.

Imprint-net data can help fill gaps in the available body of knowledge surrounding the issue of price reform. By promoting sustainable transport the project is helping to improve the quality of life for EU citizens, reduce environmental impacts and boost the economy.

(1) 'Implementing pricing reforms in transport — networking'.

Funded under the FP6 programme Sustdev (Sustainable development, global change and ecosystems).
Collaboration sought: further research or development support.
http://cordis.europa.eu/marketplace > search > offers > 5607

Improving models for sustainable transport

Decision-makers in the transport field require advanced computer models and policy assessment tools, which have grown increasingly complex over time. This challenge has been addressed by the Spotlights-tn([1]) project which provided a platform for European transport modellers to discuss their work.

The Spotlights-tn project explored how to make transport models more reliable and transparent to end-users, as well as becoming more integrated in the policy making process. Project partners also established four different discussion lines in order to produce procedures or tools for making advanced transport models more available to decision makers. Themes included recognising the scientific character of models, documenting models in a transparent way, exchanging results and improving the models' usability. Results from closely related projects were also added.

The project carried out workshops, one for each discussion line. Results of the workshops included setting up a quality control procedure for modelling and establishing harmonious descriptions of transport models. Researchers also created a generalised transport data format (GTF) for exchanging information between advanced models. The final workshop explored new long-term software and modelling solutions for integrating models into decision-support tools, so they can be used as effectively as possible.

The network established by Spotlights-tn inspired transport modellers to embrace new opportunities for making their work more widely known and accessible to end-users. Increased use of highly accurate, reliable and user-friendly transport models can enable decision makers to make better informed choices and help improve the quality of life of EU citizens.

(1) 'Supporting European policy makers: assembling information and briding models towards a European policy decision-support system'.

Funded under the FP5 programme Growth (Competitive and sustainable growth).
Collaboration sought: information exchange/training
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Forecasting Europe's freight transport needs

The Think-up([1]) project successfully brought together national experts on transport modelling through a series of workshops concerning the difference in results between Europe as a whole and individual Member States. Individuals were able to exchange experiences and achieve greater insight into the impact of policy measures aimed at promoting more environment-friendly forms of transport.

The European-funded project comprised a thematic network for transport experts and included policy-makers, service providers and users. The project developed a common platform for forecasting the future of transport in Europe and supporting the long-term decision-making process. The consortium collated results for building future scenarios that compared and contrasted the different methodologies employed.

Transport users from different industrial sectors were brought together with service providers to identify segments of the freight transport market. The different segments were later verified by transport experts and included changing logistical requirements and improved operating systems.

A policy impact analysis was also performed using different conditioning constraints to study transport logistics. The result was a more detailed understanding of competition between different forms of transport, including road, rail, inland waterways and short sea shipping. However, any assessment needed to take into consideration the influence transport operators and industrialists can have on policy through lobbying.

The Think-up project therefore successfully created a discussion platform that took a long-term view in developing and comparing a common working model for transport demand. The results will help the EU to deliver both competitiveness and sustainable growth in the transport sector.

(1) 'Thematic network to understand mobility prediction'.

Funded under the FP5 programme Growth (Competitive and sustainable growth).
Collaboration sought: further research or development support.
http://cordis.europa.eu/marketplace > search > offers > 5481



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Making hydrogen for transport work

The project Hylights(1) has assessed European and US demonstration projects on hydrogen for transport. The main conclusions were that there are too few vehicles running on hydrogen for a full-scale demonstration project to be effective.

The managers of nine European demonstration projects and one US demonstration project were interviewed for the assessment. The outcome of the interviews was that there were too few hydrogen vehicles on the road. Another point mentioned was the need to define a follow-up phase early on to ensure continuity in the project.

Refuelling stations for hydrogen vehicles remain a problem. It was suggested that only one partner should be in charge of approval, building and operation of these stations, to avoid any complexities.

To enable the success of these demonstration projects it is imperative that there are more hydrogen vehicles on the road. This can be achieved through the early commitment of the vehicle industry.

Although all demonstration projects undergo some form of assessment, these tend to vary. It was suggested during the interviews that assessments be carried out under the common Hylights monitoring and assessment framework. This would provide a practical approach to project assessment.

Another point raised concerned the unclear guidelines on what to do once the projects have been finalised. It was therefore suggested that in future it should be made clear early on as to where each project fits into the overall strategy.

Financing remains a lasting problem, as there are no guarantees of continuous funding. One idea floated to counter this problem was to secure finances during the project preparation phase.



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Flexible financing was also called for throughout a project, as priorities could change and more money could be needed in other areas.

Furthermore, in future every publicly funded project should be required to provide information regarding data, results, publishing status and lessons learned.

(1) 'Hydrogen for transport in Europe'.

Funded under the FP6 programme Sustdev (Sustainable development, global change and ecosystems).

Collaboration sought: further research or development support.

http://cordis.europa.eu/marketplace > search > offers > 5658

The complete recipe for energy sustainability

The gradual move away from fossil fuel dependency for transport must be accompanied by research into alternative engineering and infrastructure. A European project has mapped out the direction research should be taking.

The evolution of the future of the global transport system is linked to energy supply. The development of the motor engine and its environmental challenges is a prime example. Rising fossil fuel prices as a result of limited supply have helped to direct research on the path to alternatives like biofuels and hydrogen.

The unsustainable growth of vehicles has also raised concerns about pollution. Unlike many studies on transport, a comprehensive assessment of transport needs coupled with technological progress and supply of energy sources is required.



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With funding to the tune of over half a million euros from Europe, the project TRIAS(1) came up with a series of models covering the next 40 years. Variables included transport and energy technologies, and their economic, social and environmental impacts.

TRIAS researchers merged established models such as the 'Prospective outlook on long-term energy systems' (POLES) and 'Assessment of transport strategies' (ASTRA). The ASTRA model assesses the long-term prospect for transport and investments whereas POLES focuses on energy supply and demand.

The newly combined simulations were then updated with the latest transport models for projections up to 2050. For this purpose, the team developed a new tool to merge the established models with crucial data to compare the results of eight policies with a baseline situation.

Ironically, use of biofuels led to a conflict with global food supply so the hydrogen fuel cell reigns as the preferred source of the fuel. Advances in the production of hydrogen from renewable resources emerge as the key to set production of future energy and transport requirements in the right direction.

However, to reduce the carbon debt it is recommended that carbon taxes should be levied on all fossil fuels. If oil prices stay high, the study concludes that Europe will be on track to drive its technology to more sustainable modes of transport.

TRIAS has succeeded in taking a fresh perspective on established, respected transport and energy sector models. A truly integrated approach can steer Europe's research in the most sustainable direction.

(1) 'Sustainability impact assessment of strategies integrating transport, technology and energy scenarios'.

Funded under the FP6 programme Sustdev (Sustainable development, global change and ecosystems).

http://cordis.europa.eu/marketplace > search > offers > 5584

Clean up for the city of the Alps

European cities are under constant threat from their own economic success. Research and finance is being ploughed into improving technologies to reverse the adverse symptoms of urban development.

The 'Integrated software for health, transport efficiency and artistic heritage recovery' (Ishtar) project aimed to develop software to monitor the effects of recovery initiatives in eight European cities. The Grenoble case study focused on improved traffic flow and public transport.

Grenoble, known as the city of the Alps, suffers from traffic problems due to major roads being wide enough to hold six lanes. Reducing this to four means that bus lanes can be accommodated. By installing new traffic lights, the hope was to reduce car speeds and therefore emissions and noise.

Sophisticated monitoring systems were installed to measure noise, speed, pollution and weather conditions which may impact exhaust gas levels. The data was fed into simulation models and results compared with those collected before the EU-funded Ishtar began.



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Ishtar software, in most cases adapted to the French city conditions, analysed the information. Tools used included geographic information systems (GIS), Davisum for traffic forecasting, ARIA for air dispersion/pollution modelling and an emissions model TEE.

Simulations showed that the results of reserved lanes and modified traffic lights led to a reduction in emissions, likely to improve air quality. There was a reduction of noise levels in some areas and particulate matter declined significantly in the short term.

Integrated measures like the combination of changes in public transport and traffic flow merit the use of comprehensive monitoring suites. Logging changes and simulations for a range of European cities can give a basis for future studies and an effective clean-up of our urban areas.

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 > 5606

Robots carry out aircraft inspection

European engineers and scientists have developed a robot for undertaking faster, cheaper and safer inspections of aircraft.

Manual inspection of aircraft is both time-consuming and expensive and also vulnerable to human error. The process is particularly costly when components need to be examined by X-ray as they must first be removed from the plane. The project 'Development of a robotic system for the inspection of aircraft wings and fuselage' (Robair) has solved the problem by developing a robot inspector that can conduct mandatory non-destructive testing (NDT) of civil aircraft.

Researchers developed a device that can climb over an aircraft's fuselage and wings while searching for loose rivets and cracks. The device enables data to be automatically collected and checked and structural flaws identified without having to first remove components. The robot employed both conventional sensors and state-of-the-art technologies developed by the project.

Flexible feet adhere to the curved surface of the aircraft and sensors check that there is sufficient vacuum to hold the robot in place before each step is taken. A series of universal joints in each foot, ankle and the rest of the structure provide sufficient flexibility to enable it to climb over the aircraft.

The prototype and technologies developed by the Robair project will be commercialised following the project's completion. The work undertaken by the consortium will help promote Europe's aviation industry in the global marketplace.

Funded under the FP5 programme Growth
(Competitive and sustainable growth).
Collaboration sought: Further research or development support.
http://cordis.europa.eu/marketplace > search > offers > 5695



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Super efficient boats riding high on a cushion of air

Fast ferries are riding the waves with increasing comfort, speed and greater fuel efficiency while producing less pollution. A European project is helping to accelerate their technological development even further.

Air supported vessel (ASV) technology has resulted in fast ferries that cut journey time dramatically for passengers and freight. Support of the vessel is from a captured quantity of air known as a bubble. Hydrofoils, large fin like structures, lift the hull clear of the water at speed, give support and control.

With EU funding, the project 'Energy efficient safe innovative fast ships and vessels' (Effises), with 13 partners from 9 European countries, developed a new generation of energy-efficient fast ships using air cushion techniques and approved catamaran hull configurations. SES Europe AS, experts in high-speed marine transport, headed the project to improve fuel and hull efficiency, reduce emissions and decrease wake wash or turbulence which can damage coasts and moored vessels.

The Effises team worked on two ASV catamarans to increase air support up to 85 % for the 40 metre catamaran passenger ferry and 50 % for the larger 125 metre Ropax vessel. Ropax is basically a roll-on/roll off freight vehicle ferry with passenger accommodation.

Trials for the new boats were comprehensive. After successful tests in tanks in still water and wave conditions, two large operational manned prototypes confirmed the tank results. Test runs were made in a range of locations, the Mediterranean, the Danube and Scandinavian waters.

The results were very encouraging. For the 40 metre boat, improvements of up to 40 % efficiency were recorded. All important for safety and efficiency, motion was recorded as excellent. The Ropax vessel gave equally impressive figures and high-speed efficiency improvements nudged 20 %.

For both models, load carrying capability and transport efficiency come into the market leader bracket. From a green point of view, wake wash was lower, good news for coastline erosion.

The Effises engineers have proved that significant technical improvements can be developed into fully operational vessels. The new environmentally-friendly fast ships can be used both on inland waterways and offshore ferries. Freight and passenger movement will both benefit, improving marine transport efficiency in line with Europe's vision for relieving the load on overcrowded roads.

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

Collaboration sought: Further research or development support.

http://cordis.europa.eu/marketplace > search > offers > 5690



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Common concern for ships operating in Arctic ice-covered waters

International initiatives can make a positive contribution to the overall effect of industrial development in Arctic regions. By facilitating direct discussions between industry representatives and local people, EU-funded researchers are fulfilling an important mediation task.

Amidst growing concern over the rapid climate changes occurring in the Arctic regions, experts in marine transport and researchers of sea ice established a framework for cooperation, the 'Arctic operational platform' (ARCOP). This initiative was the first critical step in addressing the multi-faceted issues of the future for Arctic marine transport.

While the ARCOP project considered the entire Arctic Ocean, a significant portion of the discussions focused on Russia's Northern Sea route. First under Soviet rule and now the Russian Federation, strong emphasis continues to be placed on exploring and developing shipping through the Arctic Ocean.

An indication of Russia's interest in expanding the activities in the Arctic Ocean is the creation of a new federal law dealing with the Northern Sea route. Using this sea route to move oil and gas out of Russia is an attractive possibility but several issues must be addressed to attract potential investors.

The aim of the ARCOP project was to understand the marine transportation problems of the Arctic Ocean, as these apply to oil and gas. For this purpose, the discussion forum between the European Union and Russia was established, as well as between industry and academia so that common recommendations could be provided.

This international gathering placed a spotlight on the increasing possibilities for marine access through the Arctic Ocean. Scientific information presented on sea ice trends provided evidence that oil and gas transportation by the Northern Sea route is technologically possible and environmentally feasible.

However, the safety issues, including the protection of the Arctic environment should be further investigated. Maritime safety in the Arctic regions is based in general on the same rules that regulate maritime activities on a global basis. But the area used to be visited only by ships specially designed for trips under the extreme conditions that ice and low temperature create.


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The damage that can result from shipping accidents stresses the need to take initiatives to strengthen the safety of ship movements in the Arctic. One issue of particular importance is the availability of rescue and pollution abatement services. Since there is no automatic identification system (AIS), new tools are required for marine surveillance and ship traffic management.

The research agenda formulated by the end of the project aims to build on the internationally recognised need to manage human activities within the context of entire ecosystems. An increase in shipping in the region will require their harmonisation to achieve sustainable development of the Arctic.

Funded under the FP5 programme Growth
(Competitive and sustainable growth).
Collaboration sought: Information exchange/training.
http://cordis.europa.eu/marketplace > search > offers > 5694

Spreading the word on urban freight solutions

For the city dweller, easy access to shops, jobs, services and entertainment can come with a high price. An EU-funded project, 'Best urban freight solutions II' (Bestufs II), has extended the scope of innovative urban solutions to deal with the downside of urban living.

For most people, the phrase 'urban freight' conjures up images of exhaust and noisy vehicles that block or damage roads and even buildings. Valid reasons why a city should be accommodating freight vehicles include delivering goods and removing waste. Unfortunately, heavy vehicles are essential for keeping shelves stocked and vital trade going whilst removing the spoils of urban life.

In Europe, the cities with the edge in innovative transport solutions tend to be found in the capitals or in those with the largest populations. Access to funding is the key to implementing the most advanced city logistics solutions (CLS). The aim of the EU-funded project was to build on the success of the predecessor project, Bestufs. A major objective was to extend the advantage of CLS to small and medium-sized cities with particular focus on the newer Member States.

The Bestufs II researchers widened and strengthened the network of city freight stakeholders. A large spectrum of players is involved including the freight experts themselves, policy makers and researchers. The result is an in-depth analysis of the advantages and disadvantages of possible solutions. These solutions were presented in surveys and reports. A more physical presence of participants came at conferences and workshops throughout Europe.

Apart from finance, another reason for small urban areas lagging behind their larger counterparts is the lack of access and information to up-to-date CLS. To remedy this major shortfall, which could be due to language difficulties, a Bestufs good practice guide was published.

Translated into 17 languages, the guide aims to communicate information and solutions to all urban areas in Europe. The guide acts as base material for local project representatives to communicate the most efficient ways to distribute goods in their areas without being a nuisance to the environment.

As the title suggests, the *Bestufs good practice guide on urban freight transport* is a collection of good practice examples taken from all over Europe. Updated versions in Bestufs II stressed intelligent transport systems, e-commerce, and the role of public-private partnerships for waste transport, greener vehicles and enforcement of city access restriction schemes.

The Bestufs II comprehensive approach is taking urban solutions to those cities where they are most needed. For the citizen, this means that city dwelling can have all the advantages of access to services without the usual noise and pollution of a large population.

Funded under the FP6 programme Sustdev
(Sustainable development, global change and ecosystems).
Collaboration sought: further research or development support.
http://cordis.europa.eu/marketplace>search>offers>5486


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Who put environmental policy on the map?

Why did the EC develop and pass ground-breaking environmental legislation in the 1970s? The Entranet(1) project has sought to provide an answer by outlining the beginnings of environmental policy at the European Commission level, which led to its incorporation into the Single European Act in 1987.

The Entranet project studied how a new area of policy, not anticipated in the Treaties of Rome in 1957, was taken up by the European Commission. This development was even more unexpected as it occurred at a time when the main focus was on economic modernisation and prosperity.

Researchers examined how informal transnational networks comprising the European Commission, national ministries and the environmental movement were able to shape a new environmental policy agenda. This was in contrast to the conventional approach, which concentrates on the role of Member States.

The Council Directive on the Conservation of Wild Birds 79/409/EEC was used as a case study. The study revealed that European Parliament Members responded to public pressure to protect wild bird populations. Findings showed that European institutions in the 1970s were more responsive to the demands of public and expert opinion and non-governmental organisations (NGO) than previously believed.



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The results of the Entranet project will provide a valuable contribution to the ongoing debate among academics, lawyers and policy makers regarding the way new areas of legislation arise within the European Union.

(1) 'Protecting the environment. Transnational networks in the emergence of a new EC Policy in the 1970s'.

Funded under the FP7 specific programme People (Marie-Curie actions).

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Mapping the future of biodiversity

Climate change and the expansion of human habitation have put pressure on biodiversity. There is a growing consensus that the only way to counter this threat is to adopt effective adaptation strategies and provide decision-makers with accurate information through the careful monitoring of our natural environment.

EU environmental monitoring services have been defined, developed and implemented through the 'Global monitoring for environment and security' (GMES) initiative. The focus of GMES has been to provide harmonised geo-information at both local and international levels in a time- and cost-effective manner.



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A good example of a GMES project is Geoland(1), which was completed in 2007 and aimed to build on previous work by developing and demonstrating a range of reliable, affordable and cost-efficient European geo-information services. The purpose of these services would be to support the implementation of European directives and their national implementation, as well as European and international policies.

Some 56 Geoland partners developed products and services that utilised available Earth observation (EO) resources in combination with *in-situ* measurements. It was envisaged that these geo-information services would support authorities and institutions in fulfilling their expanding monitoring and reporting obligations, and help them to better manage natural resources.

The project was conceptually divided into regional and global services. Regional services, which focused on the implementation of newly established European directives, were structured into three observatories.

A nature protection observatory addressed the Habitats and Bird Directive, the Ramsar Convention and the Convention on Biological Diversity. A water and soil observatory was geared towards the Thematic Strategy for Soil Protection and the Water Framework Directive. Finally, a spatial planning observatory tackled the European spatial development perspective. A core service supported the observatories with cross-cutting products.

All these activities took into account the need to implement the Sixth Environmental Action Programme and the Sustainable Development Strategy. As two leading initiatives in Europe today, these programmes have been geared by all major stakeholders to steer long-term

sustainable change in all types of environment — from marine to air.

Global services focused on supporting policies concerning global change and sustainable development. These projects were again structured into three observatories. Two observatories — one for natural carbon flux and the other for forest change supplied information in line with recent UN forums on climate change and forests respectively. A food security and crop monitoring observatory addressed food aid policy issues. Again, a core service supported the observatories with cross-cutting products.

The project succeeded in developing EO-derived information such as maps, statistics, indicators, typologies and scenarios that allow for systematic and geo-spatially explicit territorial analysis. This provides the European Commission, Member States and regions significant information and tools, and will enable decision-makers to efficiently implement and assess actions that protect our precious biodiversity.

(1) 'GMES products & services, integrating EO monitoring capacities, to support the implementation of European directives and policies related to "land cover and vegetation"'.

Funded under the FP6 programme 'Aeronautics and space'.
Collaboration sought: further research or development support.
http://cordis.europa.eu/marketplace > search > offers > 5752

Going underground for evidence of climate change

Cave formations such as stalagmites have been investigated for their suitability for studying changes in climate over recent decades.

Caves across Europe have been examined by scientists for signs of climate change. Researchers from the Procavet(1) project identified five suitable study sites located in Spain, France, Slovenia and the UK. Experts monitored temperature and changes to the cave environment and cave formations for evidence of global warming. Earlier records of conditions within the caves were also recovered and compared with the latest findings.

Stalagmite samples were taken from all the different sites and analysed to determine the age of the cave. The results were compared with other techniques that employed hydrochemistry and Carbon-14 dating. Project partners also examined growth rates of stalagmites, which can give an indication of temperature changes over the previous decades.

A computer model was used to explain the transfer of heat from the surface to the cave below. The model enabled researchers to gain a better understanding of the processes involved in the transmission of temperatures. The depth of each gallery is critical to the caves response to environmental change as heat is mainly transferred through conduction. Other important processes, apart from climate change, which can affect the temperature within the cave, include land use and loss of forest cover.

Data from the Procavet project indicate that caves close to the surface are recording rises in temperature due to global warming, however, delays of up to several decades were recorded for galleries that are tens of metres deep. Work conducted by project partners showed that stalagmites were capable of recording environmental changes within the cave.

The study of caves and cave formations by the Procavet consortium will provide scientists with an additional technique for gaining evidence of climate change and increase their understanding of the problem.

(1) 'Proxies from cave deposits: testing their sensitivity using the current period of global change'.

Funded under the FP7 specific programme People (Marie-Curie actions).
http://cordis.europa.eu/marketplace > search > offers > 5723



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Understanding ocean acidification

The failure to fully address the effects and implications of ocean acidification could have disastrous economic and environmental consequences. Before effective action can be taken, however, a thorough understanding of ocean chemistry and biology is needed.

The EU-funded 'European project on ocean acidification' (EPOCA) was launched in June 2008 with the aim of advancing scientific understanding of the biological, ecological, biogeochemical, and societal implications of ocean acidification. The thinking behind the project was to provide scientists with a detailed picture of the sensitivity of marine organisms, communities and ecosystems to ocean acidification. Through the integration of these results, scientists would be in a better position to understand and predict the responses of the Earth system to ocean acidification.

The EPOCA project is reportedly the first international research effort on ocean acidification. Due for completion in 2012, the project has brought together more than 100 researchers from 29 institutes and 10 European countries.

The key goal of the project was to document changes in ocean chemistry and biology. Paleo-reconstruction methods

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have been used on several archives, including foraminifera and deep-sea corals in order to determine past variability in ocean chemistry and to tie these to present-day chemical and biological observations. The project then focused on uncertainties, risks and thresholds ('tipping points') related to ocean acidification at scales ranging from sub-cellular to ecosystem wide, and from local to global.

A sediment model was developed to evaluate the response of coastal marine sediments to ocean acidification. More than 70 students and young scientists were trained in two courses organised by EPOCA in Bergen, Norway and Cambridge, UK in 2009.

Significant findings have been made. The project has determined, for example, that degradation of organic matter in the Laptev and parts of the East Siberian Sea has led to elevated CO_2 and low degrees of aragonite saturation state, even in the surface water. There is also evidence of a combined impact of CO_2 and temperature on the cold-eurythermal spider crab *Hyas araneus*, suggesting a narrowing of its thermal window under moderate increases in CO_2 levels.

The first results on the response of deep-sea corals found that lowering pH by 0.15 and 0.3 units relative to the ambient level resulted in calcification being reduced by 30 % and 56 %. The study has also found adverse effects of elevated CO_2 on the *cyanobacterium Nodularia spumigena*, a heterocystous bloom-forming diazotroph of the Baltic Sea. Furthermore, during the summer months, 10 % of Arctic surface waters will likely become undersaturated within 10 years.

All the objectives of the first reporting period — from May 2008 to October 2009 — have been met. However the project, which still has two years to run, aims to answer other critical questions. These include the rate at which ocean acidification proceeds and the hotspots where critical pH values will be reached first, the consequences of ocean acidification in terms of biodiversity and the ecosystems which are most vulnerable to ocean acidification.

Funded under the FP7 specific programme Cooperation under the theme Environment (including climate change).
http://cordis.europa.eu/marketplace > search > offers > 5717


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Reducing air pollution in urban environments

Air pollution is a major concern for many European cities, particularly those situated in the Mediterranean area where climatic conditions heighten the problem. An EU-funded project based on four European cities is developing new methods to safeguard citizen's health and quality of life.

The interdisciplinary 'Health risk from environmental pollution levels in urban systems' (Hereplus) initiative is studying the risk from air pollution in urban environments. Project partners have developed maps for Rome, Madrid, Athens and Dresden that indicate the threat to human health. The risk maps have been developed with the aid of geographic information systems (GIS) and validated epidemiological models for the four cities.

Epidemiological studies show that there is a clear link between air pollution and an increase in the number of cases of sickness and death in a given population. The inhalation of air pollutants such as ozone (O_3) and particulate matter (PM) can cause heart and lung problems. Researchers from the Hereplus project have modelled the response of the human body to O_3 and PM by adapting the best available existing models to local conditions in the cities in question.


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Project partners are working alongside local authorities to develop best practice guidelines for selecting vegetation to reduce the impact of air pollution in built-up areas. The guidelines are being used to determine which species should be planted in the green spaces located around city neighbourhoods. They include risk maps and advice on which vegetation is most effective and cost-efficient as a sink for these pollutant gases.

Risk maps and guidelines for the use of urban vegetation will continue to be collected for an operational manual that can be used as a baseline for local authorities and European policies. This coordinated approach is helping to develop decision-support tools for administrators and environmental agencies for determining current and future health risks.

The Hereplus project has successfully used an interdisciplinary approach to examine the health risk posed by air pollution. In parallel, they have also developed a cost-effective, sustainable and potentially attractive solution for reducing levels of O_3 and PMs.

Funded under the FP7 specific programme Cooperation under the theme Environment (including climate change).
http://cordis.europa.eu/marketplace > search > offers > 5754

Monster system for fighting noise pollution


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Of all the environmental problems related to air transportation noise pollution has, without doubt, one of the greatest effect on the people who live around airports. An EU-funded project developed a new method that could help stakeholders to reduce the extent of this problem.

The sources of noise today seem almost limitless – in homes, factories and on the street. But for most Europeans, transportation sources, particularly private airplanes and helicopters as well as commercial jets and military aircrafts are the most serious offenders.

Governing bodies adopt ever-stricter measures to contain this problem, but this imposes a drastic limit on the growth of air traffic. On the other hand, researchers are busy trying to find solutions and technologies on behalf of the aeronautical industry.

The development of a new system capable 'listening' to noise emissions in order to identify aircraft types and manoeuvres could contribute to the protection of people who live close to airports. Progress has been made in this direction in the 'Monitoring noise at European airports' (Monster) project. Coordinated by Air Support S.r.l. in Naples, the project involved research centres and companies from Bulgaria, Spain and Italy.

The system developed works like a speed camera for aircraft. It is composed of an algorithm to identify the aircraft's acoustic signature and a dedicated neural network classifier. The latter was 'taught' to recognise different aircraft types, the manoeuvres performed and the route taken through a 'learning campaign' conducted at Naples airport.

Five aircraft types, including commercial jets such as the Boeing B737 and Airbus A320, popular carriers for short-haul journeys were monitored as part of this campaign. The number of take-off and landing operations recorded and the aircraft noise emissions analysed by the Monster researchers exceeded 200.

By the end of the project, a prototype was set up which consists of four noise monitoring stations located inside the airport and one remote receptor located at the Italian Aerospace Research Centre. The need for a smaller number of monitoring stations, compared with current systems, allowed project partners to envisage a significant reduction in the costs of the new system.

Furthermore, the satisfactory results of experimental tests leave the door open for using the new system for other purposes as well, such as making sure that no-fly zone agreements are respected.

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

Collaboration sought: further research or development support.

http://cordis.europa.eu/marketplace > search > offers > 5706

Progress for EU farm animal welfare


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The promotion of farm animal welfare across the EU is receiving a necessary boost.

European farm animal welfare not only impacts the animal but also has an important role in the livestock production chain and in the concerns of civil society. The EU-funded Econwelfare([1]) project began in August 2008 and involves nine academic partners from eight European countries. The project is in line with the Commission's Action Plan on Animal Welfare, published in 2006.

Econwelfare has undertaken several main objectives. Among them are to first of all examine current EU animal welfare initiatives and standards as well as those of primary EU trading countries. The strengths and weaknesses of the initiatives are to be spotted in relation to the animal, society and the production chain. The plan is to create and develop policy measures for the promotion of higher animal welfare standards and to monitor this progress. Finally a cost-benefit analysis needs to be implemented.

Initiatives and literature analysis are being conducted and current animal welfare policies of the EU categorised. Since one solution for furthering animal welfare cannot be applied to all countries, policy measurements will need to be implemented on multiple layers. Thanks to recent collaboration with the European Animal Welfare Platform, the progress of the project should be heightened by the exchange of data and expertise.

Results will be made available on the project website: www.econwelfare.eu

(1) 'Good animal welfare in a socio-economic context: project to promote insight on the impact for the animal, the production chain and society of upgrading animal welfare standards.'

Funded under the FP7 programme Cooperation under the theme 'Knowledge based bio-economy'.

http://cordis.europa.eu/marketplace > search > offers > 5740

Tracking wood from forest to furniture

Wastage in the traditional wood industry is high, causing big economic and environmental costs. An EU-funded project looked into technologies to introduce greater traceability throughout the wood production chain and increase productivity in the sector considerably.

If a tree is felled in the forest, will it make into a finished wood product? This variation on the common philosophical riddle is a question that the industry needs to ponder. At present the answer is uncertain, as around 10 % of the wood that is felled is wasted. This translates to a volume of 25 million m^3 of wood and a cost of EUR 5 billion each year across Europe.

'This is a huge waste of money and resources,' says Dr Richard Uusijärvi from the wood technology department of the SP Technical Research Institute of Sweden. 'Europe is a very big exporter of wood, accounting for 25 % to 30 % of all wood worldwide.'

The problem, he explains, is that manufacturers do not take into consideration the quality of wood before it goes into sawmills. 'They put all wood in there and decide which to use afterwards. In many cases the wood is not the correct quality and they get rid of it.'

Dr Uusijärvi was coordinator of the 'Traceability for wood industry competitiveness digital forestry chain' (Indisputable key) project, a recently-finished collaborative research effort looking into how to improve this situation using advanced information technology. 'We wanted to create a system that could automatically trace wood throughout the production chain on a large scale,' he says.

The system uses electronic tagging to enable logs to carry their history with them on the path from the forest to sawmill and wood printing technology on boards to final wood product.

'The result is that trees that are not suitable to be sawn will not end up in the sawmill. The properties of the timber will be exploited to minimise waste,' continues Dr Uusijärvi. 'This means increased product quality at a lower environmental cost.'

Introducing tracking

The project developed a system based on individual associated data (IAD). It means that when the tree is felled and cut up into logs, each log is marked electronically with a unique code linking it to a database storing information such as the size of the log, felling location and time of felling.

This data about the tree and its quality can then be used in the forest and throughout the wood production chain for important decision-making, suggests Dr Uusijärvi. Instruments in the transport vehicles and processing machines can use this data to ensure wood of the correct quality is delivered where it is needed. The technology improves logistics and prevents the mixing of different quality logs.

The project team developed two elements in order to tag the logs — a microchip transponder that is embedded in the wood and an ink-based marking system. These elements are added as the trees are felled and further information is inputted as the logs travel through the production chain.

The researchers also developed the supporting technologies for the system, including an automatic transponder applicator (ATA) to insert the tags into the wood; an automatic sword printer (LogDots) to apply the ink, as well as the supporting systems and software to read them.

An important feature of the system, stresses Dr Uusijärvi, is that it refines itself. 'Data is collected as wood goes through the system. This means that the wood that was the correct quality for a given use is noted, enabling better decisions the next time,' he says. 'It minimises the wood needed for specific uses.'

Viability

The project built on an earlier EU-funded effort. 'The Lineset project had enabled us to understand that such a system of traceability would be possible and it explored the benefits it could bring for the industry,' says Dr Uusijärvi. 'But we needed to create a new system to make it practical at a commercial level.'

'We worked on efficiently adapting available communications and data technology to the market,' he adds.



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A key technological development was to use ultra-high frequency RFID (radio frequency identification) transponders. 'These had never been used before with wood. We were able to demonstrate that they were viable at an industrial level,' says Dr Uusijärvi.

Some 30 000 transponders were produced for the 'Indisputable key' project. 'We had them produced in an injection moulding process,' he

says. The transponders were tested at a number of sites, from logs in the forest to sawmills and plywood and pole manufacturers in Finland, France, Norway and Sweden.

'We achieved what we set out to do,' he adds. 'We showed that is possible to produce the transponder on a large scale. We have shown that the IAD works and we tested the system in practice over a long period of time.'

Next steps

However, more development of the technologies is needed before they can be commercially viable. 'We need to minimise the costs and size of the transponders,' says Dr Uusijärvi.

The current cost in large quantities is about 30 cents per transponder. 'Though this could still be slightly reduced, it is still too high,' he continues. 'To get the industry to adopt the system it would need to be around 3 cents but this requires a continuous manufacturing process instead of the present batch process.'

Another important factor is to reduce the unit size. 'We need a continuous process that can insert the transponders instantaneously as the logs are cut,' says Dr Uusijärvi. 'This is not possible with the size of the current units and the forces needed to put them in the logs. Today it takes some seconds extra, which is too long.'

However, he remains optimistic that it would be possible to half the dimensions of the unit, which would enable this breakthrough. 'We have some good ideas on how to do it. This would reduce the volume by a factor of 10 and all forces would be much less,' he says.

Another element that needs to be developed in follow-up activities is to improve the visibility of the ink. His team is now in 'early-stage' negotiations to take forward the work from the project in a subsequent collaborative research effort. 'Many of the partners are keen to continue working together,' he confirms.

Twenty-eight partners from five countries participated in the three-year project which ended in March 2010. It had an original budget of EUR 12.6 million, which was finalised at EUR 13.5 million, of which EUR 7.7 million came from the EU's Sixth Framework Programme (FP6) for research.

'Indisputable key' demonstrated the technologies that can bring much greater traceability into the wood chain. With managing natural resources efficiently an issue for many sectors, the challenge is now on to make the system a commercial reality.

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http://cordis.europa.eu/marketplace > search > offers > 5704

Analysing European democracy and governance

A three-year study is underway to assess the viability of an online tool to improve research into citizenship, political participation and electoral democracy in the EU. It would allow the social science community to perform an 'audit' of the electoral process and thereby detect challenges to the system.

A pilot study to examine the viability of the project was undertaken during the 2009 European Parliamentary elections. These elections, held every five years, are the primary target of the study. 'Audits' of national elections are widespread among non-EU countries, such as Australia, Canada and the US, and this project aims to fill the existing gap at EU level.

The project 'Providing an infrastructure for research on electoral democracy in the European Union' (Piredeu), chaired by the European University Institute, has 14 partners.

The study has established an integrated database that will draw information from candidate surveys, voter surveys, content analysis of party manifestos, content analysis of news content and contextual data. It is based on a US model for monitoring voter behaviour which has been in use since 1948. By going beyond voters and including media and politicians, the European model will look to eclipse the US model.

The data would be made available to academic researchers, politicians, political parties, journalists, commercial interests and civil society. It would provide researchers and others an unparalleled view into cross-national electoral behaviour, as well as the media's role.

It is hoped that the study will open up the European electoral process beyond the confines of academia and make Europe an attractive place to carry out further such studies. Once all the data is collected into one database, it will be possible to access it from anywhere, thus hopefully creating a global virtual community interested in European governance.

The project will allow possible research projects into EU democracy and citizenship that are at present either difficult to conceptualise or not feasible with currently available tools.

It is hoped that the outcome of the project, which is due to run until 2011, will have an impact not only on scholarly research and debate, but also on European governance itself.

Funded under the FP7 specific programme Capacities under the theme Infrastructures.
http://cordis.europa.eu/marketplace > search > offers > 5722



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Island dreams to become virtual reality

Three-dimensional versions of Mediterranean islands will be updated virtually automatically with current information from a range of public and private databases. The European research project may launch a 'revolution' in the tourist trade sector.

With the 'Mediterranean islands 3D aerial navigation' (Medisolae-3D) project you will be able to 'fly over' Mediterranean islands and swoop down when something catches your attention. 'Landing' on the beach or a village square, you will be able to move about, getting a feel for the shops, restaurants and attractions. You can make purchases and reserve tables. You can find a hotel — and if you like it you can book in. If you don't find what you want, you can simply 'swoop up' into the air once more and try somewhere else. Of course, you will do all this without stepping away from the computer on your desk.

Medisolae-3D is a project that combined software designed for aircraft landing simulations with orthophotography and satellite images of the islands, as well as public data such as digital terrain models, maps and tourist services to create a portal to the 3D island experience. It has capitalised on the Landing project that was also funded by the Aviation Sector of the EC/RTD programme.

The plan is to link the virtual-visiting tool to web-geoplatforms such as Google Earth, MS Virtual Earth, or ESRI ArcGlobe to make it available to people across the globe. The EU-funded Medisolae-3D project planned to deliver the service to more than 100 European Mediterranean islands — territories of Cyprus, Spain, France, Greece, Italy and Malta offer platforms for island visualisation.

Combining multi-sources in one

One of the biggest challenges for the Medisolae-3D team was to take data from local governments and other providers in a range of formats and data standards, and to use this data to produce a system capable of interoperating its sources to deliver a single virtual visiting service.

Medisolae-3D is an EU-funded project and it builds on the recent development of Inspire, a standardised spatial data infrastructure (SDI) for Europe. Inspire, backed by an EU directive creates a standard that allows the integration of spatial information services across the Union. Once standardised, users can access local and global level social services, in an interoperable way.



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The result of the combined datasets must be seamless for the user as they move from satellite generated images above the islands and onto the island's roads and streets.

Once the Medisolae-3D framework is in place, it can work in combination with a range of spatial data services to aid tourism, transportation and other money-earners for the island economies, but it can also provide services for health and disaster planning, the environment, and policy making.

Preparing for commercial launch

At the moment, Medisolae-3D is in a pre-commercial state, according to Professor Marc Bonazountas from the National Technical University of Athens, and project coordinator. He is also a part-owner of Epsilon International SA, the company that intends to exploit the innovations developed in Medisolae-3D.

'There is a large number of islands and if you want to offer a product to the market, you can't do it simply with one island, you have to do it with a large number. That is what we are investigating now. We want to package this in a cheap way to get money for these islands,' he says.

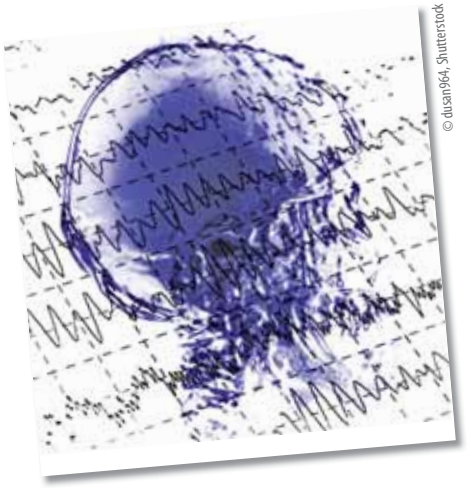
A pilot has been built using data from the Greek Island of Santorini. The project team is in discussions with five local prefectures which have responsibility for the government of over 50 islands. Once the system has been completed, standardised data can be delivered more or less automatically into Medisolae-3D to create or update 3D images. A spin-off product has already been developed — www.yachting123.com — that provides boating enthusiasts with information and views of marina facilities and services in island ports.

The Medisolae-3D project received funding from CIP ICT-PSP/eContentplus programme.

Promoted through the ICT Results service.
http://cordis.europa.eu/ictresults/index.cfm?section=news&tpl=article&id=91441

A brain wave for imaging technology

From its psychology to physiology, the brain and its function still pose many mysteries. European researchers have developed a new scanning technique for the brain that combines the best qualities of two tried and tested systems.


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The best way to study how the brain works is to actively monitor patient behaviour and response while watching real-time scans of the brain. There are many imaging techniques available but each has its limitations. An EU-funded project has combined two processes to get the best of both worlds.

The 'Hybrid MEG-MRI imaging system' (MEGMRI) project, as the name suggests, has fused the magnetoencephalography (MEG) process with magnetic resonance imaging (MRI). MEG maps brain activity by recording minute magnetic fields from electrical currents in the brain. Arrays of superconducting quantum interference devices (SQUIDS), being extremely sensitive to weak magnetic fields, are used to produce images reflecting brain activity.

More well-known, the MRI scan also uses magnetic fields to produce well-contrasted images of soft tissues in the body. The project researchers have refined the process and used so-called low-field, as opposed to conventional high-field, MRI.

Use of low-field MRI has implications for both the user and the patient. Enhanced image contrast and improved geometric accuracy make for easier and more accurate interpretation. For patients with pacemakers and pregnant women, the procedure is safer. Furthermore, reduced costs are good news for health authorities, hospitals and of course the patient.

The MEGMRI scientists have also made excellent progress in the application of mixed-sensor technology to the hybrid imager. SQUIDS are combined with a giant magnetoresistive sensor to give an ultra-sensitive device capable of detecting brain signals that are extremely weak — in the order of a billionth of a millionth of a unit!

Project researchers are continuing to develop better SQUID and mixed-sensor technology to apply to the new hybrid MEG-MRI imager. Applications range from improved diagnosis and therapy for brain abnormalities to getting to grips with how brain activity and behaviour are linked.

Funded under the FP7 specific programme Cooperation under the theme Health.
http://cordis.europa.eu/marketplace > search > offers > 5730

Access to data of the past — and the future

Tools to understand data from out-of-date systems will help rapid integration of data from newly developed systems.

A software infrastructure that enables scientific data from long-completed projects to be accessed and understood while advancing shared global usability of current digital research is under construction.

Since the 1970s, spacecraft have made vast numbers of readings on their travels and sent that data back to Earth. But what happens to the data when the mission ends and the software and tacit knowledge needed to interpret it are no longer available?

Generally, there is little money put aside for long-term data preservation. Magnetic tapes full of valuable information have ended up sitting on shelves. A huge amount of data from the arts and humanities, as well as scientific research, is becoming inaccessible and/or unusable more quickly.

Researchers from across Europe on the project 'Cultural, artistic and scientific knowledge preservation, for access and retrieval' (Caspar) set out to find secure, reliable and cost-effective ways to ensure digitally encoded information remains usable for an indefinite time period. The methodologies and tools developed during the project are not only important because they will give us access to data from the past, suggests David Giaretta, Caspar project coordinator, and a researcher at the STFC's Rutherford Appleton Laboratory.

'The techniques that you need to preserve old digital objects — techniques that make unfamiliar digital objects usable — are exactly the same techniques you need to make newly created digital objects accessible and understandable,' he says.

If the e-science concept of research facilities sharing computational processing and data collections across the internet is to be fully realised, it will require a Caspar-style infrastructure.

Indeed, Caspar infrastructure will put data into a context so that it can be interpreted or understood by 'designated communities' — defined by those who are responsible for the data. For example, the infrastructure may inform us that long lists of numbers are actually calls made from a telephone over a certain period. Learning this would provide most of us with no useful information. However, for 'designated communities' such as the police investigating a crime or the telephone company's invoicing department, understanding that the numbers are telephone calls may be very valuable knowledge indeed.

Driving industry standardisation and change

Because the infrastructure developed by this EU-funded project is a pioneering implementation of 'Open

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archival information system' (OAIS, ISO 14721), an ISO standard reference model for digital preservation, its influence will be felt right across the digital preservation industry. The purpose of OAIS is to increase awareness and understanding of concepts relevant for archiving digital objects, especially among nonarchival institutions. It defines terminology and concepts for describing and comparing data models and archival architectures.

In fact, Caspar's implementation of OAIS defines the methodology and infrastructure for digital preservation across Europe. It guarantees not only understandability but also the protection of digital rights as well as the authenticity of the information preserved.

Caspar produced eleven reusable infrastructure components and toolkits to support digital preservation: registry, knowledge management, orchestration, representation information, preservation datastore, data access and security, digital rights management, finding aids, virtualisation, packaging, and authenticity.

All components are independent from each other and they offer web-based (and other) services. That gives the system great robustness because there is no single point of failure. Caspar is an open system able to interoperate with the many different commercial digital preservation solutions on the market.



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Building the e-science infrastructure

'Over the next five years or so we expect to see those Caspar components … integrated into the broader e-science infrastructure that is being created in Europe,' says Mr Giaretta.

'That is why it was so important that Caspar tools could cope with all types of data, and were tested using cultural and performing arts as well as science data. There are a number of tools and toolkits within Caspar that are closely tied to specific domains, but there are also elements that are discipline-independent, as you would expect with infrastructure', he says.

'We expect an evolution in the use of the domain-specific tools while other parts will be made even more robust and scalable as they move over into the broader infrastructure across Europe,' he concludes.

The Caspar project received funding from the ICT strand of the Sixth Framework Programme for research.

Check out Caspar's software releases which can also be found on Sourceforge.net's digital preservation services section.

Promoted through the ICT Results service.
http://cordis.europa.eu/ictresults/index.cfm?section=news&tpl=article&id=91437

Integrating injury statistics for accident prevention

Injury reporting can be enhanced by an innovative method of linking prevention-oriented statistics with routine data. The new system takes into account important indicators which are necessary to help prevent accidents.

Reporting statistics of injuries and disabilities caused by accidents is crucial in assisting injury prevention and safety promotion. Reliable and valid indicators for the multiple external causes of injury as well as for possible severe consequences are required in order to make this possible.



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Until now EU health statistics were not able to cover both causes and consequences in one single data source. The Integris(1) project, funded under the EU's Seventh Framework Programme (FP7), has integrated two main data sources: the European injury database (IDB) and the hospital discharge registers (HDR). In order for the IDB-HDR integration to be effective, appropriate research and technology methods are being implemented and assessed via a demonstration project in several Member States.

Integrating injury data collections has already been successfully received by prestigious health information organisations across Europe. To date the project is running according to plan with a completion goal set for spring 2011.

(1) 'Improved methodology for data collection on accidents and disabilities integration of European injury statistics.'

Funded under the FP7 specific programme Cooperation under the theme Health.
http://cordis.europa.eu/marketplace > search > offers > 5711

Joint emergency operations — a European vision

A European consortium is looking to refine a European vision for interoperability in joint emergency and security services, in close cooperation with end-users and stakeholders. But first there are some technical matters to address.

Anyone who has witnessed a crisis as it unfolds will attest to the chaos that can follow, as communications are broken or stretched to capacity and first responders struggle to get a handle on the events, to minise the loss of lives and property damage.

The 'European software-defined radio (SDR) for wireless in joint security operations' (EULER) project has gathered major players in Europe in the field of wireless systems communication integration and SDR — fully progammable radios — with the aim of improving interoperability among national and international joint emergency service operations.

But what do they mean by interoperability? According to the project literature it is 'the ability for first responders from different agencies to communicate among themselves, to exchange voice and/or data on demand and in real time, whenever necessary'.



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The three-year, Seventh Framework Programme (FP7) project is supported by a strong group of end-users, and is planning to define and demonstrate how the benefits of SDR can be leveraged to ensure faster deployment in emergency situations. Consortium partners, with backgrounds in law enforcement, fire and rescue, civil protection and military, hail from Spain, France, Italy, the Netherlands, Sweden and the UK.

EULER is proposing to develop a more agile, interoperable and robust communication system supporting a new range of practical services, such as telemedicine and live video. To achieve these goals, according to the consortium, three main components will be combined: a reference high-data-rate radio technique, a communication system architecture allowing integration of heterogeneous radio standards, and SDR as a key enabler for this.

The total cost of this work will come to nearly EUR 15.5 million, with the EU contributing around EUR 8.7 million of that. The project is being led by Thales Communications in France and is due for completion early 2012, by which time the partners plan to have delivered an integrated demonstrator of their systems targeting end-user needs.

Funded under the FP7 specific programme Cooperation under the theme Security.

http://cordis.europa.eu/marketplace > search > offers > 5718

Ensuring effective global satellite monitoring

A European network has developed tools for monitoring security and stability in different areas, from population changes and border regions to rapid assessments of damage following disasters. These tools showed that exchange of information among the stakeholders during crises was of paramount importance.

The 'Global monitoring for security and stability' (GMOSS) network of excellence was created to bring together Europe's civil security research to develop satellite Earth observation. GMOSS used test cases, workshops, benchmarking and staff exchanges to maintain its capacity for global monitoring.

The network of 22 partners and 11 associate members took 4 years to develop satellite observation technologies and practices covering diverse scenarios, including nuclear non-proliferation treaties, static and dynamic populations, border regions as well as rapid remote assessments of damage in an area.

The multidisciplinary nature of the network was put to good use in the test cases of GMOSS. It successfully put together political, social and economic aspects which contributed greatly to background information in the test cases.

Because of the variety of network partners, different software packages, techniques and algorithms were being used. As a result, it was decided to benchmark all of these activities late in the project to consolidate working procedures.

Part of the success of GMOSS was down to the workshops and conferences that were organised. These meetings were instrumental in bringing together the network partners and were an opportunity to propose new activities. They were an occasion to launch common operations and implement near real-time exercises (called GNEX). Some of the meetings were opened up to external parties who were possible end-users of the product.



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GNEX exercises created challenging real-time simulations where teams had to respond in a matter of hours or days. They were set up in a way that no network partner could handle a scenario on its own, thereby strengthening coordination and cooperation. GNEX enabled teams to analyse state-of-the-art satellite images and enhance the delivery of civil crisis response. These exercises aimed to demonstrate to users and decision makers the added value of Earth observation by using GMOSS methods.

A gender working group in GMOSS addressed institutional gender issues linked to security and highlighted the importance of a work-life balance.

Training sessions became a popular forum for attracting a number of institutions involved in policy analysis, science and technology and service providers to apply to become associated partners of the project. The training events, such as GNEX, summer schools and seminars also provided a platform to exchange ideas within the network.

Funded under the FP6 programme 'Aeronautics and space'.
Collaboration sought: further research or development support.
http://cordis.europa.eu/marketplace > search > offers > 5716

Alpine safety to be improved through Earth observation

A research initiative under the aeronautics and space priority of the Sixth Framework Programme sought to simplify and improve available information on natural hazard risks. While focused on the Alps, the information service proposed to reduce the risks for life and property can easily be extended to other mountainous areas.

High mountainous regions are challenging in many senses. For centuries people living in these areas had to contend with settling on steep slopes, cultivating on sparse agricultural land and transporting goods on hazardous paths.

Moreover, these unfavourable conditions have strongly influenced the way information on such an extreme environment has been collected for scientific research. That means cumbersome working procedures that do not only require skilled manpower but also generate high costs.

But all that is about to change. Satellite-based Earth observation systems offer an opportunity to extract land surface information that until recently could only be derived from aerial photographs or by extensive field work. The European Commission seized this opportunity to improve risk management of landslides, avalanches and debris floods in the Alpine regions.

Researchers engaged in satellite remote sensing, communications technology and Alpine safety were funded to develop a portfolio of safety and risk information. The project, called 'Alpine safety, security and information services and technologies' (Assist), was carried out under a joint initiative of the European Commission and the European Space Agency, 'Global monitoring for environment and security' (GMES).



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Before the Assist project, scientists wishing to use Earth observation data collected by satellites faced volumes of data so immense that it is almost impossible to extract information relevant to their needs. The data was often of poor quality and incomplete, not comparable or even difficult to access.

The Assist project proposed a flexible information service which combines data from satellites with ground observations with airborne and meteorological data to help improve services delivered by risk management centres. In, particular, newly developed algorithms have shown the benefits obtained from the combined use of all-weather synthetic aperture radar (SAR) images and high resolution optical data.

Organisations such as the police, fire fighters, hospitals, ambulance and air rescue services form the backbone of this new service. These so-called 'service nodes' are capable of receiving and processing raw data into products suitable for risk prevention and crisis management. In case of crisis, the products are distributed from the regional risk management centres up to the field staff.

Whilst making the lives of mountain inhabitants and tourists safer, the Assist project has also helped the European industry become more competitive. No longer relying on international data, Europe can offer now its own information service and negotiate better its participation in international projects.

Funded under the FP6 programme 'Aeronautics and space'.
Collaboration sought: further research or development support.
http://cordis.europa.eu/marketplace > search > offers > 5715

EU scientists aim to break storage capacity barrier

Our ability to store huge volumes of documents, photos, videos and music on our computers and other gadgets is a result of enormous strides in technology over the years. Scientists from the EU-funded 'Terabit magnetic storage technologies' (Teramagstor) project are now aiming to push the boundaries even further with a hard disk that has the storage density capacity of one terabit per square inch.

The project received EUR 3.45 million in funding under the 'Information and communication technologies' (ICT) theme of the EU's Seventh Framework Programme (FP7).

To develop their concept, the researchers used tiny magnetised nanospheres, which at 25 nanometres in diameter, are larger than traditional grains but smaller than typical storage cells. According to the team, the benefit of using these nanospheres is that they self-assemble into a regular array, which has the potential to keep costs low.

The nanospheres were then blended with an alcohol-based solution that was placed onto the substrate. To make sure the particles were held into place, the scientists then added a magnetic film (an iron-platinum alloy that has attracted considerable industry interest) on top of the surface to form a kind of magnetic 'cap'. This cap effectively acts as a magnet (with a north and south pole), and the array can be used as a storage device.



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Since spheres that are separated by 25 nanometres are equivalent to storage density of 1 terabit (1 000 gigabits) per square inch, the 'Magnetic films on nanospheres: innovative concept for storage media' (MAFIN) team believed that the same approach with smaller spheres could produce densities that are up to six times greater.

Beyond the recording medium itself, the researchers also investigated recording techniques (they discovered that adjustments will need to be made to the iron-platinum so that information can be easily recorded and read) and experimented with using a magnetic-tip probe (as a replacement to the conventional recording head) to magnetise and read each of the nanospheres.

Teramagstor is the successor of the original MAFIN project, which was funded EUR 1.3 million by the 'Information society technologies' (IST) thematic area of the EU's Sixth Framework Programme (FP6).

Unlike today's hard disks that record information on a ferromagnetic layer made up of grains, the objective of MAFIN was to develop a completely new magnetic recording medium for ultra-high-density magnetic storage applications.

Teramagstor has now picked up on the results of the proof-of-concept project to design, fabricate and test future perpendicular magnetic storage media with areal density (the density of a two-dimensional object) larger than 1 Tbit/in^2.

Chemists, physicists, engineers, and materials scientists from nine European institutes began work on Teramagstor in 2008, which is headed by Demokritos, the National Centre for Scientific Research in Greece. The team's approach is based on the development of advanced film media using techniques from nanotechnology, one of the key manufacturing technologies of the 21st century.

Under MAFIN, the aim was to build a recording surface comprised of purpose-made magnetic cells, and to produce these nanostructures both inexpensively and on a large scale. The three-year Teramagstor project will conclude in April 2011.

Promoted through the Research Information Centre.
http://ec.europa.eu/research/infocentre > search > 17093

Interview
Blooming innovation


© Lauren Wickman, Network of Valencian Universities for the promotion of R&D
Prof. Jose Duato

Innovation is blooming in Europe, but the successful transfer of research knowledge to industry is still lacking says Professor Jose Duato of NANOC who answers* research*eu results supplement's *questions this month.

Technology has permeated all levels of society, from the moment we wake up to our daily commute, from the way we work to the way we play. More powerful computing in more compact and affordable forms also means new business opportunities, better and faster manufacturing, as well as new ways of doing research and collaborating between organisations. All this helps Europe keep its competitive edge.

The EU has invested heavily in research and programmes to strengthen its knowledge-based economy, including micro- and nanoelectronics, e-infrastructure for doing 'virtual' research, the networks and fundamentals behind the future internet, embedded sensors and technologies monitoring all manner of things, and diverse initiatives to improve how information is shared and used, how software functions, and the information and communications technologies (ICTs) we increasingly expect to benefit from in a joined-up society.

This is the setting that we find ourselves in as we introduce the interviewee for this edition of *research*eu results supplement*, Prof. Jose Duato of the Universidad Politécnica de Valencia which participates in the European NANOC project. He has worked with major multinational companies in the ICT sector and several of the most powerful supercomputers in the world use his group's research results.

Prof. Duato works at the university's department of computer engineering. He has published over 400 peer-reviewed papers and authored several books. He is the mind behind a powerful theory of deadlock-free adaptive routing for interconnection networks. Versions of this theory have been used in the design of the routing algorithms for the MIT Reliable Router, the Cray T3E supercomputer, the on-chip router of the Alpha 21364 microprocessor, and the IBM BlueGene/L supercomputer, which led the Top500 list for four years. He has won numerous awards including the National Research Prize 'Julio Rey Pastor' in Mathematics and Information and Communication Technologies in 2009.

He shares with us his vision of how Europe can convert its decades of R & D investment into a technology dividend.

• In your long experience in the field, how do you think micro-electronics have changed the way we work?

More than any other technology throughout the history of humanity, micro-electronics and information technology have introduced more changes in the way we live and work. Moreover, these changes have been introduced over a short period of time. For example, having access to huge amounts of information on almost every topic within minutes, or even seconds, just by typing a few keywords was unthinkable even decades ago.

But there are many more examples. It's the ability to communicate with other people within seconds and in different formats from almost anywhere. It's the large set of tools which make our lives easier both at the office and while travelling, the huge advances in manufacturing automation and medical equipment, and the much wider set of activities we can now enjoy in our spare time. Focusing on changes in our work, tools like word processors, drawing tools, spreadsheets, video and image editors, allow us to increase our productivity by relieving us from tedious tasks or by dramatically accelerating them.

• Has industry or SMEs benefited more from new technology innovation than we realise?

Definitely yes. We think of industry using computers to speed up document writing, information access, information exchange, accounting, etc. But relatively few people know that the microcontroller market is larger than the desktop/laptop computer market. A large number of microcontrollers is used to automate different manufacturing processes.

Also, a huge number of microcontrollers are integrated in products we frequently use like cars. And these microcontrollers not only increase the functionality, efficiency, reliability, and safety of those products, but they also reduce their cost.

Computers, and even supercomputers, are also frequently used today to shorten the design and verification time for new products. Some examples include crash simulations in the car industry, wind tunnel simulations, molecule design and analysis, to name a few.

• We all have 'technology' in our pockets and handbags, but do you think the average person knows what it takes to get an idea from the drawing board through R & D to the technology development stage?

Certainly not. Since new products are available every few months users tend to think that it does not take too long to design and produce a new device or software package. However, the design, verification, and manufacturing processes are taking increasingly longer. Design time can be shortened by reusing components from a previous design whenever possible, but the verification time has dramatically increased due to the continuous increase in complexity. Nowadays, it takes approximately four years from the time the specifications for a new desktop/laptop processor are defined until the new processor reaches the market.

• How important is public support, especially EU funding, for this sort of development?

Public funding is crucial for the continued evolution. Not only does it take exceedingly long to produce certain products, like a high-end processor, but it is also extremely expensive and can cost several million euros. As a consequence, companies tend to follow the same evolutionary path, with relatively little innovation from one product generation to the next.

It should be noted that it is better to release a more conventional product in time than a full-featured product too late. A good recent example is Intel Larrabee. Despite having a very innovative design, delays in product design and manufacturing made the product available at a time when AMD ATI cards had a peak computing power 2.5 times higher than Larrabee. Thus, Larrabee-based graphics cards were not commercialised.

In this context, public funds are fundamental for 'riskier' research approaches that significantly depart from common evolutionary paths. The best results are frequently obtained when a strong collaboration is established among consolidated research groups in academia and top companies in the corresponding field.

• Europe emphasises the need to be competitive with other regions, especially the Asian tigers. What has it done well/what could be improved in this area?

It is difficult to state precisely what has been done well and what can be improved when we compare ourselves with some Asian countries. Unfortunately, consumer electronics is a market in which lowest cost products are almost always the most successful ones and Asian countries are good at that. But one way of competing is by focusing only on top-quality products which offer many more features and better quality but which tend to fall into a higher price range. In Europe, there are many areas where things have been done correctly. But there is one thing that, in my opinion, has not worked as well as it should have: European projects. Despite many successes, I have witnessed cases of projects where partner collaboration could have been better. And despite some changes in FP7, the bureaucracy is still a bit overkill. Consortia should be spending less time writing up their deliverables so they can focus more on developing the research itself. Nevertheless, there has been a tremendous effort to improve control and quality in European projects, and we are progressively approaching the optimal solution.

• You are currently working on a project called 'Nanoscale silicon-aware network-on-chip design platform' (NANOC). Can you tell us a little about this and what it could mean for chipmakers or electronics manufacturers.

Power consumption has become a crucial issue in chip design, especially when it comes to designs including high-performance processors. A way to reduce power consumption, as well as design and verification time, is to design processors consisting of multiple-processing cores that are not only simpler than the monolithic single-core design, but also offer the same computing power. But multicore chips, which started to reach the market around 2003, keep increasing the number of cores per chip as well as the communication needs among cores. On the one hand, more powerful, cost-effective, and power-efficient interconnects are needed among cores. This gave rise to the so-called network on chip (NoC) to overcome the limitations of traditional buses. But on the other hand, tools are needed to dramatically simplify and speed up the design of those NoCs.

Those tools should also provide support for design-space exploration so that the best design parameters can be easily found. This is the challenge we address in our project. We want to develop a powerful design platform to speed up NoC design. Key industry partners will need this type of tool for their own future designs. And their participation in the project will guarantee the transfer of the design platform to their production teams.

• In your experience of technology transfer in Spain and Europe, what are the key ingredients for making it work?

A key ingredient is to establish a solid collaboration with some relevant industry partners that have expertise in developing their own R & D. However, this is not easy because many academic researchers approach industry and try to 'sell' them their research results. So, in general, industry is reluctant to listen to academics.

In order to succeed when approaching industry, in my opinion, one needs to first produce top-quality academic research and publish it in the most relevant venues. Doing so will significantly increase international visibility. The second step, which can be done in parallel with the first, is to make sure that academic research focuses on topics of current interest to industry. Otherwise, results can hardly be transferred to industry. In doing so, it is not enough to read academic papers and look for 'hot topics'. It is also necessary to analyse current commercial trends and try to anticipate future industry needs.

The third step, which is optional but very convenient, is to consolidate a large research group, so that the group could address more interdisciplinary research when collaborating with industry, and also to allow academic research to continue while some group members devote all of their time to collaboration with industry. If those steps are properly accomplished, it is likely that top-industry R & D departments will contact the group and ask for a joint meeting. But even if that request does not come, it is obviously possible to approach some industry laboratories and ask for a meeting to present research results.

Finally, it is very important to avoid trying to 'sell' research results. It is unlikely that one group's academic research will directly fit the needs of a given company. In general, it is much better to demonstrate the expertise of the



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research group, and identify challenges that need to be addressed so that the research developed by the group can then be directly transferred to industry. Obviously, no company will directly communicate their future needs. It is necessary to establish a suitable framework that promotes confidence by demonstrating previous successes, signing a non-disclosure agreement, etc.

For those research groups that have not been able to reach the level of visibility and expertise I mentioned above, clusters like the 'Network of Valencian universities for the promotion of research, development, and innovation' (RUVID) as well as the initiatives from several universities to advertise the expertise of their research groups are very important to establish initial contacts with industry. After that initial contact, it is usually up to the research group to turn it into a successful collaboration.

• Innovation is a hot topic in Europe right now. For example, initiatives like the 'Innovation Union' imply that new ideas can lead to new products, services and economic opportunities. Where do universities and research groups like yours fit in this picture?

Once a solid contact with industry has been established, research groups will need to transfer their results. And this link should work bidirectionally. I confess that I've learned a lot from industry, including information about technological and cost constraints for their future designs, market trends, and even applications for some of our results in contexts that I could not anticipate. But at the same time, such knowledge combined with mutual confidence and respect has led to a situation where a research group like ours effectively participates in the definition of future opportunities and even standards and product lines. If this level of collaboration with industry is achieved, then there is a clear path for innovation based, at least in part, on the research results from the research group.

• We've come a long way since microcomputing launched an electronics and technology boom. Where do you think Europe will be in another 20 years? How will the 'technology at work' landscape look?

Europe's position within 20 years will heavily depend on the decisions that are taken at different levels, from the university to the European level. For instance, universities in Spain often do not hire people unless required for teaching duties or are directly funded by a research project. Also, there are incentives for research, like salary complements and research prizes, but not enough incentives for technology transfer to industry. Moreover, most professors have never worked in companies and even fewer professors have developed successful collaborations with industry that led to true technology transfer. We can change this for a better future.

Regulations could also be changed to improve Europe's chance of becoming a true knowledge-based society, such as reduced taxes for start-ups, technology-based companies, and/or R & D laboratories.

And regarding technology at work, I guess that trends like cloud computing will dominate. As a consequence, computers will be replaced by low-cost, noiseless, extremely power-efficient terminals (desktop, laptop, and mobile flavours) that will run virtual computers on servers potentially anywhere. Applications will no longer require a licence, and will be paid on a per-use basis, usually executed remotely by a server somewhere in the world.

It may also happen that voice recognition becomes widespread as the standard interface for entering commands and dictating text, sharing this space with touchscreens. But this latter point is not clear to me, mostly because voice recognition requires a non-negligible amount of computing power, thus going against the trend to minimise power consumption and make the computers much 'greener'.

Boosting computing systems' productivity

A gap exists between the design and productivity of complex and heterogeneous embedded computing systems. A European project is looking to close this gap through a set of formal methods and programming languages developed over 24 months.

Heterogeneous computing systems are basically electronic systems that run different computational units (such as audio or video systems, networked applications, etc.) and need extra specialised resources to work.

The design-productivity gap in these systems occurs for two main reasons: embedded processors are becoming more complex and the applications running on these processors are larger and equally complex. As a result, the project 'Formal design methods for globally asynchronous/locally synchronous embedded computing systems' (Dynagals) looked at three issues to overcome these problems: high-level programming languages, time-predictability, and component-based design.

To tackle the first concern, the researchers looked at the SystemJ programming language. SystemJ is particularly suited to the design of globally asynchronous locally synchronous systems (GALS), a crucial part of the project. Dynagals set about defining the task and conducted case studies to see whether SystemJ could be used for the design of embedded computing systems.

Secondly, the team created a new time-predictive programming language, called Precision Timed C (Pret_C). This is based on the widely used C programming language with some added dynamics to improve performance. Pret_C allows memory communication



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between two existing threads, something normal C programming does not offer. As a result, the mapping of logical time to physical time was more easily achieved. Arpret, a dedicated target architecture combining a hardware accelerator with a soft core processor which increased the efficiency of Pret_C, was also designed.

The third issue that Dynagals tackled had to do with component-based systems. These are complex systems that are made of blocks of code or components. An essential problem is how to compose components designed in isolation when only the communication interface of an individual component is known.

When you try to link the different components together, regular mismatches occur. As a result, the team created a new formal approach incorporating a converter synthesis (a type of verification) which bridged the mismatches between different components.

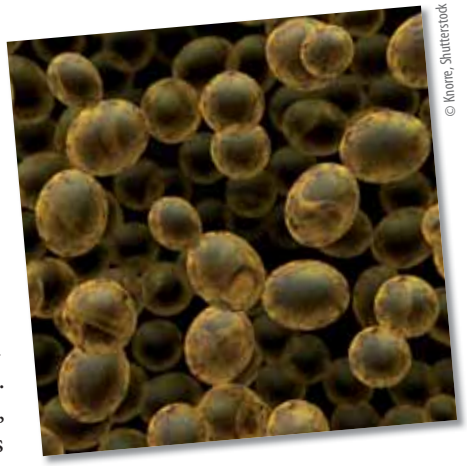
The project, which cost EUR 111 667 ran until February 2010. SystemJ promises to become the major system-level design language for complex and heterogeneous embedded systems.

Funded under the FP7 specific programme People (Marie-Curie actions).

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Purity for yeast products

Food, drugs and even vitamins are produced by microbes at factory scale but some processes are still inefficient. European scientists have pioneered a way of extracting pure proteins from yeast cells using high-intensity electric pulses.



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The uses of the humble yeast cell have gone way beyond the age-old crafts of baking bread and brewing wine. Yeast is now a major player in the biotechnology world and its cell components are used in many biochemical processes including drug, food and chemical production.

Using the insides of the yeast cell for manufacture, one crucial requirement is to extract the pure protein to make sure that products are not contaminated and the process is efficient as possible. Simply rupturing the cell to release the contents is highly non-specific. An EU-funded project Electroextraction(1) has supplied manufacturers with a neat method to extract and collect only the protein required for a particular process.

High-intensity electric pulses are fired at the yeast cell envelopes (surrounding the cell contents) which cause them to leak their contents. The trick is to gear the pulses so only required proteins are released at any one time. As with previous extraction procedures, the cell is not ruptured. An added bonus is that yields are higher.

The next stage is further selection of specific proteins by using the principal of sorption. Commercial beaded adsorbents are added to the soup that will stick or adsorb onto a particular protein, a process known as direct product capture.

Project researchers will be continuing to sort out the best conditions and materials to use during the electroextraction process that can be operated in batch or continuous mode. Benefactors of this major leap in the biotechnology field will be the pharmaceutical and food industries as well as the European consumer.

(1) 'Protein electroextraction coupled to direct sorption: a new route for primary recovery of intracellular bioproducts from industrial yeast.'

Funded under the FP6 horizontal research activities involving SMEs.

http://cordis.europa.eu/marketplace > search > offers > 5732

Testing metals for nuclear reactors

Generation IV nuclear reactors, which are currently being designed and should be available for construction by 2030, will need to be built from specific types of metal. European researchers are on the case.

The EU-funded 'Generation IV and transmutation materials' (Getmat) project was launched in early 2008 to research which alloys can withstand the likely conditions — i.e. high temperatures and capable of handling highly corrosive materials — in new-generation nuclear reactors.

Getmat found that two alloys meet the required standards: 9-12 Cr (chromium) ferritic martensitic and oxide dispersion strengthened (ODS) steel. It set out five objectives: to improve the 9-12 Cr ferritic martensitic alloy; to develop ODS alloys; to research joining and welding procedures; to develop and define corrosion protection barriers; and to improve the modelling of alloys.

The structure of the research and development part of the project falls under four headings: alloy availability, weldability, and finding out the mechanical properties of alloys; alloy compatibility with aggressive coolants (such as sodium); performance under neutron irradiation; and a deeper understanding of how the alloys will react using other model alloys. The process of validating these model alloys has already begun.

After realising that making the ODS steels through a process of casting would be time-consuming and not fit into the Getmat project timeframe, the project coordinators decided to procure the 12 Cr ODS steel from the Kobelco firm in Japan.

Numerous tests of the alloys have been carried out, including high-temperature

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mechanical tests, different welding techniques, and corrosion tests using gas, heavy liquid metal and super critical water (water at a temperature and pressure that is above its critical point). During the tests, it was found that, when a corrosion protection barrier was produced using high-velocity oxygen fuel spray and laser treatment, it would warrant further investigation if it was to be used for a nuclear reactor.

The EUR 14 million project also aims to improve European competitiveness in the field of metal research. It will run until 2013.

Funded under the FP7 programme Euratom under the indirect action Fission.
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New imaging technique gives a clearer picture

Accurate diagnosis is one issue; appropriate therapy is another. Together, they are the key to eradication of many diseases. With EU funding, researchers have pioneered a hybrid imaging technique to achieve both ambitious objectives.

Diagnosis and analysis of processes in abnormal tissue have come on in leaps and bounds with techniques like fluorescence molecular tomography (FMT). As the process can detect the presence of fluorescent chemicals in cells which vary according to conditions, many changes associated with disease at cell and sub-cell level in abnormal tissue can be identified.

Previous methods depended on photographic methods to assess the luminescence of tissues. However, this does not allow for depth of tissue and the fact that light that does not travel in straight lines from some cells. Errors in diagnosis are possible and researchers turned to methods based on photons, the basic particles that make up light, one being FMT.

Unfortunately, even FMT has a few drawbacks. These include limited resolution between objects and lack of anatomical information. European scientists have therefore drawn upon another imaging technique to fill in the gaps.

Researchers with the project FMTXCT([1]), have come up with a hybrid between fluorescence imaging and computer tomography (CT). A type of X-ray technique, CT makes images out of many cross-sectional X-ray beams but is non-invasive and produces two and three dimensional images.


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The XCT-based correction improves FMT performance in a radical way. It allows flexibility in targeting the physiology and function of molecules without the use of radioactive materials. Most labs have access to fluorescent reporting but use of radionuclides means extra cost — the provision of a particle accelerator, for example — and handling difficulties associated with radioactive materials.

The main focus of the project research is preclinical imaging for breast cancer. As well as diagnosis, FMT-XCT can be used for gauging therapy response. Trials have also been done on the response of cells under conditions of low oxygen levels. As such, it is important in many conditions such as lung cancer, asthma and heart failure.

Project researchers have already developed the functional prototype and associated software. It seems the sky is the limit for diagnostic and therapeutic applications for a machine of this resolution and accuracy. Altogether, early, accurate diagnosis and more effective treatment give a rosier prognosis for the patient and money spent more wisely for health authorities.

(1) 'Hybrid fluorescence molecular tomography and X-ray computed tomography system and method.'

Funded under the FP7 specific programme Cooperation under the theme Health.
http://cordis.europa.eu/marketplace > search > offers > 5729

Cracking codes with the help of atoms

Quantum computing is in its infancy but thanks to European initiatives, it is maturing very quickly. The QAQC([1]) project is making sure we can all take advantage of quantum computing wizardry in the very near future.

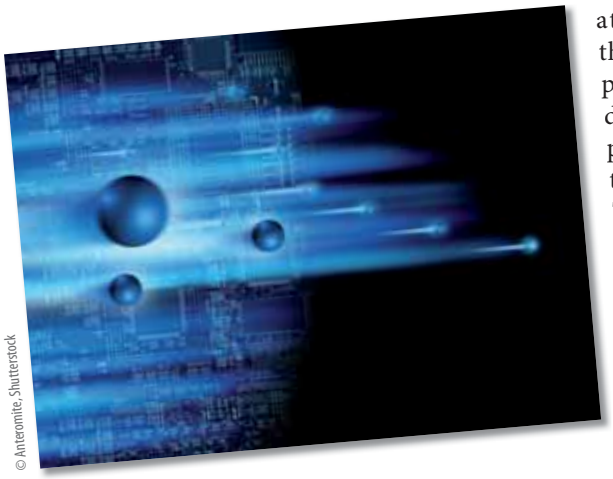
Quantum computing promises to revolutionise computing as we know it. Differing from the standard computer in our homes and offices, the quantum computer relies on properties of atomic particles. Data is therefore stored and manipulated using sub-atomic particles instead of silicon.

Quantum properties can be used to represent data and perform operations on data such as factoring. It would take a supercomputer billions of years to find the component parts or factors of a 400 digit number. Scientists believe a

quantum computer will be able to do this in just a few minutes.

Another enormous job for the quantum computer is searching. The search function uses a quantum algorithm, a rule that specifies how to solve a problem, to search an unsorted database much faster than its classical counterparts.

On a grander scale, factoring and associated mathematical principles concerning so-called logarithms can be used for encryption, or code making and breaking. As quantum computers can be used for factoring where traditional computers cannot, it follows that today's data encryptions used for systems security will be made insecure.



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The QAQC project is aiming to investigate the applications of quantum computers apart from factors and search. The researchers are also attempting to answer the question as to what problems cannot be handled by quantum computers even assuming they become available. The further mysteries of quantum states will also be put under the physics and maths microscope.

So far, the results are encouraging. New algorithms have been developed and a new method for proving properties of algorithms has been outlined. Furthermore, a breakthrough has been made in the area of combinatorics, the branch of maths to do with finding the largest, smallest or optimal objects, again too large a task for the standard computer.

QAQC results are going to contribute to as yet uncharted areas such as new global positioning systems with a degree of precision once unthinkable and the design of drugs to the last atom. Recognition of patterns in highly complex data can make the transfer of money ultra-secure. One way or another, the quantum computer will infringe on every area of our lives without us even being aware.

(1) 'Quantum algorithms and the foundations of quantum computation.'

Funded under the FP7 specific programme People (Marie-Curie actions).

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Industrial doors reduce fire risk

A European consortium has developed rapidly closing industrial doors fitted with sensors at a price that customers can afford. The doors represent a fresh opportunity for businesses operating in the security field.

Researchers from the 'High speed fire stopping sectional door' (Nofire) consortium investigated how sensors and other electronics devices could help industrial doors stop flames from spreading to other parts of a building. Project partners also developed light barriers and contact bands for use in fire situations.

The doors were designed to take up as little space as possible while enabling them to close rapidly despite an increased level of fire insulation. Sensors were also developed to control the rapid opening and closing of the door and the activation of fire security measures.

A prototype door was built to test out the design and the materials used in its construction. An economic and environmental analysis was also conducted on all components. Key issues considered during the doors' development included reduced maintenance costs and improved thermal and sound insulation.

The development of new technology for industrial doors will help improve safety through greater reliability, speed of closing, and increased fire resistance. The new product will give a welcome boost to European SMEs involved in industrial security through increased sales, as well as providing greater public safety.

Funded under the FP7 programme Capacities under the theme 'Research for the benefit of SMEs'.

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The following upcoming events were selected from the event diary of the Directorate-General for Research and from the CORDIS event calendar.

For further information on past and upcoming events, please visit:

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

Fifth international workshop on personalisation for eHealth

The fifth international workshop on personalisation for eHealth will take place in Casablanca, Morocco on 13 December 2010.

eHealth is a relatively recent phenomenon in which healthcare practice is supported by information and communication technology (ICT) processes. The area is part of the EU 2020 Strategy and the European Digital Agenda, with an aim to provide user-friendly and interoperable information systems for patients and health professionals.

One of the promising aspects of eHealth is the potential for more tailored and focused intervention. Personalised eHealth intelligent systems would, for example, enable people to take more control of their well-being, by accessing personalised and qualified health information, both medical and pedagogical, and accessing appropriate medical care from their homes.

Personalised eHealth enables professionals to manage their activity more efficiently, by receiving relevant and timely updates on patients and clients. And it helps medical teams to work together more effectively, coordinating their activities, sharing their knowledge about patients they are collectively taking care of, and ensuring the best coordinated care is provided.

The event will be an occasion for eHealth stakeholders to share issues and practices on a variety of subjects related to the field.

For further information, please visit:
http://www.csc.liv.ac.uk/~floriana/Pers4eHealth10/Home.html

Exascale challenges in computational biology

An event on 'Exascale challenges in computational biology' will be held from 13 to 15 December 2010 in Barcelona, Spain.

Molecular biology is receiving increased attention as a major strategic research area due to its significant potential. The high-throughput and supercomputing systems which have been developed in recent years have contributed to the field. During the 1990s, for example, the challenge was to build computers that reached the Teraflop scale.

In 2007, the first computer to register 1 000 times the 1 Teraflop limit was developed. This milestone opened the door to the exploration of complex combinations of genetic variants, large-scale molecular dynamics and high-throughput virtual screening.

The event will bring together bio-supercomputing stakeholders in order to share information and further discuss the key questions and challenges of this field. At the top of the agenda will be the expected development of computational power equivalent to 1 000-fold that of the current most powerful supercomputer (Exascale).

The conference will be organised around four thematic sessions: systems biology, genomics, molecular simulations, and simulation in medicine.

For further information, please visit:
http://mmb.pcb.ub.es/exascale2010/index.htm

ESF-COST research conference on extreme environmental events

The European Science Foundation (ESF) - European Cooperation in Science and Technology (COST) research conference on extreme environmental events will take place from 13 to 17 December 2010 in Cambridge, United Kingdom.

The definition of extreme weather includes weather phenomena that are at the edges of historical patterns, especially severe or unseasonal weather.

Understanding the frequency and magnitude of extreme environmental events and their impacts is a critical aspect of climate prediction. This conference aims to bring together an interdisciplinary group including statisticians, climate modellers, meteorologists, and other environmental scientists to focus on extreme events and the uncertainties inherent in their understanding.

Sessions will include: extreme events and statistical methodology, modelling of extreme environmental events, and the impacts of extreme events.

For further information, please visit:
http://www.esf.org/index.php?id=7048

Second international IEEE games innovation conference 2010

The Institute of Electrical and Electronics Engineers (IEEE) games innovation conference 2010 will be held from 21 to 23 December 2010 in Hong Kong.

The conference will be a platform for innovative research in game design and technologies and will focus on the multidisciplinary aspects of the subject. It will look to make the sector more accessible to researchers and developers from academia and industry.

Highlights of the conference will include display technologies and interfaces for games. Participants will also be able to get information on new audio technologies, mixed reality technologies and gain insight into the software engineering process of games.

Following last year's inaugural conference in London, the second edition has been scheduled in Hong Kong ahead of another major games event (the Asian Game Show 2010, 24-27 December) giving participants at the conference the chance to network and learn a lot more about the Asian market.

For further information, please visit:
http://ice-gic.ieee-cesoc.org/2010/index.html

HICSS 2011 minitrack: web information credibility analysis

The 44th annual 'Hawaii international conference on system sciences' (HICSS) on web information credibility analysis will take place from 4 to 7 January 2011 in Hawaii, United States.

In the absence of publishing standards and review processes, the quality control of web content is often viewed as insufficient. As a result, there is a lot of mistaken or unreliable information on the internet that can have a detrimental effect or negative influence.

However, technology may be able to help judge the 'trustworthiness' of content and the quality and accuracy of the information that users encounter on the internet. Such technology should be able to handle a wide range of tasks: extracting credible information related to a given topic, organising this information, detecting its provenance, clarifying background, facts, and so on. The problem of information reliability and quality has become also apparent in view of the recent emergence of many popular Web 2.0 applications.

Topics at the conference include:
- information credibility evaluation and its applications;
- web content analysis for credibility evaluation;
- web content quality;
- author's intent detection;
- search models for trustworthy content on the web;
- conflicting opinion detection;
- news credibility;
- multimedia content credibility;
- credibility evaluation of user-generated content;
- sociological and psychological aspects of information credibility estimation;
- web spam detection;
- modelling trust on the web.

For further information, please visit:
http://tinyurl.com/2vav7dv

Workshop on immunology and metabolism

The workshop on immunology and metabolism will be held from 13 to 15 January 2011 in Marseille-Luminy, France.

The event will be the fourth in a series of meetings focusing on the emerging interfaces between immunology and other disciplines. The aim of this edition is to bring together scientists and physicians to discuss intersections between immune responses and metabolism.

The central themes of the workshop will be the influence of specific metabolic pathways on the physiology of immune cells, and the reciprocal contribution of immune responses to the development and progression of metabolic diseases, notably diabetes, obesity and atherosclerosis. Attention will also be paid to molecular crossroads, such as nuclear orphan receptors, bridging immune and metabolic responses. Other topics are set to include:
- immunology and lipids;
- metabolic stress and immunity;
- T-cell function and metabolism;
- inflammation and metabolic diseases.

For further information, please visit:
http://cwp.embo.org/w11-02/index.html

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