



European
Commission

research^{eu}

RESULTS MAGAZINE

No 29 February 2014



In this issue:



Special feature:

'Shaping the future of air transport'.

Interview:

Massimiliano Amirfeiz of Selex ES on 'Networking the sky with new aircraft communication technology', page 28

Other highlights:

A 'smart' knife to fight cancer, crime and contamination, page 6

Sound advice: modelling music halls, page 14

Effectively monitoring the state of Europe's marine environment, page 22

Achieving chameleon-like adaptability in the machine tool sector, page 36

Improved port accuracy and safety

through novel (satellite) technology, page 40

research*eu

RESULTS MAGAZINE

Published by

Publications Office of the European Union
2, rue Mercier
2985 Luxembourg
LUXEMBOURG
E-mail: cordis-helpdesk@publications.europa.eu

Editorial coordination

Gyn Nilsson

The *research*eu results magazine* is published by the Publications Office of the European Union, as part of the EU-funded research programmes. Content is prepared using several sources, including CORDIS, the Research Information Centre, ERC, as well as original material collected specifically for this publication.

The *research*eu magazines* are free of charge.

For all issues of the *research*eu results magazine* you can:

- download the PDF or e-book version
- order single paper copies
- subscribe to have every issue posted to you at <http://cordis.europa.eu/research-eu>

Disclaimer

Online project information and links published in the current issue of *research*eu results magazine* are correct when the publication goes to press. The Publications Office cannot be held responsible for information which is out of date or websites that are no longer live.

The technologies presented in this magazine may be covered by intellectual property rights.

ISSN 1831-9947 (printed version)
ISSN 1977-4028 (PDF, EPUB)

© European Union, 2014

Reproduction permitted, provided the source is acknowledged. Neither the Publications Office nor any person acting on its behalf is responsible for the use that may be made of the information contained in this publication or for any errors that may remain in the texts, despite the care taken in preparing them. For reproduction or use of photos and any other artistic material, permission must be sought directly from the copyright holder. Excluded from this constraint are the photos and artistic material owned by the European Union.

'Specials' icon: © iStockphoto.com/Tom Nulens
Cover photo: © Shutterstock

You can still order previous issues of *research*eu results magazine* from EU Bookshop:

http://bookshop.europa.eu/research_eu



Do you know *research*eu focus magazine*?

You can order it from EU Bookshop:

http://bookshop.europa.eu/research_eu_focus



Air transport sets course for the future

Air-traffic congestion, insufficient capacity at airports, growing data traffic between aircraft and infrastructure, and customer demands for better cabin and passenger communication systems ... This is not some future nightmare scenario that the air-transport sector plays out on simulators. It is the reality facing the industry today.

So, if air traffic more than doubles by 2050, as experts predict it will, the sector may find itself struggling to cope with increasingly crowded skies and airports, and the resulting challenge to safety levels. However, optimists may see this trend in another light: it is also an opportunity to develop new systems to boost efficiency and productivity in a vital economic sector in Europe.

The air-transport sector is cruising on an unsustainable course somewhere between rapidly changing digital technology and analogue systems designed in a bygone era. Passengers could be surfing high-speed internet on the latest tablets, while the pilot is preparing to land using decades-old analogue voice communications, slow data links and ad-hoc systems added to help aircraft meet changing standards.

Overly complex, disparate and inefficient communications could delay a pilot's reactions to unforeseen events, suggests our feature story, 'Networking the sky with new aircraft communication technology'. But EU-backed researchers in the SANDRA project have successfully tested new in-flight communications to help aircraft travel safely and efficiently. The success of the technology prompted the European Commission to include this flagship project in its communications heralding the launch of the new Horizon 2020 research programme.

This issue of *research*eu results magazine* details the technologies used by SANDRA and other research developments 'shaping the future of air transport', including revolutionary wing designs for smoother flight, noise dampening in helicopters, and more.

If you prefer more down-to-earth topics, our 'biomed' section gets to the roots of better crops (page 8) and offers insights into our unique tree of life (page 12). The feature story in our 'social sciences and humanities' section (page 14) asks the question: What makes a good concert hall work? Researchers are modelling the acoustics in music halls for better building design and augmented reality applications.

Apart from air transport stories, the 'energy and transport' section features 'System support for moving goods at port terminals' (page 21). The 'environment' section kicks off with a story about efforts to monitor Europe's marine environment more effectively, and the 'industrial technologies' section showcases how the machine tool sector is responding to industrial changes. Finally, the 'space' section focuses on how satellite technology can improve port safety (page 40), and the usual preview of events and conferences concludes issue 29.

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

cordis-helpdesk@publications.europa.eu

The editorial team



Want more information on the contents of this issue?

For online versions or information about the contributors in this issue

of *research*eu results magazine*:

- CORDIS: <http://cordis.europa.eu/projects>

<http://cordis.europa.eu/stories> - <http://cordis.europa.eu/news>

- European Research Council: <http://erc.europa.eu>



Special topic

Each issue of the *research*eu results magazine* sheds light on a specific science topic. To find out more about the latest results and findings, look out for this icon next to article headlines.



Videos

Want to see EU research projects in motion? Some of the projects presented in this issue have a dedicated video available on the internet. To view a video, just open the digital version of the magazine (available at <http://cordis.europa.eu/research-eu>) and click on this icon.

See you next month!

Coming up in issue 30 of *research*eu results magazine* — a special dossier called 'From the forest to the lab, what science can learn from nature'.

TABLE OF CONTENTS

BIOLOGY AND MEDICINE

6

A 'smart' knife to fight cancer, crime and contamination	6
Do-it-yourself muscle repair	7
Facilitating diagnosis of neurodegenerative diseases	8
Getting to the roots of better crops	8
Reasonable use of OTC drugs	9
Using sensory technology to provide daily dietary guidance	10
Optimising cochlear implant functionality	11
Genetic predisposition to type-1 diabetes	11
Outlining our unique tree of life	12
Water regulation in rice plant varieties	13
Development of a 'universal' influenza vaccine under way in Europe	13



SOCIAL SCIENCES AND HUMANITIES

14

Sound advice: modelling music halls	14
Preparing for an ageing Europe	15
'New deals' in the workplace	16

ENERGY AND TRANSPORT

17

Multi-chip electronics platform eliminates aircraft hydraulics	17
Keeping air flow over aircraft under control	18
Turning down helicopter noise levels	18
Turbomachinery exhibition takes off	19
Improved safety for critical aircraft components	20
Bumps on aircraft wings make for a better flight	20
System support for moving goods at port terminals	21



ENVIRONMENT AND SOCIETY

22

Effectively monitoring the state of Europe's marine environment	22
A sustainable future for European forage fish	23
Helping to mitigate the threat of public water contamination	24
High-performance buildings	24
Targeting ticks and bedbugs through eco-friendly textile materials	25
Aquaculture partnership between Asia and Europe	26
An early-warning system for oil spills	26
Building global biodiversity knowledge through open-access data	27



TABLE OF CONTENTS

Turning plastic waste into food packaging.....	27
--	----



IT AND TELECOMMUNICATIONS

28

Networking the sky with new aircraft communication technology.....	28
--	----

Graphene: the wonder material for electronics, computers and beyond.....	30
--	----



Using video games to enhance recovery from stroke.....	32
--	----

Empowering Europe's SMEs online.....	33
--------------------------------------	----

Complementary detection system for safer borders.....	33
---	----

Sharpening the blur in remote imaging.....	34
--	----

Fostering internet innovation.....	35
------------------------------------	----



INDUSTRIAL TECHNOLOGIES

36

Achieving chameleon-like adaptability in the machine-tool sector.....	36
---	----

Building complex 3D micro parts.....	37
--------------------------------------	----

Smoother design processing.....	37
---------------------------------	----

Optimising testing to produce better prosthetics.....	38
---	----

Bioreactors on the nano scale.....	39
------------------------------------	----

SPACE

40

Improved port accuracy and safety through novel satellite technology.....	40
---	----



Satellite monitoring of snow cover and glaciers.....	41
--	----

EVENTS

42

BIOLOGY AND MEDICINE



© IMPERIAL COLLEGE LONDON



A 'smart' knife to fight cancer, crime and contamination

Cancer is one of the most challenging medical issues we face. In the United Kingdom alone, there are 300 000 new cases every year — leading to almost 2 million surgical operations annually. Thanks to ERC funding, Dr Zoltán Takáts of Imperial College London has developed a 'smart' surgical knife that can 'smell' the tissues it is cutting through — with the potential to revolutionise cancer treatment, as well as food and drug analysis, and research into the human 'microbiome'.

The instrument, which the researchers call the 'iKnife', uses a mass spectrometer to analyse the 'smoke' produced by a scalpel that cuts using high-frequency electric current. From this, surgeons receive real-time feedback on whether the tissue they are cutting is cancerous or healthy.

Dr Takáts' project, DESI-JEDI IMAGING¹, has already reported a successful trial of the technology in the journal *Science of Translational Medicine*, which attracted a great deal of press attention. During the study, the project built up a database of signatures for different cancers — including brain, breast, lung and colonic — by taking tissue samples from more than 300 patients. The iKnife was then used in 80 surgical

operations, and in every case its real-time results matched the traditional tissue analysis carried out after the operation.

'We didn't expect to get this far in the project when we made the original proposal in 2007,' says Dr Takáts. 'But in the six weeks since our paper was published we've gone on to complete our clinical experiments and have shown the technology is ready for application — so we are now close to beginning official clinical trials with a view to regulatory approval.'

A beautiful breakthrough

Mass-spectrometers measure the mass-to-charge ratio of ionised (charged) particles by passing them through electric or magnetic fields. Scientists use them to analyse

the chemical composition and structure of samples.

The big breakthrough for Dr Takáts came when he realised that new surgical techniques — such as ultrasound-, laser or electro-surgery — produced charged particles of tissue which were ideally suited as input to a mass spectrometer. His first simple experiment — using pork liver and off-the-shelf surgical instruments — worked beautifully, with results much better than expected.

'For this fantastic tool, we immediately started thinking about applications — we looked for problems where an imaging mass spectrometer could help transform the landscape.'

BIOLOGY AND MEDICINE

Currently, a surgeon would take a tissue sample and have it analysed (called a 'biopsy') by a histopathology laboratory — with at least a 40-minute wait — before knowing whether to continue the operation. But by using an air pump to 'suck' particles from the site of the surgery to the mass spectrometer — the iKnife can supply instant feedback to the surgeon so that he or she can avoid cutting away more tissue than is necessary to remove all tumorous or inflamed cells. Leaving more of the remaining tissue intact will improve medical outcomes and patients' quality of life.

From science to surgery

'We are now moving to official clinical trials,' says Dr Takáts. 'We expect to see the start of trials in brain surgery early next year.'

This has proved a challenge, since the design of all three of the instrument's components — the electro-scalpel, the database for identification and diagnosis, and the mass

spectrometer tailored for the operating theatre — must be finalised before clinical trials begin because it cannot be changed after approval.

'The ERC's Proof-of-Concept (PoC) Grant was of key importance to this,' says Dr Takáts. 'The Starting Grant gave us a huge opportunity to set up the research group and do the science, but we really needed the PoC funding to look into regulatory issues, intellectual property management and starting up a company to bring the instrument to market.'

The iKnife has been developed for electro-surgery, as this is preferred by cancer specialists, but the technique is also applicable to hydro- and laser surgery. New applications for the tool could also include analysis of mucous membranes and the respiratory, urinogenital or gastrointestinal systems.

Its usefulness for tissue and substance analysis has led the team to have talks with food

industries and crime-fighting agencies. It could also be a powerful new tool for microbiologists, accelerating the creation of databases of the microbial population inhabiting our bodies.

'The millions of bacteria that live in — and on — us may be linked to cancers and illnesses like diabetes,' says Dr Takáts. 'Identifying them may help in diagnosis and treatments. We now have a unique tool to look into the fine detail of those interactions — leading to new approaches and therapies.'

The project was coordinated by Imperial College, London, in the United Kingdom.

- 1 'Development of mass spectrometric techniques for 3D imaging'.

Funded under the FP7 specific programme 'Ideas' (European Research Council).
<http://erc.europa.eu/erc-stories/>

Do-it-yourself muscle repair

Stem cells can be found in almost every tissue in an organism. An EU-funded project is developing new strategies for stimulation of the stem cells that are resident in damaged tissue for in situ repair.

Somatic stem cells constitute a long-lived population of cells with the ability to self-renew (duplication) and produce multiple cell types (differentiation) of the tissue of their location. Adult stem cells reside in a specific area of each tissue, termed the niche.

The goal of the ENDOSTEM¹ project is to develop strategies to

activate muscle-tissue-associated endogenous stem cells as a tool for efficient tissue repair. The initial goal is focused on finding candidate agents that target muscle and muscle vasculature progenitor cells and prevent tissue damage to optimise endogenous stem-cell function.

During the first three years of the project, the development of

several therapeutics to act as stem-cell activators was initiated. These therapeutics are nucleic acids, peptides, antioxidant drugs or epigenetic modifiers and have high potential in the regenerative medicine market.

A 'phase IIa' study of patients suffering from Duchenne, Becker and limb-girdle dystrophy was finalised. The study included 71 patients, 35 of whom were treated with the drug combination of nitric oxide and ibuprofen for up to 12 months. Results of the study provided a base for further developing the drug combination for a clinical setting.

At the current stage of the project, researchers are investigating the molecular mechanisms that control stem-cell activation and differentiation. First results identified a candidate protein, Cripto, which promotes stem-cell activation and migration. It was demonstrated that in a gain-of-function

model, Cripto enhances muscle regeneration.

Molecules that can be used to therapeutically target these kinds of stem cells will lead to more effective approaches to muscle regenerative medicine. This will also facilitate the development of novel cures for other degenerative diseases, including atherosclerosis as well as vascular damage in diabetes and in peripheral ischaemic vascular disease.

The project was coordinated by the Université Pierre et Marie Curie – Sorbonne Universités, France.

- 1 'Activation of vasculature associated stem cells and muscle stem cells for the repair and maintenance of muscle tissue'.

Funded under the FP7 specific programme 'Cooperation' under the research theme 'Health'.
http://cordis.europa.eu/result/brief/rcn/10124_en.html



BIOLOGY AND MEDICINE

Facilitating diagnosis of neurodegenerative diseases

The vital early diagnosis of neurodegenerative diseases requires combining the results of neuroimaging investigations with other genetic and cognitive evaluations. A prototype system integrates content and context to provide a powerful search tool for medical professionals in this area.

Our comprehension of the human body's most complex organ, the brain, has advanced dramatically. Today, we understand the functioning of individual neurons well, but how these billions of neurons combine and work together remains largely a mystery.

The early detection and diagnosis of neurodegenerative diseases, such as Alzheimer's disease and multiple sclerosis, requires a combination of neuroimaging investigations, cognitive evaluations, behavioural assessments, lab examinations and genetic testing. With funding from the EU, the COSERMI¹ project sought to help make

such diagnoses possible by integrating content and context information for the search and retrieval of digital medical images.

More specifically, the project worked on enabling the input of content and context information for describing and indexing medical images. This included colour, texture, shape, demographic information and clinical findings as well as anatomical and disease knowledge encoded in ontologies.

Employing a user-friendly graphical interface, the COSERMI system uses this integrated information to search and



© Sergey Nwens, Shutterstock

retrieve from multiple databases. The prototype search system, extending well beyond the capabilities of conventional keyword indexing, is capable of searching and retrieving relevant images for dementia, Alzheimer's and Parkinson's.

COSERMI has potential applications not only in diagnostics but also for educational and training purposes. Further applications include enabling neurology and radiology experts to identify previously unknown relations

in brain disorders, as well as working as a learning tool for medical doctors.

The project was coordinated by Bahçeşehir University, Turkey.

- 1 'Content- and ontology-based search and retrieval of medical images'.

Funded under the FP7 specific programme 'People' (Marie-Curie actions).
http://cordis.europa.eu/result/brief/rcn/12290_en.html

Getting to the roots of better crops

Almost 842 million people worldwide are chronically undernourished according to the Food and Agriculture Organization of the United Nations (FAO). The world faces a huge challenge if it is to achieve food security for a global population predicted to reach 9 billion by 2050. With ERC help, Professor Malcolm Bennett of the UK's University of Nottingham is trying to improve crop yields through better understanding of roots and the way they grow.

To feed everyone, crop production needs to double, while coping with the effects of climate change — such as reduced water availability in many parts of the world — and trying to reduce the negative impacts of agricultural fertilisers.

We need food crops that produce better yields by accessing and absorbing water and nutrients more efficiently. 'For 10 000 years, agriculture focused on the top half of plants,' explains Prof. Bennett. But the key to this lies underground.

Water and nitrates tend to sink deep into the soil, while phosphates are present in the topsoil near the surface. If we can choose and breed crop varieties to explore the topsoil more efficiently, and send their roots deeper, then we will be able to

produce more food and reduce the amount of fertilisers needed.

It's a kind of 'engineering problem', but to solve it we need to understand the genes that regulate root traits such as angle, depth and density.

Studying the root system — the 'hidden half' — is much more complicated than studying the aerial part of a plant. They can be grown under artificial conditions in the lab, or dug up from the soil, but in a living plant the roots are underground and difficult to access. 'The FUTUREROOTS¹ project aims to improve the technology to measure and analyse these root architectures,' says Prof. Bennett.



© Prof Malcolm J. Bennett

BIOLOGY AND MEDICINE

Recently, scientists have been able to image living roots non-invasively while still growing in the soil. X-ray Computed Tomography (CT) is better known as a medical scanning technique, producing images of the inside of the human body. Advances in the technology mean it can now be used to study the finest of root hairs.

'But up to now we could only CT-scan small soil volumes,' according to the professor, 'say, the size of a coffee cup, which is not enough for studying the deep roots of crop plants.'

X-ray vision

The solution came from advances in CT-scanner technology in the aviation industry: a room-sized scanner, used to inspect engine and wing parts, can look at soil samples 1 metre in length, 0.25 metres in diameter and weighing up to 80 kg.

'Funding from the European Research Council, the Wolfson Foundation and the University of Nottingham has enabled us to establish a unique root-imaging

platform, the Hounsfield Facility,' says Prof. Bennett. The ERC grant has paid for the new x-ray scanning equipment, capable of producing 3D images of the entire root networks of plants as they grow in soil in a state-of-the-art, fully automated greenhouse.

'The building was completed in July 2013, just 12 months after the project was launched,' he continues. 'The instruments will be operational in January 2014.'

A deep-rooted problem

Soil is heterogeneous, 3D and complex — with water and nutrients spread around the volume. A CT scanner can show the water, soil and roots by producing a series of 'slices' of soil, x-ray cross-section images that show each root only as a tiny spot where it passes through the slice.

'The challenge is to reconstruct the roots from these cross-sections,' explains Prof. Bennett. 'We have been able to adapt "object-tracking" techniques — an approach employed by the security industry

for finding suspects as they move through crowds — to recognise and follow each root branch and allow us to "peel away" the soil.'

Prof. Bennett is also the Director of the Centre for Plant Integrative Biology (CPIB) at the University of Nottingham, an interdisciplinary centre bringing together mathematicians, engineers and computer scientists, as well as plant and soil scientists.

'This multidisciplinary environment has really opened us up to different influences — it's a fantastic mixing pot,' he says. 'We need to work with every discipline, from software engineers to plant biologists, to address this challenging project. There are 20 of us in the ERC research team, with six PhD students co-funded by the ERC and the university.'

The centre is working with many International groups including the Institut de recherche pour le développement (IRD) in Montpellier, France, and Professor Jonathan Lynch in the US — pioneer of the

'second green revolution'. The object is to produce better crops for both Europe and developing countries.

'We are also discovering novel mechanisms for how roots search for water,' Prof. Bennett concludes. 'And, if this helps us generate new varieties of crop plants, giving higher yields in difficult conditions and more efficient in their use of soil nutrients, it will have a real agronomic impact.'

The project is coordinated by the University of Nottingham in the United Kingdom.

- 1 'Redesigning root architecture for improved crop performance'.

Funded under the FP7 specific programme 'Ideas' (European Research Council).
<http://erc.europa.eu/erc-stories/getting-roots-better-crops>
 Researcher's website
<https://www.nottingham.ac.uk/biosciences/people/malcolm.bennett>
 Project website <http://www.cpiib.ac.uk/research/projects/futureroots/>

Reasonable use of OTC drugs

Inappropriate supply and use of 'over-the-counter' (OTC) medicines pose major public-health risks for developed and developing countries alike. European researchers have created a scientific basis for reducing related problems and maximising the potential of medicines used in health care.

The OTC SOCIOMED¹ project was established with EU funding to assess the extent of inappropriate supply and consumption of non-prescribed medicines in certain southern European countries. Project

partners also aimed to identify factors influencing the provision and consumption of these medicines in four primary care groups: general practitioners (GPs), pharmacists, patients and clients.

Further, researchers worked to implement theory-guided interventions, addressing the training needs of physicians and the behavioural aspects involved in the inappropriate provision of over-the-counter (OTC) medicines. The project involved 12 participating organisations from eight countries: Cyprus, Czech Republic, France, Greece, Malta, the Netherlands, Sweden and Turkey.

The OTC SOCIOMED team initially described OTC provision and consumption, and then carried out regional and geographical comparisons of this. They subsequently assessed beliefs, attitudes and perceived

behaviour control of GPs and pharmacists, on the one hand, and patients and clients, on the other.

Subsequently, a multifaceted intervention for addressing GPs' beliefs and attitudes towards medicines was designed, implemented and evaluated. The aim was to test the feasibility of a pilot intervention, and to change GPs' intentions to provide medicines without well-documented evidence.

A set of recommendations and practical guidelines was distributed to stakeholders, public and private organisations, and bodies involved in medical research and education, health-care planning, drug industry distribution and monitoring.



BIOLOGY AND MEDICINE

OTC SOCIOMED successfully identified modifiable determinants in the provision and consumption of non-prescribed medicines. Project partners also delivered well-designed interventions that promote the better use of non-prescribed medicines in Europe, particularly in southern European countries. The study advanced

an operationalised structure for defining and evaluating interventions that target similar behaviours in other health-care professions and disciplines.

Outcomes from the OTC SOCIOMED project stand to reduce adverse drug reactions and rein in the trend of opting

for self-treatment over seeking medical advice. Implementing the knowledge and insights produced by the project will help the EU maintain the good health of individuals and society as a whole.

The project was coordinated by the University of Crete in Greece.

- 1 'Assessing the over-the-counter medications in primary care and translating the theory of planned behaviour into interventions'.

Funded under the FP7 specific programme 'Cooperation' under the research theme 'Health'.
http://cordis.europa.eu/result/brief/rcn/12133_en.html

Using sensory technology to provide daily dietary guidance

An innovative new way of providing personal behavioural guidance to children and young adults could play a crucial role in tackling the ongoing obesity epidemic. The EU-funded SPLENDID project will use high-tech sensors to record eating habits and physical activity across the course of a day, and provide valuable — and accurate — information to users and health professionals.

The emergence of obesity is a major health concern, causing 2.8 million deaths among adults worldwide each year. Studies have shown that children who are obese are likely to be obese as adults, making them more susceptible to adult health problems such as heart disease, type-2 diabetes, stroke and several types of cancer.

Traditional weight-loss interventions have in the past relied mainly on people's memory of what they ate for dinner, and how many minutes they

worked out. Researchers have long known however that this method can be unreliable since people often forget details, or unconsciously give incorrect information.

The SPLENDID¹ project aims to address this through the use of cutting-edge technology. The new sensory devices are being designed in labs or created with off-the-shelf parts. Although some similar instruments are already on the market — including a model that tracks calories burned by measuring motion,

sweat and heat — the devices currently in development through the SPLENDID project will be more sophisticated. They will feature more precise electronics and sometimes even video cameras.

A key advantage of the new system will be the provision of instant and personalised feedback. The high-tech sensors will deliver real-time data to smartphone and web-based interfaces, highlighting risk behaviours and helping users to change their daily habits and lifestyle. By doing so, the SPLENDID project hopes to communicate directly to young people most at risk from developing obesity and prevent the onset of serious health-related problems.

Obesity is of course just one side of the issue. Children and young people are also susceptible to other eating disorders, such as bulimia and anorexia, which can lead to serious health problems. Anorexia nervosa is characterised by extreme food restriction to the point of self-starvation and excessive weight loss.

The sensory technology and instant feedback being pioneered by the SPLENDID project can also be used by individuals who might be susceptible to such eating disorders. Behavioural patterns in both

obesity and eating disorders usually emerge early in life, and need to be managed immediately. This is why the project is being targeted at young people and children.

The SPLENDID consortium brings together expertise in neuroendocrinology, clinical practice, microelectronics, signal processing and personalised health management. European partners come from Greece, the Netherlands, Spain, Sweden and Switzerland, and the project involves the participation of the Internationella Engelska Skolan in Sweden, which has an established interest in improving the health of students.

The project is coordinated by the Aristotle University of Thessaloniki in Greece.

- 1 'Personalised guide for eating and activity behaviour for the prevention of obesity and eating disorders'.

Funded under the FP7 specific programme 'Cooperation' under the research theme 'Information and communication technologies' (ICT).
http://cordis.europa.eu/news/rcn/36316_en.html
 Project website: <http://splendid.ee.auth.gr/>



Optimising cochlear implant functionality

Hearing loss affects over 55 million people in the EU and the numbers are expected to reach about 100 million in 20 years. Cochlear implants (CIs) are surgically implanted devices used in patients with damaged hair cells in the cochlea (inner ear) resulting in sensorineural hearing loss.

A CI has an external speech processor to convert sound to an electronic signal that is sent to an array of electrodes implanted inside the cochlea. These electrodes stimulate multiple sites in the cochlea with high- and low-frequency signals of varying amplitude. The brain detects and interprets these signals in terms of pitch and loudness.

CI speech processors are currently adjusted by a tedious, technically challenging and time-consuming manual fitting procedure. An expert audiologist or engineer is needed for these adjustments, requiring over 30 man-hours per patient in the first year alone. The audiological tests are currently conducted in sound-treated rooms with routine loudspeakers. Settings selected depend on patient perception and audiologist expertise, resulting in inconsistent and often suboptimal outcomes. There is an urgent need for an efficient and accurate fitting process that adjusts several electrical parameters in the speech

processors based on psychoacoustic feedback.

The EU-funded OPTIFOX¹ project developed three products — OTOSpeech, FOX and OtoCube — to optimise technical fitting using an individualised programme ('map') to meet patient hearing needs.

OTOSpeech is a generic, automated psychoacoustical software application for speech scoring of CI users that is unaffected by patient dialect or language variation. Tests can be carried out in 22 European languages for accurate and optimal results, with test-word lists representing the patient's lexicon. Results are tester-independent and tests can be carried out for quiet as well as noisy speech conditions.

FOX is an artificial intelligence (AI) tool for semi-automated scoring of patient verbal response using 'dynamic time warping' (DTW) technology and OpenMarkov software. It combines psychoacoustical test



© iStock, Thinkstock

results with patients' maps (electrical parameters) to tune the CI and improve hearing. Work is ongoing to develop a self-learning mechanism for corrective action by continuously analysing a patient's growing dataset.

OtoCube is a commercial portable desktop module for carrying out standardised and calibrated psychoacoustic testing and fitting of CI patients. Developed after testing three prototypes, it has an acoustically insulated box that contains the CI speech processor to produce exact acoustic replicates of the electric input signal. This obviates the need for specialised equipment and sound-treated rooms, and considerably reduces fitting time as well as expenses.

OPTI-FOX members successfully developed three products for commercial clinical application to optimise hearing in CI users and improve their quality of life while reducing associated health-care expenses.

The project was coordinated by Otoconsult NV, Belgium.

- 1 'Optimization of the automated fitting to outcomes expert with language-independent hearing-in-noise test battery and electro-acoustical test box for cochlear implant'.

Funded under the FP7 specific programme 'Capacities' under the theme 'Research for the benefit of SMEs'.
http://cordis.europa.eu/result/brief/rcn/12129_en.html

Genetic predisposition to type-1 diabetes

Type-1 diabetes (T1D) is an autoimmune disease that is caused by the immune-mediated destruction of insulin-producing cells in the pancreas. Lifestyle, environmental and genetic factors appear to contribute to disease onset and progression.



Genetic studies have identified certain susceptibility genes associated with disease incidence, including the 'human leukocyte antigens' (HLAs), the IL-2 Receptor alpha chain (CD25), and PTPN22. Protein tyrosine phosphatase, non-receptor type 22 (lymphoid) is the protein expressed by the PTPN22 gene. The R620W polymorphism at the PTPN22 gene, which induces a single amino acid change, has recently received considerable attention.

The EU-funded PTPN22 IN T1D¹ project aims to delineate the mechanism by which the PTPN22 allele acts as an autoimmune susceptibility locus. To this end, researchers are studying the role of PTPN22 in regulatory and effector T cell populations in healthy and pre-diabetic individuals.

Genotyping of T1D patients or individuals-at-risk for the R620W polymorphism revealed a higher percentage of the predisposing polymorphism in these populations in comparison to healthy controls. Concomitantly, these individuals also present with an increased number of



BIOLOGY AND MEDICINE

memory and effector T-lymphocyte populations.

Experiments to delineate the role of PTPN22 in T-lymphocyte development have demonstrated the importance of this allele in driving the differentiation of regulatory T-cells. These results have been corroborated by studies in mice lacking the

PTPN22 allele, further showing that PTPN22 sets the threshold of T-cell receptor activation. In addition, the same allele seems to control antiviral responses by influencing the formation of memory and cytotoxic T-lymphocytes.

By delineating the role of PTPN22 in T-cell development and function,

researchers hope to understand how it predisposes individuals to develop T1D. In the long term, the information generated could form the basis for genetic testing and the development of novel therapeutic interventions.

The project was coordinated by the Ospedale San Raffaele, Italy.

- 1 'Effect of PTPN22 on Treg to Teff equilibrium in human and murine autoimmune diabetes'.

Funded under the FP7 specific programme 'People' (Marie-Curie actions).
http://cordis.europa.eu/result/brief/rcn/12168_en.html

Outlining our unique tree of life

EU-funded scientists have developed large-scale mathematical models of evolutionary biology that promise to shed light on the history of life and the processes of genome evolution.

Charles Darwin established the foundations of modern evolutionary biology with two fundamental concepts — all species are related to one another through a common ancestor, and natural selection reflects the interplay between hereditary information (in modern terms, genes) and the environment in which species evolve. The pathway of the descent of species from a common ancestor is traditionally depicted as a phylogenetic tree. Similarly, the histories of genes can be depicted as trees, although these can differ significantly from the history of species because genes are affected by a variety of evolutionary events such as duplication, loss, or lateral transfer.

Scientists set out to develop phylogenetic methods to reconstruct multiple gene trees in the context of a species tree, with EU funding of

the GENEFOREST¹ project. Their goal was to deliver models applicable to very large datasets through large-scale reconstructions of genomic processes such as gene 'duplication, transfer and loss' (DTL). Such methods, while computationally intensive, enable the study of complete genomes rather than a handful of genes, and hence to fully reconstruct the history of these genomes. Interestingly, these methods also provide information on the timing of species diversification, even in the absence of fossil data.

As a proof of concept, the probabilistic model named 'Origination, duplication, transfer and loss of genes' (ODT) was used to reconstruct the dated phylogeny of 36 cyanobacterial species using more than 8000 gene families. Scientists extended their ODT model to derive the first model

of gene acquisition and loss along extinct or unsampled lineages (exODT). This extension promises to enable exploration of the enormous diversity of life that is now extinct, but which may have contributed to existing genomes through ancient lateral gene transfers.

Scientists also developed the first probabilistic method to simultaneously determine the species tree and all the gene trees that together make up the history of genomes, thereby significantly improving the quality of both types of tree. This programme, called PHYLOG, was used to reconstruct the evolutionary history of 36 mammalian genomes.

In the final step, investigators combined the exODT model with other probabilistic models to obtain the 'approximate likelihood estimation' (ALE) model. ALE can infer a gene

tree with remarkable accuracy from a given species tree and is capable of accommodating up to 100 genomes.

The comprehensive large-scale evolutionary models of genome evolution developed in the GENEFOREST project will have major impact on the study of phylogenetic species trees, gene trees and their interrelationship.

The project was coordinated by the Université Claude Bernard Lyon 1, France.

- 1 'Integrating pattern and process to reconstruct the phylogeny of genomes'.

Funded under the FP7 specific programme 'People' (Marie-Curie actions).
http://cordis.europa.eu/result/brief/rcn/12298_en.html



Water regulation in rice plant varieties

Rice is a major food crop worldwide, but little is known about its aquaporin function and water regulation at the cellular level. The EU-funded ORYZAQUA project will address these gaps in knowledge in different rice cultivars and changing conditions.

Aquaporins are proteins in the plasma membranes of plant cells that act as water channels and are critical in water regulation. Hydraulic conductivity (Lp), water permeability and osmotic potential regulation are some of

the key factors involved in water regulation in plants.

ORYZAQUA¹ researchers will study a variety of rice aquaporins, root architecture and hydraulics in challenging conditions

such as salt and drought, as well as stress-free conditions. Researchers successfully cloned some rice aquaporin sequences and tagged them with fluorescent protein (FP), while the transformation of other rice isoforms and cultivars was ongoing.

Moreover, researchers have successfully cloned the fluorescently tagged OsRab5 sequence (aquaporin) for co-expressing endomembrane markers tagged with the mCherry FP. Work is under way to express other aquaporin sequences that include OsGAP1 and OsNST1. Studies are also being conducted to assess aquaporins' sub-cellular localisation and function in stressed and stress-free conditions in these rice plants.

Successful project outcomes should identify the aquaporins involved in water transport regulation. Their localisation and relocalisation in tissues and cellular compartments could also be revealed. The study results stand to provide important insight into the effects of global climate change and changing water conditions on the growth of rice crops.

The project was coordinated by the Centre national de la recherche scientifique (CNRS) in France.

1 'Cell biology of rice aquaporins'.

Funded under the FP7 specific programme 'People' (Marie-Curie actions).
http://cordis.europa.eu/result/brief/rcn/12164_en.html



© iStock, Thinkstock

Development of a 'universal' influenza vaccine under way in Europe

A newly launched European project is set to take a major step towards the development of a universal flu vaccine. It aims to counter the emergence of new strains and seasonal epidemics.

The viral infection usually strikes in colder months with seasonal influenza being responsible for around 3-5 million cases of severe illness and 250 000 to 500 000 deaths worldwide.

Due to its rapid spread, particularly among high-risk population groups, influenza remains a serious public health problem. To date, the most effective way to prevent the disease or severe symptoms is annual vaccination but current vaccines only offer limited protection against evolving strains of the infection.

To overcome these weaknesses, a public-private partnership comprising seven renowned organisations across Europe joined forces under the EDUFLUVAC¹ project to develop a broad-spectrum, long-lasting vaccine against influenza.

The recently launched EDUFLUVAC is taking a novel approach by 'educating' the immune system to cross-recognise common regions within multiple influenza virus strains.

'Developing a universal flu vaccine has become a global health

priority for preventing the spread of the virus and the emergence of new strains, and we are convinced that EDUFLUVAC will be a major step forward towards achieving this goal,' says Othmar Engelhardt, principal investigator at the National Institute for Biological Standards and Control, United Kingdom.

The research team expects to achieve better protection against epidemic influenza through the development of a vaccine that would not only offer the tremendous advantage of eliminating the need for a seasonal vaccine every year but could also reduce the need for costly annual vaccination campaigns.

Odile Leroy, Executive Director of the European Vaccine Initiative and coordinator of EDUFLUVAC, says: 'Low- and middle-income countries currently have minimal influenza vaccination

programmes. Thus, the development of a vaccine that elicits broad long-lasting defence would facilitate vaccination campaigns and confer protection against influenza in hitherto untargeted groups with limited health care.'

The four-year project is coordinated by the European Vaccine Initiative headquartered in Germany.

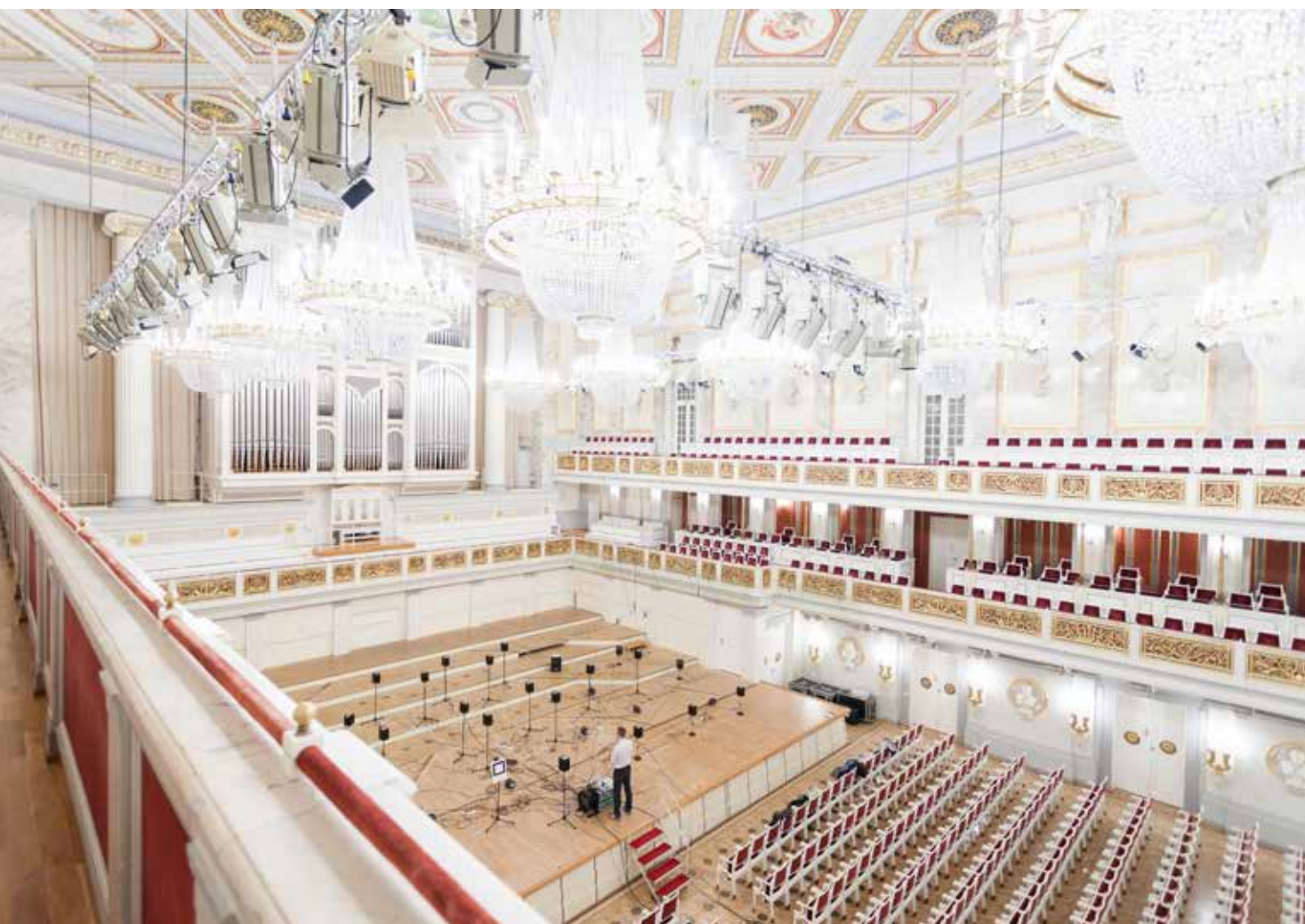
1 'Combinatorial immunization strategy to educate the immune system towards cross recognition and coverage against antigenic drift in seasonal influenza virus exposure'.

Funded under the FP7 specific programme 'Cooperation' under the research theme 'Health'.
http://cordis.europa.eu/news/rcn/36304_en.html
Project website: <http://www.euvaccine.eu/>



© wavebreakmedia, Shutterstock

SOCIAL SCIENCES AND HUMANITIES



© Jukka Pöyry — Aalto University

Sound advice: modelling music halls

Have you ever seen an engineer conducting an imaginary orchestra? We think of scientists working in a lab, but Professor Tapio Lokki, of the Aalto University School of Science in Finland, has spent the last few years visiting concert halls and making meticulous measurements of their characteristics. 'Karaoke' is Japanese for 'empty orchestra' — and in some ways that is what he has created to help his studies. The research could lead to improved building designs and a form of audio 'Augmented Reality' (AR).

'There has been research on concert halls ever since the most famous ones were built, more than 100 years ago,' he says, 'but it is still a mystery as to why some are better than others. And when a new concert hall is built, it is still a mystery as to how it will sound.'

What makes a good concert hall work? This is the question Prof. Lokki is trying to answer. His research may even lead to a new form of multimedia Augmented Reality, as well as better designs for auditoriums. 'We need more in-depth knowledge, using modelling, psychology, measurement, music aesthetics and acoustics,' he explains, 'to measure and simulate the behaviour of sound waves produced by 100 musicians in a complex

physical environment, and the effects for different audience members sitting in different locations.'

'Testing, testing, 1 - 2 - 3 ...'

But acoustic preferences — and even sound quality — are very subjective, so how can we measure such things scientifically? 'We needed both subjective and objective measures,' says Prof. Lokki. So he decided to borrow some ideas from other fields that need to quantify subjective opinions — the food and wine industries. 'We asked listeners to define their own terms to describe the sound quality of recordings from different concert halls — "bass", "clarity", etc. — and give them ratings. This leads to sensory profiles, and preference orders, for each hall.'

However, his team also needed to provide a standard by which to measure these subjective opinions — how to make sure everyone is reporting back on exactly the same sound qualities? This is where the 'empty orchestra' comes in.

'We built a "symphony orchestra simulator" using 34 loudspeakers,' explains Prof. Lokki. Each speaker is placed at an identical location on each concert stage, and plays a studio recording of an individual player and instrument. 'They always play the same piece of music, played by the same musicians, and then we record the overall sound from identical seat positions in each hall — so the only variable is the architecture.' Then, the researchers invited 20 listeners for each study and played them the piece,

SOCIAL SCIENCES AND HUMANITIES

while jumping from seat to seat and from hall to hall by switching between recordings, 'so we can really compare the halls', he continues.

The team have profiled mainly Finnish halls to date — and have started on auditoriums across Europe. And they are now working on mathematical models to complement this qualitative research.

From simulating orchestras to simulating acoustics

This is multi-disciplinary research, which needs a sizeable team for good results. ERC funding of the PHDVIRTA¹ project has enabled Prof. Lokki to hire experts in various fields: at first, four PhD students, now expanded to include three postdocs.

'Sound is not like light — it exists at wavelengths between 17m and 1.7 cm — so echo

delays, refraction due to corners, and wall vibrations are all factors — and full computer simulation of each hall is still a long way off,' explains Prof. Lokki. 'But thanks to our measurements, we can reproduce the specific effects that reduce bass, for example, and our 3D simulations can show that, say, staircases in specific locations will act as filters and affect speech intelligibility.'

The researchers can produce visualisations of sound energy — tracking reflections, their directions, and identifying the relevant surfaces — and superimpose these on plans and drawings. This could provide valuable advice on the construction of new concert halls, auditoriums and even libraries or shopping centres.

'As another application, we are working on Augmented Reality for sound with the Nokia Research Centre,' he continues. 'Visual AR uses smartphones or Google glasses, but we can use

a microphone to turn headphones "transparent" — the opposite of noise cancellation — and apply this to, say, a three-way phone conversation that fades out as you approach the people you are speaking to. Or you could use it to enhance your acoustic environment. In addition, we have provided hundreds of downloads of our music files from the orchestra simulator, and these are now being used to build on our research all over the world,' he concludes.

The project is coordinated by the Department of Media Technology, Aalto University School of Science, in Finland.

1 'Physically-based Virtual Acoustics'

Funded under the FP7 specific programme 'Ideas' (European Research Council).
http://erc.europa.eu > Projects and results > ERC stories
Project website: <https://mediatech.aalto.fi/~ktlokki/>

Preparing for an ageing Europe

An in-depth study of 'long-term care' (LTC) for the fast-growing number of elderly people across the continent will help ensure a more sustainable care model for this large segment of society.

Europe's population is ageing rapidly, putting a heavy strain on the continent's health systems. The EU-funded ANCIEN¹ project studied LTC for the elderly in Europe to improve care services and mechanisms for this rapidly growing age group. The project worked on making viable projections of future LTC use and costs involved, beginning with data

collection and the preparation of 22 country reports.

Developing typologies for the different LTC systems, the project team chose four representative countries for each type: Germany, Spain, the Netherlands and Poland. It then analysed the need for LTC in each country and used Eurostat population projections

to establish care projections. Another important aspect examined was the role of informal care and private funding versus public expenditure.

ANCIEN also looked at the use of care, including the choice between formal and informal care, as well as at the choice between care at home and in an institution. It analysed supply of informal and formal care, noting that the number of care users is set to increase in all countries. Other important issues examined include technological solutions likely to impact LTC, as well as economic, cultural, organisational and regulatory considerations.

Against this backdrop, the project team highlighted a need for policies to increase LTC capacity, closely examining and classifying policies related to the quality of care provided. It then looked at efforts to improve the quality of LTC, an exercise that could reveal much information on the sustainability of the LTC approach in each country.

In essence, the project team developed a robust epidemiologic

and demographic model that can project the future elderly population by age, sex and disability status. The method can be used for many types of countries, even those lacking detailed data on the incidence of disability.

The project's results and findings have been disseminated through a dedicated website with links to participating institutes. The website also includes research reports and policy briefs that can be accessed by interested parties. This will be invaluable for policy-makers and for pre-empting challenges in LTC as Europe's elderly population grows. The result is potentially better care and a better standard of living, not only for elderly patients but for the people in their lives as well.

The project was coordinated by the Centre for European Policy Studies in Belgium.

1 'Assessing needs of care in European nations'.

Funded under the FP7 specific programme 'Cooperation' under the research theme 'Health'.
http://cordis.europa.eu/result/brief/rcn6002_en.html



SOCIAL SCIENCES AND HUMANITIES

'New deals' in the workplace

European countries have different cultures of capitalism and employment. But in the face of challenges like globalisation and the financial crisis, the various models are changing — in different ways. At the National University of Ireland, Maynooth, Professor Seán Ó Riain is using an ERC Starting Grant to understand how European employers and employees are making 'new deals' in response to these challenges.



© Vedim Ramilov, Shutterstock

'I'm interested in social change and the possibilities that people have for leading a better life in the workplace — in terms of pay, relationships with colleagues, job satisfaction and even enjoyment,' explains Prof. Ó Riain. 'I want to look at it in a very direct and practical way. Comparisons between countries will allow us to draw conclusions from and for the different economic models.'

His NEW DEALS¹ project is using EU-wide survey data, the European Union Survey of Working Conditions (EUSWC), to analyse trends in pay, work processes, careers and working time during a period of economic boom and financial crash. The team will combine this with sectoral, regional and national data to understand how 'workplace bargains' — such as working hours or job security — emerge and spread, shaped by social and institutional contexts.

'In the 1990s and 2000s, there were debates on European economic models that grouped them into "varieties of capitalism", such as Liberal, Nordic, Continental or Mediterranean,' the professor says. 'But underneath these labels we know that all those models have been

changing — in Germany, for example, the workplace changed a lot between 2000 and 2008, with less security, a period of wage restraint and a focus on exports.'

Flexibility takes many forms

According to Prof. Ó Riain, while Nordic capitalism, for example, may be different from UK capitalism, both are changing to more flexible working practices. Where they differ is how those changes are implemented — in the UK, managers have more power and can put pressure on employees to work longer hours, whereas in Nordic countries teams are led by fellow employees, not managers, and 'flexibility' may mean being available for phone contact after work rather than longer hours in the workplace. This can have surprising results.

'In theory, "Liberal" economies such as Ireland and the UK are more flexible, because hiring and firing is easier,' he says. 'But in practice — also because out-of-work benefits are lower — this raises the stakes, and resistance to change may actually be stronger. Paradoxically, it can be easier to ask people to make sacrifices in the name of a

longer-term goal in the supposedly less flexible "Continental" economies. Stronger social security, and greater equality, means the stakes are lower and there is a stronger sense of common purpose and a shared future.'

In order to analyse the processes behind these kinds of workplace bargains, and their connection with the wider political and cultural landscape of each country, the project team will combine their survey-based research with a series of in-depth case studies. These will focus on six companies that represent three industries — software, retail and health — in two countries, Ireland and Denmark.

'The case studies will "lift the bonnet" in order to see what's "under the hood",' says Prof. Ó Riain. The researchers will interview managers and employees, as well as their customers and suppliers, attend their meetings, analyse project histories and 'shadow' managers over the course of their working day.

EU economy comprises 'varieties of capitalism'

The professor hopes the detailed information gathered from

knowledge-intensive sectors and countries with different 'varieties of capitalism' will lead to new theoretical insights and practical conclusions on the ways that finance, industrial policy, employers and employees interrelate.

'You couldn't do a project on this scale without the ERC grant funding,' he says. 'In particular, the longer-term, multi-year nature allows for a much more coherent project as a whole. The grant has enabled us to build a research team of two postdocs and three postgrads — as well as host conferences — and this has become one of the anchors of a research group on workplace sociology at our university.'

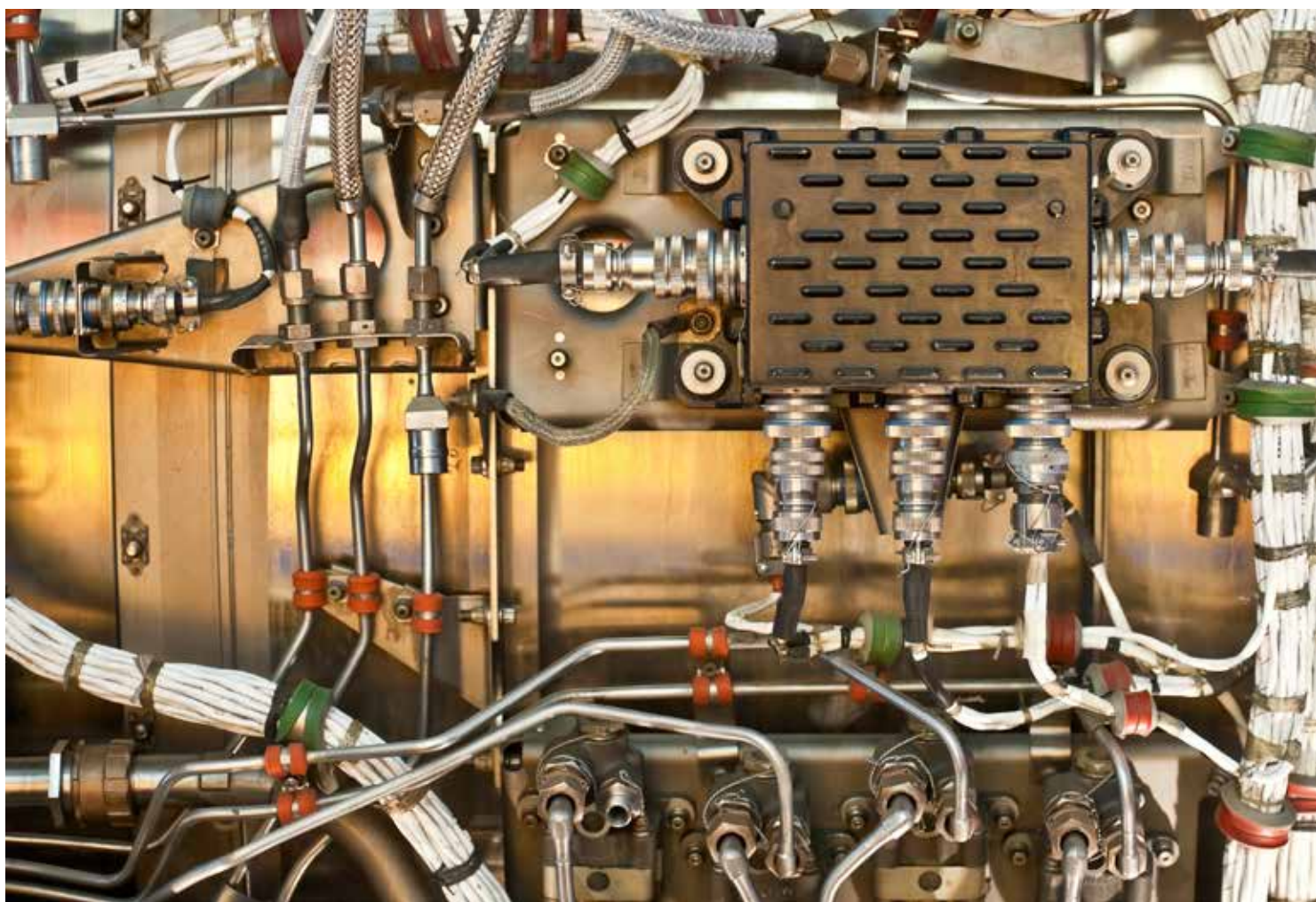
Prof. Ó Riain believes their findings will show more systematically how different aspects of the workplace are organised across countries, and how these are based not simply on the interaction of individuals but also on their collective capabilities, such as shared understandings of 'pathways to the future' and supportive institutions.

'There is a link between the workplace level and the European level,' he says, 'so we hope this research will give insights into current efforts to integrate the EU economy.'

The project is coordinated by the National University of Ireland, Maynooth, Ireland.

1 'New deals in the new economy: European workplaces in an era of transformation'.

Funded under the FP7 specific programme 'Ideas' (European Research Council).
<http://erc.europa.eu> > Projects and results > ERC stories
 Project website: <http://www.nuim.ie/newdeals/>



© iStock, Thinkstock

Multi-chip electronics platform eliminates aircraft hydraulics

Scientists have established the feasibility of all-electric actuation of flight-critical aircraft control surfaces. Removal of bulky hydraulic systems will lead to reduced costs and emissions for a more competitive and eco-friendly EU aerospace sector.

All-electric aeroplanes will exhibit a significant reduction in complexity, weight and fuel consumption, which will have important implications for operating costs and environmental impact. In addition, electrical systems are expected to lead to significantly reduced maintenance costs compared to hydraulic systems.

EU-funded scientists working on the project CREAM¹ focused on eliminating as many hydraulic power sources and hydraulic lines as possible through the development of high-performance electromechanical actuators (EMAs).

Conventional aircraft use actuators powered by hydraulic circuits containing pressurised fluids to move various aircraft control surfaces such as wing flaps and landing gear.

EMAs use electric motors to produce a torque that drives the actuation providing a much simpler and more compact solution.

The CREAM multi-chip power module (MCPM) is an electronics platform packaging the various chips or functionalities on the same substrate for use as a single component. It includes both the power electronics components and the control electronics integrated in the actuator housing.

The system delivers high-power density in approximately half the volume and mass. With advanced thermal management, the electronics will withstand the extreme operating conditions associated with air transport. Four fully assembled MCPMs incorporating all sub-parts of the EMA were manufactured and tested in a harsh-environment test bed.

CREAM results establish the ability of EMAs to reliably actuate flight-critical control surfaces on aircraft. Facing intense competition from the United States, the EU is now in a position to build on project outcomes and assume a leadership role in the challenging aeronautics sector.

The project was coordinated by Sagem Défense Sécurité in France.

1 'Innovative technological platform for compact and reliable electronic integrated in actuators and motors'.

ENERGY AND TRANSPORT



Keeping air flow over aircraft under control

Scientists have developed and tested novel technology for the active control of aircraft using pulsed jets of compressed air. The system actuator has no electrical or moving parts, and promises robust and effective modulation.

'Active flow control' (AFC) systems for the aerospace sector, as their name implies, actively control the flow of air over or around an aircraft component to improve efficiency or performance. AFC of flap systems using pulsed blowing can potentially shift stall onset. Scientists initiated the EU-funded project FLOCOSYS¹ to equip full-scale aircraft with AFC technology, including the actuator system and compressed air generator, distributor and conditioner system.

Actuators are basically transducers, changing an input signal that is often electrical into an output signal that is often mechanical. FLOCOSYS used a novel actuator core with no moving or electrical parts (flueric), relying only on a supply of pressurised air. Developed by the scientists in a previous research project, this was integrated into the AFC architecture and the system was subjected to extensive and successful ground tests simulating various critical scenarios.

The flueric actuator is extremely robust and experiments demonstrated that the AFC system incorporating it is capable of very good flow control. Scientists have advanced understanding of AFC for civil aircraft and expect certification of the actuator to follow shortly. Active control of flow over aircraft components is an important and effective way to decrease turbulence, increase stability and enhance safety, and FLOCOSYS has delivered a reliable and effective way to achieve it.

The project was coordinated by the Technical University of Berlin, Germany.

- 1 'Efficient system for flow-control actuation'.

Funded under the FP7 specific programme 'Cooperation' through the 'Clean Sky' Joint Technology Initiative (JTI).
http://cordis.europa.eu/result/brief/rcn/12187_en.html



© iStock, Thinkstock



Turning down helicopter noise levels

EU researchers are helping to develop a noise-reduction system for helicopters. Quieter helicopters are better for both passengers and people on the ground.



The Clean Sky Initiative is a European aeronautical research programme working on technologies to produce less noisy and more fuel-efficient aircraft. One of its objectives is to minimise the noise impact of helicopters both on-board and 'on-the-fly'. To this end, reliable and fast noise predictions will be required, based on actual flight conditions. The model that has been envisaged for this purpose requires information to be derived from experimental data.

The EU-funded ANCORA¹ project will play a part in this by determining the transfer function between the noise measured on-board the helicopter and that registering on the ground. During the project's flight-test campaign, a large number of steady-state conditions and manoeuvres will be flown over a grid of microphones. All results from the flight tests and data analysis will be made available through a database.

© iStock, Thinkstock

ENERGY AND TRANSPORT

ANCORA has selected the types of microphones to be used and their positions on the helicopter's fuselage, and has tested the microphones and the full measuring system working together. In addition, the project has developed the software required to determine the transfer function. However, in order to take full advantage of the project test

flights, it was decided to perform additional measurements simultaneously.

Since these extra tests required certain components with a very long lead time, they proved incompatible with the original planning for ANCORA. Consequently, the flight tests have been postponed, well

beyond the current project's duration and an extension has been requested.

The project was coordinated by Anotec Consulting SL in Spain.

- 1 'Anotec-Comoti rotorcraft acoustics initiative for preliminary acoustic flight tests for the tuning of simplified rotorcraft noise models'.

Funded under the FP7 specific programme 'Cooperation' through the 'Clean Sky' Joint Technology Initiative (JTI).
http://cordis.europa.eu/result/brief/rcn/12150_en.html



Turbomachinery exhibition takes off

A highly successful exhibition on cutting-edge advances in turbomachinery has brought new partnerships and many innovations to different fields, from aerospace to wind-based energy.

Considered the leading European scientific event on fluid dynamics and thermodynamics in turbomachinery design and operation, the European Turbomachinery Conference (ETC) has truly enhanced excellence in the field. In March 2011, after eight successful previous events, the ninth conference was held in Istanbul, Turkey aiming to upgrade turbomachinery in propulsion systems and energy-conversion processes.

The EU-funded EUROTURBO 9¹ project supported technology transfer across Europe in the

field by presenting the latest developments and practices at the event. The project facilitated cross-fertilisation among senior scientists and users, providing a European forum for important knowledge exchange and integrating ideas from both eastern and western European nations.

Of the 174 papers submitted for review to be presented at the conference, 134 were accepted, showing an increase of 24% over the last conference. The papers represented a vigorous mix of authors from academia, industry and research centres,

with 14 notable papers being selected for journal publication. The conference itself attracted over 280 participants, including students and researchers, with major contributions from Germany and Italy as well as the Czech Republic, Poland, Spain, Switzerland and Turkey.

Conference presentations highlighted important contributions to theory, design methods, optimisation, reliability and operability in turbomachinery. Key topics of interest included blade design, three-dimensional (3D) advances, unsteady flows, heat transfer,

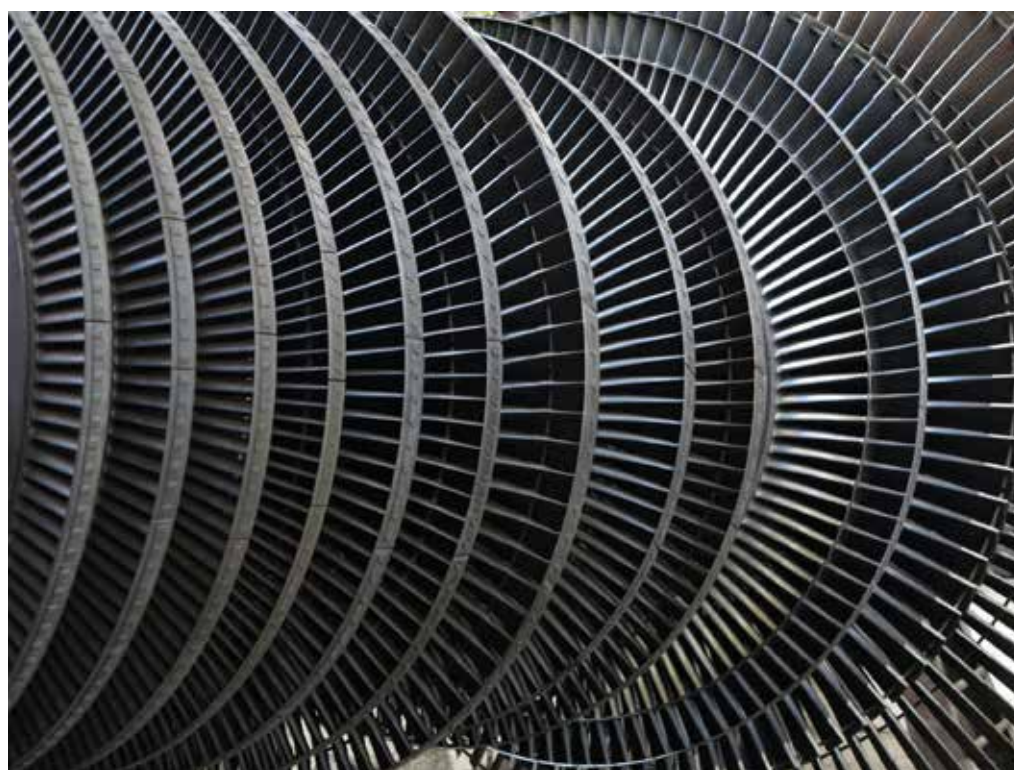
aeroelasticity, noise, thermodynamics and two-phase flows. These topics were of particular interest to research workers, design engineers and users of turbomachinery, furthering knowledge transfer and improving cross-fertilisation among leading technologies.

Overall, EUROTURBO 9 fulfilled its goal as a primary driver for technology transfer across Europe in this field, presenting an exciting array of cutting-edge developments, best practices and innovations. Supported by high-quality lectures, technical tours and emerging publications, the biannual conference has become a leading event in the field. From more efficient aero-jet engines and steam turbines to compressors and wind turbines, the new age in turbomachinery will benefit the economy, industry and citizens in exciting new ways.

The project was coordinated by the Istanbul Technical University, Turkey.

- 1 'Support to ninth European conference on turbomachinery'.

Funded under the FP7 specific programme 'Cooperation' under the research theme 'Transport (including aviation)'.
http://cordis.europa.eu/result/brief/rcn/11407_en.html



ENERGY AND TRANSPORT

Improved safety for critical aircraft components

Titanium and its alloys have become the materials of choice for structural components in the aerospace sector. EU-funded scientists developed previously lacking non-destructive testing (NDT) of sub-surface defects that could save lives.

Titanium and its alloys exhibit high strength-to-weight ratios and excellent corrosion resistance. Given the additional benefit of withstanding extreme temperatures, titanium is particularly well suited to structurally significant item (SSI) applications in the aerospace sector.

However, current NDT techniques to assess the titanium billets from which the components are formed have to overcome several challenges. They are expensive and complex, and require prior knowledge of the materials' properties and extremely precise probe positioning. As a result, the numerous small and medium-sized enterprises (SMEs) working in the field are finding it hard to compete with larger manufacturers. In addition, they have low sensitivity and repeatability, such that even large manufacturers have missed defects with catastrophic consequences.

Funded by the EU, the QUALITI¹ project developed NDT technology suitable for application during the manufacture of titanium components for the aerospace sector. The technology exploits a combination of two NDT methods. Phased-array ultrasonic testing (PAUT) probes detect defects within the billet, compiling information from a number of ultrasonic beams and employing beam steering to help correct misalignments. The performance is equal to or better than industry-standard ultrasonic inspection.

One restriction is that both systems are unable to evaluate the so-called ultrasonic dead zone, a region below the surface of the test object where signals are confounded by strong interface echoes. In order to overcome this limitation, the QUALITI system employs eddy current (EC) inspection that relies on



© iStock, Thinkstock

electromagnetism. A coil with alternating current placed near the surface generates a changing magnetic field to produce an EC in the vicinity. Changes in the EC properties provide information about defects.

The automated EC technology is revolutionary in the field of NDT of titanium for SSIs in the aerospace sector. The combined QUALITI system now provides comprehensive defect detection in titanium billets that may be subject to surface defects during manufacture. This will have a major impact on the safety and operating costs of airlines, on the profitability of titanium manufacturers and even on the

expanded use of titanium, now that reliable defect detection is possible.

The project was coordinated by TWI Ltd in the United Kingdom.

- 1 'Development of New and Novel Quality Control System for the Inspection of Titanium Components in Safety Critical Applications in the Aerospace Industry'.

Funded under the FP7-specific programme 'Research for the Benefit of SMEs' (SME).
<http://cordis.europa.eu/projects/222476>



Bumps on aircraft wings make for a better flight

An EU-funded project is helping Europe to introduce new aircraft with laminar-flow wings. This technology can increase fuel efficiency by reducing an aircraft's aerodynamic drag.

Laminar-flow technology is necessary to improve the efficiency of future aircraft. However, it poses a number of problems and a degree of flow control is necessary to mitigate the undesirable side effects of the laminar wing design.

Previous research has identified 'shock control bumps' (SCBs) as a promising method of achieving the required control, although questions still remain regarding their



© moodboard, Thinkstock

ENERGY AND TRANSPORT

performance and operation. To address these issues, the NEXTWING¹ project, funded by the EU, was established.

Using a joint experimental and numerical approach, the NEXTWING project tested different shock bump geometries. The extended tail geometry offered an improved robustness relative to the other geometries.

However, none of the geometry modifications tested by

the project team were found to cause any significant change to the vortex production characteristics. In light of this, the project conducted a study, using computational data, on the vortex nature of the swirling air structure being formed.

Although the precise mechanism of vortex production is still not fully understood, it does provide the NEXTWING project with a way to strengthen the vortices produced by the bump. As a result,

it may enable the project to use SCBs as a novel type of vortex generator capable of reducing buffeting.

During the first stages of the project, guidelines for robust SCB design were developed. The final project stage will be dedicated primarily to a final assessment of the impact of SCBs on the design of a full 3D laminar-flow wing.

The project was coordinated by the University of Stuttgart, Germany.

- 1 'Numerical and experimental shock control on laminar wing'.

Funded under the FP7 specific programme 'Cooperation' through the 'Clean Sky' Joint Technology Initiative (JTI).
http://cordis.europa.eu/projects/rcn100013_en.html



System support for moving goods at port terminals

EU researchers are developing a combined tool for managing separate port terminals. Optimising the intermodal transport between such port areas is cost effective and, at the same time, can reduce the related environmental impact.

In recent years, maritime traffic flow has been increasing in terms of the volume of goods and the number of interconnections with different transport modes. To increase the available space, dry ports are being established nearby and directly connected via rail or road networks.

However, overall port management thus becomes more complex since the two terminals have to be managed as if they were one. Providing a solution to this problem is the goal of the SAIL¹ project, funded by the EU. The project aims to develop

a 'decision-support system' (DSS) and a 'discrete event simulation' (DES) to support the management of intermodal transport facilities at European ports. It will work on precise representation, modelling and simulation of the intermodal port.

SAIL has carried out a thorough investigation of the current approaches of a model-based DSS in the logistics field. In addition, it has identified an expert-knowledge approach for potential use based on fuzzy reasoning.

During the development of a DES, the SAIL project identified the main components of the port system being studied. These include the port area, the surrounding inland area, the road connection system and input from the rail network system.

Recently, SAIL has started testing the algorithms and tools that it has developed. The next step is the finalisation of these activities, following which the focus will move to the integration and evaluation of the prototype tools in experimental scenarios.

The project was coordinated by the Università degli Studi di Trieste, Italy.

- 1 'ICT system addressed to integrated logistic-management and decision-support for intermodal-port and dry-port facilities'.

Funded under the FP7 specific programme 'People' (Marie-Curie actions).
http://cordis.europa.eu/result/brief/rcn12278_en.html



ENVIRONMENT AND SOCIETY



© Richard Whitcombe, Shutterstock

Effectively monitoring the state of Europe's marine environment

An EU-funded project has recently been launched that will help Member States to effectively and efficiently monitor the environmental status of oceans and seas. This will enable them to meet their obligations under the Marine Strategy Framework Directive (MSFD).

Tackling marine litter and removing contaminants from our oceans are crucial to ensuring marine biodiversity and the long-term sustainability of our fish stocks. The EU has addressed these issues through the MSFD, and now wants to ensure that this legislative measure is being properly implemented.

Fundamentally, the aim of the MSFD is to protect the marine environment. It establishes European Marine Regions on the basis of geographical and environmental criteria, and each Member State is required to develop strategies for their marine waters.

These strategies must contain a detailed assessment of the state of the environment, a definition of 'good environmental status' at regional level, and the establishment of clear environmental targets and monitoring programmes.

The EU-funded COMMON SENSE¹ project, launched in November 2013 in Barcelona, Spain, aims to make the Commission's job easier in this regard, by helping Member States take the necessary action. Funded to the tune of EUR 4.7 million through the EU's FP7, the initiative brings together 15 partners from seven different countries, encompassing

a wide range of expertise and know-how in the marine-monitoring area.

COMMON SENSE will develop a marine-monitoring system consisting of cost-effective sensors and a data-management platform. This will help to reduce data-collection costs and increase the availability and dissemination of important data. The project will focus on monitoring heavy metals, marine litter and underwater noise, and will measure parameters such as temperature and pressure.

The project will begin by examining the cost of developing bespoke sensors for detecting

ENVIRONMENT AND SOCIETY

specific particles or contaminants in the sea. These sensors will then be integrated into multifunctional systems, along with sensors for temperature, pressure and pH levels.

A common sensor web platform will then be developed to optimise data acquisition, access and interoperability. The sensors developed will also be interoperable with existing systems. It is expected that the finalised platform will enable the swift dissemination of findings and technology, which will boost commercial, scientific and conservation interests.

The COMMON SENSE consortium comprises six SMEs, five research development institutes, three universities and one foundation. The consortium's expertise and geographical distribution will enable multidisciplinary marine environmental monitoring of key marine regions, including the Baltic Sea, the north-east Atlantic Ocean and the Mediterranean Sea.

A dedicated website for COMMON SENSE will go live in February 2014, providing project news and updates, as well as detailed information on the objectives and results of the project which is due for completion in February 2017.

The project is coordinated by Leitat Technological Center in Spain.

- 1 'Cost-effective sensors, interoperable with international existing ocean observing systems, to meet EU policies requirements'.

Funded under the FP7 specific programme 'Cooperation' under the research theme 'Environment'.
http://cordis.europa.eu/news/rcn/36325_en.html
 Project website: <http://www.commonssenseproject.eu>

A sustainable future for European forage fish

Poor management of forage fish stocks could lead to the collapse of marine predatory fish, bird and mammal populations. An in-depth investigation into the effects of ecosystem management on four European seas will provide support for sustainable development and conservation efforts.

The EU-funded FACTS¹ project focused on four main foraging fish: herring, capelin, sardine and anchovy in the Baltic and Barents Seas, the Bay of Biscay and in the North Sea. FACTS has also developed and disseminated advice on the effects of various forage-fish-harvesting strategies on the ecosystem, including their economic implications.

Project researchers quantified the trophic interactions between forage fish and their prey and further investigated the competition among forage fish species. Changes in potential habitat characteristics and prey requirements were determined using physiological-based habitat modelling to determine likely areas of distribution.

The project used multi-species models to investigate the effect of forage fish exploitation on diet and food intake. Bioenergetic models helped assess their effect on the reproductive potential of top predators. This has enabled identification of the ecological requirements and economic costs for forage fisheries when top predators sustain or reach a specific reproductive potential.

By analysing several ecosystems as well as generic models, FACTS provided the basis for deriving general rules applicable to forage fisheries in European waters. This type of general knowledge required internationally coordinated investigations of forage fish dynamics in a range of different ecosystems rather than local studies.

FACTS' dissemination efforts among all Member States will continue after the project ends. Media efforts have included a project website, popular scientific press and peer-reviewed journals, daily/weekly press and workshops as well as brochures and newsletters.

Consortium members recommend a pan-European approach to ecosystem management and have built a network of associated partner institutes to aid its evolution. Similar initiatives are

being undertaken in the north-west Atlantic and, to promote optimal flow of knowledge and initiative sharing, a Canadian institute has become an associated partner.

The project has assessed the importance of forage fish in European ecosystems and its economy. This analysis can be used to weigh the costs and benefits of different levels of exploitation of forage-fish resources. It therefore provides a basis for decision-makers to integrate forage fish dynamics and their exploitation into an ecosystem within the EU's common fisheries policy (CFP).

The project was coordinated by the Technical University of Denmark.

- 1 'Forage fish interactions'.

Funded under the FP7 specific programme 'Cooperation' under the research theme 'Food, agriculture and fisheries, and biotechnology' (KBBE).
http://cordis.europa.eu/result/brief/rcn/11375_en.html
 Project website: <http://www.facts-project.eu/>



ENVIRONMENT AND SOCIETY

Helping to mitigate the threat of public water contamination

Drinking water infrastructures are vulnerable to deliberate contamination, which can have far-reaching consequences for both public health and the economy. A European project has developed a comprehensive approach to rehabilitating a drinking water system after deliberate contamination.

Public water infrastructure such as tanks and pipes are easy targets for terrorist attacks using chemical, biological or radioactive contaminants. This would not only cause direct harm to end-users, but could also create social disorder through the

interruption of water supplies to the public.

An EU-funded project called SECUREAU¹ developed an early-warning system to minimise the public impact of such an attack. It has also created tools to

rapidly locate the source of contamination and its spread along with ways to clean the water-distribution system, including the inner walls of the pipes.

To develop the early-warning system, researchers tested a wide range of new sensors to detect any significant changes in water quality, and advanced mathematical models to optimise the position of those sensors in the water network. They also looked at methods to identify the source of the contamination.

Many cleaning and decontamination methods were then tested to find the most effective approach for reservoirs and pipe walls. Techniques for the accurate and safe handling of decontamination waste were also developed.

The SECUREAU team used their results to generate a final model and decision tool (which can be appended to the obligatory water safety plan) for dealing with contamination. These steps will not only protect against future contamination events, but will also provide improved monitoring and everyday management of water distribution infrastructure.

The project was coordinated by the University of Lorraine in France.

1 'Security and decontamination of drinking water distribution systems following a deliberate contamination'.

Funded under the FP7 specific programme 'Cooperation' under the research theme 'Security'.
http://cordis.europa.eu/result/brief/rcn/12299_en.html
 Project website:
<http://www.secureau.eu/>



© iStock, Thinkstock

High-performance buildings

The time has come to standardise assessments of building performance in terms of sustainability. A large European consortium has paved the way by developing a set of indicators and a benchmarking process.



Sustainability has become the buzzword of the century. Countries, businesses and even individuals have become increasingly aware of, and concerned about the conservation of natural resources and the protection of the planet and its environment. Making buildings more sustainable is an excellent way to make a significant impact on challenges such as water and energy consumption and material waste.

A large European consortium laid the groundwork for the development of a standardised assessment system for sustainable buildings (SBs) with EU funding of the SUPERBUILDINGS¹ project. Scientists focused on the

development of assessment methods and indicators of environmental, social and economic performance within the European Committee for Standardization (CEN) and the International Organization for Standardization (ISO).

The consortium focused on potential indicators for which assessment information is lacking, that relate to methodological issues, or that are currently completely lacking. Researchers chose 13 indicators, including those related to water and non-renewable energy consumption, land use, global warming potential, waste generation, water pollution and indoor air quality.

Scientists determined that local knowledge regarding typical performance values and sustainability indicators is already good

© iStock, Thinkstock

ENVIRONMENT AND SOCIETY

among architects, designers, planning authorities and building authorities. However, it is currently of minimal concern to bankers, insurance companies and community representatives.

Scientists studied the effective use of sustainability indicators throughout the building process, from customer briefing and planning for SBs to design, implementation and use/maintenance. The team also made recommendations

for the technical and semantic integration of indicators into 'building information modelling' (BIM). A relatively new modelling platform, BIM enables building professionals to explore a project digitally before beginning construction. Researchers concluded that SB indicators are mature enough to be included in all life-cycle phases. They thus proceeded with developing recommendations for implementation of the system.

SUPERBUILDINGS investigated the potential for standardisation of building sustainability indicators in order to benchmark building performance at all stages of the construction process. Scientists found the concepts ripe for implementation. Further development and widespread use of the SUPERBUILDINGS sustainability assessment foundations and recommendations will prompt market movement towards a higher level of sustainability.

The project was coordinated by the VTT Technical Research Centre of Finland.

- 1 'Sustainability and performance assessment and benchmarking of buildings — Superbuildings'.

Funded under the FP7 specific programme 'Cooperation' under the research theme 'Environment'.
http://cordis.europa.eu/result/brief/rcn/12305_en.html

Targeting ticks and bedbugs through eco-friendly textile materials

A newly launched EU project seeks to combat the negative health consequences of the increasing populations of ticks and bedbugs in Europe. It hopes to achieve this through the development of protective, biodegradable textile materials.

Population levels of ticks and particularly bedbugs have been steadily on the rise in Europe over the past decade — due in part to climate change — as well as a result of increased global migration, changes in patterns of insecticide use and bedbugs' reduced susceptibility to insecticide.

As a consequence, plans to develop a protective, natural material in line with

EU-authorized biocide standards has brought together a consortium of ten partners, collaborating under the BETITEX¹ project. The team are focusing their design efforts in two key domains including SMEs, in the form of personal protective equipment (PPE), and domestic use, in the form of home textiles.

Unlike bedbugs, which do not pose a serious threat to human

health, some ticks carry pathogens that can cause diseases. A key concern of the BETITEX research revolves around the use of repellent spray. These sprays contain biocides that can result in higher protection against ticks and bedbugs. However, not all of them are accepted by the European Biocides Directive because of their toxicity and environmental impact. To tackle this, the project will develop lab

cultures of both bedbugs and ticks, alongside biocide-efficacy testing of the insecticide-treated textiles.

Although the textile and apparel industry is steadily reacting to demands to introduce sustainable production into the sector, the use of eco-friendly technologies has yet to become commonplace among manufacturers. This is why members of the BETITEX consortium expect their results to contribute to the promotion of a greener and more competitive economy through the use of natural, biodegradable textile materials combined with eco-friendly textile technologies.

The project is coordinated by Gremi Textil de Terrassa in Spain.

- 1 'Development of sustainable textiles against bugs'.

Funded under the FP7 specific programme 'Capacities' under the theme 'Research for the benefit of SMEs'.
http://cordis.europa.eu/news/rcn/36319_en.html



ENVIRONMENT AND SOCIETY

Aquaculture partnership between Asia and Europe

Over the last 20 years, aquaculture has evolved from small-scale farming operations into a major technology-based bio-industry. Although the main focus of production is currently centred in Asia, research and technical development in current aquaculture technology is primarily elsewhere.

The ASEM-AQUACULTURE09¹ project was established as a forum for aquaculture research, policy, education and business. The aim was to reconcile Asian and European interests in aquaculture production and consumption.

A series of vital issues were defined to ensure successful co-operation, including a strategy for interacting with industry representatives. In addition, 'best management practices' (BMPs) were established for small farmers seeking accreditation for their

production process through group certification.

The project also sought to mitigate the environmental impact of aquaculture by building partnerships based on 'integrated multi-trophic aquaculture' (IMTA) principles. Successful examples from China and Singapore were used to develop joint research initiatives with partner institutes in order to stimulate suitable innovation.

Scientific data from Asian and European partners were used as a

basis for certification schemes and associated food safety legislation. A workshop was held that addressed the problems and solutions experienced by small-scale producers during the implementation of food certification schemes.

Disease and health management plays a crucial role in successful aquaculture. The ASEM-AQUACULTURE09 project supported an active forum of Asian and European aquatic-health management experts. They exchanged information on common problems encountered with newly occurring diseases and potential solutions that will lead to the development of joint research plans.

Education and training opportunities for Asian and European aquaculture were facilitated by mapping exchanges between higher education establishments. Vulnerable stakeholder groups were supported

by a workshop for regional experts. This workshop provided a country-specific action plan for integrating gender into a programme that empowers the poor in fish-farming communities. A manual on gender analysis and mainstreaming was also produced.

Thanks to the work of ASEM-AQUACULTURE09, the ASEM aquaculture platform will be recognised as the central focal point of Asian-European aquaculture collaboration. This concerted effort will result in major benefits for both regions, such as research excellence, good governance, fair trade, social equity and sustainability in aquaculture.

The project was coordinated by the University of Ghent in Belgium



© iStock, Thinkstock

1 'ASEM aquaculture platform'.

Funded under the FP7 specific programme 'Cooperation' under the research theme 'Food, agriculture and fisheries, and biotechnology' (KBBE).
http://cordis.europa.eu/result/brief/rcn/11177_en.html



An early-warning system for oil spills

Heavy and continuous shipping activity pollutes and damages marine life and water quality, which can also impact human health. A recent project has developed improved monitoring and prevention systems for oil spills and other marine pollutants.

Limited bodies of water, such as the Mediterranean, are under serious threat from oil spills as well as chronic pollution. To help address the problem, the EU funded the ARGOMARINE¹ project. The aim was to develop a network to monitor and protect heavily used shipping lanes, and to institute a data-management system for public use.

The first part of the project involved developing an algorithm to detect oil spills using satellite imaging. Researchers designed algorithms that used

synthetic aperture radar (good for recognising oil on water) and a vessel detection method to enable the automated identification and tracking of oil spills.

During the next phase of the project, an autonomous sensing platform was developed. Both patrolling and stationary versions were investigated and researchers built an 'electronic nose' that could detect hydrocarbons in sea water. The sensing platforms also incorporated acoustic monitoring (to detect vessels) and other environmental sensors.

Finally, an overall 'marine information system' was developed. This tool incorporates all the data generated by ARGOMARINE into a publicly available system for monitoring and data management.

ARGOMARINE successfully created mathematical and physical tools to protect the oceans from pollution, especially oil spills. The work will have an impact on coastal environments, and could potentially save money by preventing large spills.

The project is coordinated by the Parco Nazionale Arcipelago Toscano in Italy.



© iStock, Thinkstock

1 'Automatic oil-spill recognition and geopositioning integrated in a marine monitoring network'.

Funded under the FP7 specific programme 'Cooperation' under the research theme 'Transport (including aviation)'.
http://cordis.europa.eu/result/brief/rcn/11163_en.html



Building global biodiversity knowledge through open-access data

An open-access platform to enable the integration of European and Brazilian biodiversity research tools has been developed through an EU-funded programme. The EUBRAZIOPENBIO project, which was completed in 2013, will help promote cross-border innovation and the sharing of best practice in a vitally important field of research.

Indeed, one of the great challenges of the 21st century will be addressing biodiversity loss, which is already estimated to cost the EU around EUR 450 billion a year. This is one reason why Horizon 2020, the EU's new research funding programme, has stressed the importance of tackling biodiversity loss quickly and effectively.

Tackling the complexity of biodiversity requires dealing with multiple multidisciplinary datasets, from climatology to earth sciences. Much of this data is fragmented. This is why EUBRAZIOPENBIO¹ has sought to develop a platform that will enable cross-border research, and support the needs of the biodiversity scientific community by reducing the time and costs required to set up dedicated working environments and workflows.

The project is very much in line with the Open Access Movement, which

promotes the concept of openness for scientific research, and is aligned with the OPENAIRE² initiative launched in 2010 to establish an infrastructure for EU-funded researchers to publish their work.

EUBRAZIOPENBIO has also created a number of useful research tools, such as a new version of the Catalogue of Life cross-mapping tool developed in the I4LIFE³ project. By using this EUBRAZIOPENBIO Crossmapper service, taxonomists and data curators can find relationships between their own regional lists of species and different information systems, within the same virtual research environment.

Based on a list of species of Brazilian flora, containing over 43 000 species and around 30 000 synonyms, and the global Species2000/ITIS Catalogue of Life (CoL), which indexes about

250 000 plant species and 300 000 synonyms, the service allows comparison of any pair of checklists. For example, the tool can provide a list of species present in one checklist, but absent in the other.

An Ecological Niche Modelling service has also been developed, providing researchers with an integrated working environment that enables the definition and execution of computing-intensive modelling tasks. It works by retrieving high-resolution environmental data collected from different biodiversity networks, such as the Global Diversity Information Facility (GBIF) and SpeciesLink. This makes the process easier to handle and allows biodiversity researchers to create models and run them under different conditions in a quicker and less-fragmented way.

Both Brazil and Europe have much to contribute to the fight against biodiversity loss, and the EUBRAZIOPENBIO project is a significant step in the right direction. It is expected that the breadth and depth of the completed data infrastructure, along with the openness of its resources, will herald a new era of cost-effective,



© Mircea Beazghianu, Shutterstock

cross-disciplinary research within the global biodiversity research community.

The project is coordinated by the Barcelona Supercomputing Center in Spain.

- 1 'EU-Brazil open-data and cloud-computing e-infrastructure for biodiversity'.
- 2 'Open Access infrastructure for research in Europe'.
- 3 'Indexing for life'.

Funded under the FP7 specific programme 'Cooperation' under the research theme 'Information and communication technologies' (ICT).
http://cordis.europa.eu/news/rcn/36307_en.html
 Project website:
<http://www.eubrazilopenbio.eu/>



Turning plastic waste into food packaging

A new process is being developed by European researchers to recycle plastic waste for food packaging. This resource could be worth up to EUR 700 million per year.



© iStock, Thinkstock

Many of our beverages and food items are delivered in bottles or packages made from 'polyethylene terephthalate' (PET). A PET package can be made from 100% recycled PET, and the material can be recycled over and over again.

However, most of the coloured and layered PET is currently non-recyclable and thus cannot be processed for food-contact packaging. A new recycling process is needed, which is where the SUPERCLEANQ¹ project, funded by the EU, has a part to play.

Initially, the project team carried out a literature search and a patent review, and defined the material testing requirements. SUPERCLEANQ is also developing technology for the waste management of PET.

A spectroscopy system that is able to identify coloured and barrier-modified PET material in plastic waste is under investigation. Another test system is being designed that will detect undesirable levels of contamination in PET-processed parts.

Marker compounds have been identified during the project that can be used as a measure of the purity of recycled food-grade PET, and thus of the effectiveness of a PET recycling process. This analytical method is being proposed as a potential European standard.

Every year, some 700 000 tonnes of coloured and layered PET cannot be recycled by existing PET recycling facilities for food-contact packaging.

The SUPERCLEANQ project will continue its work on developing a new process that is capable of recycling this waste into food-grade material.

The project was coordinated by the British Plastics Federation in the United Kingdom.

- 1 'Development of processes and quality procedures for the valorisation of recycled plastics for food contact applications'.

Funded under the FP7 specific programme 'Capacities' under the theme 'Research for the benefit of SMEs'.
http://cordis.europa.eu/result/brief/rcn/12156_en.html
 Project website:
<http://www.supercleanq.eu>

IT AND TELECOMMUNICATIONS



© Tatiana Popova, Shutterstock

Networking the sky with new aircraft communication technology

Air transportation is expected to at least double by 2050. Coping with these needs and the resulting overcrowded sky requires top-notch communication technologies — but the sector is not quite ready yet. The SANDRA project set out to improve aircraft by means of a coherent digital architecture.

Whilst more and more airlines provide their customers with in-flight access to the internet, pilots still have to work with technology from another era. Forget high-speed access to real-time information: the pilot operates in an isolated bubble where he must rely on decades-old analogue voice communications and non-IP low bit-rate data links. This can result in overly complex, disparate and inefficient communications which may potentially delay his reactions to unforeseen events.

Besides being inefficient, the current system cannot meet upcoming aeronautics challenges, such as congestion, insufficient capacity at airports, the need for increased data traffic, and requests for better cabin and passenger communication systems.

As part of the Single European Sky Initiative, SESAR (Single European Sky ATM Research) — a joint effort by the EU, Eurocontrol and industry to modernise and provide a high-performance air traffic control infrastructure in Europe — is studying the evolution of aeronautical communications, while focusing on air traffic control and airline operational communications.

Coordinated by Selex ES and made up of 30 partners from Europe's leading aviation technology industry and research organisations, the SANDRA consortium has taken a more radical approach instead, which is able to revolutionise in-flight communications. Its newly developed technology involves connecting all aircraft applications and services to a single integrated aeronautical communication

system based on networks, radio transmission and satellite links, which is global, digital and safe.

The SANDRA technology was successfully tested in trial flights in Germany, prompting the European Commission to select the flagship project for its communications around the new Horizon 2020 research programme. Massimiliano Amirfeiz, a member of the project coordination team, details the technologies used by SANDRA and their expected impact on future aeronautics.

What are the main objectives of the project?

The SANDRA project studied, implemented and demonstrated in flight a new system that will lead pilots into the digital world of

IT AND TELECOMMUNICATIONS



© Massimiliano Amirfeiz

Massimiliano Amirfeiz

the 21st century. A single system based on Internet Protocol technology, it is capable of transmitting data through multiple data-links, directly to the ground and via satellite, digitally and at high speed, providing communication services for all aircraft needs, each with its own required quality of service and in a seamless way. Detailed information, such as the weather or traffic situation, can be exchanged between the control tower and the aircraft in a quick and reliable manner, thereby increasing air traffic safety.

Together with existing data-link technologies, such as VHF Data Link Mode 2 and Swift Broad Band Satcom, the SANDRA project also demonstrated for the first time in Europe the AeroMACS technology, the first of the three new IP-based broadband data-links (the other being L-DACS and IRIS Satcom) identified by the International Civil Aviation Organization (ICAO) for future aeronautical needs. AeroMACS has been conceived to provide broadband wireless data connectivity over the airports to support airport operations, air-navigation service providers and airline applications.

Although new communication systems will eventually replace the current ones, we are likely to witness a lengthy period during which aircraft will be fitted with all systems for the sake of global interoperability. This is the forecast from SESAR, and the additional airborne equipment required during this transition phase severely threatens the realisation of the vision of future communications. It would create a considerable extra burden in terms of size, weight, complexity and cost in avionics if the new radio links are implemented in stand-alone equipment, as has traditionally been the case in communication avionics. To tackle this problem, SANDRA has also investigated the possible exploitation of the 'software defined radio' concept, in

which radio communication system components that are typically implemented in hardware (e.g. mixers, filters, amplifiers, modulators/demodulators, detectors, etc.) are implemented by means of software on a computer, hence allowing different radios to be run in parallel over common processors as independent bits of software (waveforms). This would be a great step forward, in the same way that 'integrated modular avionics' revolutionised airborne electronics.

What is new or innovative about the project and the way it addresses this topic?

Trials validated the concept that aircraft should have multiple data links simultaneously active, which can be used for all communication needs from traffic control to airline operations and passenger services. This is to guarantee the best quality of services, as well as security and prioritisation. All this is based on Internet Protocol version 6, the most advanced IP protocol which will enter into service in ground networks in the coming years, and has already been identified by ICAO as a pillar for future aeronautical communications.

Trials have validated the feasibility of 'integrated modular radio' (IMR), an innovative avionic communication architecture whereby each single radio element can be reconfigured independently to operate a specific radio link as required, depending on the flight phase and geographical location. IMR will be a cornerstone of the SANDRA business model, bringing a wealth of advantages in terms of weight, cost of radio components, and reduced pilot workload. It should enable a less-painful transition between legacy and future communication baselines as it can support both. It is important to note that radio software configurability is critical to enable the future incorporation of future data-links such as L-DACS and IRIS Satcom.

AeroMACS has also been demonstrated for the first time in an integrated end-to-end network, providing a variety of services, ranging from pilot/controller digital communications to telemedicine and passenger private communications.

How will the switch to digital communications in aeronautics benefit the sector?

By supporting SESAR's concept of future data-centric cockpit communications, SANDRA is contributing to more efficient and safer flights, which will be particularly important as the volume of air traffic increases. The SANDRA system brings the most advanced multi-link communications, integrating L-band and Ku-band satellite links, as well as AeroMACS ground links and the current VHF data link (VDL2). It uses industry standards such as IP,

IEEE 802.16 (for AeroMACS), DVB-S2 and Inmarsat SwiftBroadBand. The system can be set up to choose the best available radio link, or the crew can select the link manually.

The use of industry standards means we can also integrate cockpit and cabin communications. The cockpit and cabin systems are separate for security purposes, but share the link. This will provide airlines with a cost-effective way of providing in-flight connectivity to both passengers and pilots.

What difficulties did you encounter and how did you solve them?

The new system was tested for the first time under real-flight conditions using the German Aerospace Center's ATRA (Advanced Technology Research Aircraft) test aircraft, which is a modified Airbus 320. The main challenge was in the integration of such a wide range of disparate systems comprising aeronautical applications, new communication avionics and networks on-board an aircraft. But the SANDRA system also includes corresponding communication technology on the ground — which researchers have installed at the German Aerospace Center (DLR) site in Oberpfaffenhofen and at the Toulouse-Blagnac Airport — and integrated external entities such as Inmarsat Satcom and SITA ground networks.

This allowed us to perform in-flight tests of the smooth exchange of data during a transition from one data-link technology to another. All this represented a challenge which the SANDRA consortium has been able to overcome thanks to consortium complementary expertise and motivation, as recognised by the EC project officer and independent reviewers.

How will SANDRA affect a pilot's routine and working conditions?

Where the new technology is available, the pilot will see all information related to weather, air traffic and current decisions at the same time as her/his colleagues on the ground who are in charge of air-traffic control. Automatic flight corrections to avoid critical situations and misunderstandings will therefore be much easier.

As an example, for landing in airports, the SANDRA system has a quick data-link that works via AeroMACS, providing the pilot with access to all required data indirectly via the local WLAN. And thanks to SANDRA's compatibility with previous technologies, the system can be used to land in any airport in the world. Depending on availability, the SANDRA system will automatically connect pilots to fast broadband connections or legacy data-link systems.



IT AND TELECOMMUNICATIONS

What are the next steps for product commercialisation, or your next research topics?

Various technologies and concepts have been investigated, not all with the same technology readiness level. AeroMACS is expected to be put into operation in major airports in 2018. A new protocol mechanism that allows existing aeronautical networks to operate through IP-based broadband data-links together with non-safety-related data traffic has also received great interest from industry. It will be further studied within SESAR and could enter into service in the coming years. Finally, our new communication avionic architecture, based on software-defined radio and integrated modular avionic technologies, has been

recognised by major aircraft integrators as a good candidate for inclusion in new aircraft within the 2020-2025 time frame. SESAR projects dealing with multilink and IP-based technologies have recognised the work performed and will take advantage of SANDRA results in this area.

But whilst SANDRA has identified the building blocks, two things are still needed to make this new communication architecture a reality. First, the project's functional building blocks should be incorporated into a coherent set of physical units taking into consideration real aircraft environments and new avionic frameworks defined in other European-funded projects. Secondly,

the cockpit migration to Internet Protocol technology, which is already a reality for ground networks, should be initiated. The latter requirement is the most difficult as it involves a cultural shift.

The project was coordinated by Selex ES in Spain.

- 1 'Seamless aeronautical networking through integration of data links, radios, and antennas'

Funded under the FP7 specific programme 'Cooperation' under the research theme 'Transport'.
Project website: <http://sandra.aero/>



Graphene: the wonder material for electronics, computers and beyond

You might think that such a new 'wonder material' would lie outside your everyday experience, but graphene is the exception. When you write or draw with a pencil, the graphite (the 'lead' of the pencil) slides off in thin layers to leave a trail — the line on the paper. Carbon's ability to form a thin layer of molecules is what makes graphene special — and scientists are starting to explore the possibilities for electronics and computing of carbon grids that are just one molecule thick.

The semiconductor industry is the basis of today's high-tech economy, directly supporting over 100 000 jobs in Europe, and indirectly even more. This has been achieved through continued miniaturisation in 'Complementary metal-oxide-semiconductor' (CMOS) technology, based on silicon. But this model will only last for 10 to 15 more years.

The major challenge for the ICT industry is to find alternatives for information processing and storage beyond the limits of existing CMOS. There are good indications that graphene is a prime candidate for 'Beyond CMOS' components and, despite its revolutionary nature, is complementary to conventional CMOS technologies.

Graphene has been the subject of a scientific explosion since the ground-breaking experiments on this novel material less than 10 years ago, recognised by the Nobel Prize in Physics in 2010 awarded to Professor Andre Geim and Professor Kostya Novoselov, at the University of Manchester. The remarkable electrical properties of graphene may overcome the physical limits silicon faces as transistors shrink to ever-smaller

sizes — providing solutions for the Beyond CMOS era, needed to meet the challenges of global competition.

Bringing together multiple disciplines and addressing research across a whole range of issues, from the fundamental understanding of material properties to graphene production, the GRAPHENE¹ Flagship was launched in October 2013. The proposed research includes electronics, spintronics, photonics, plasmonics and mechanics — all based on graphene.

Led by Professor Jari Kinaret, from Sweden's Chalmers University, the Flagship involves over 126 academic and industrial research groups in 17 European countries, with 136 principal investigators, including four Nobel laureates. With an initial 30-month budget of EUR 54 million, the GRAPHENE consortium will grow to include another 20 to 30 groups through an open call for project proposals in November, worth up to a total of EUR 9 million.

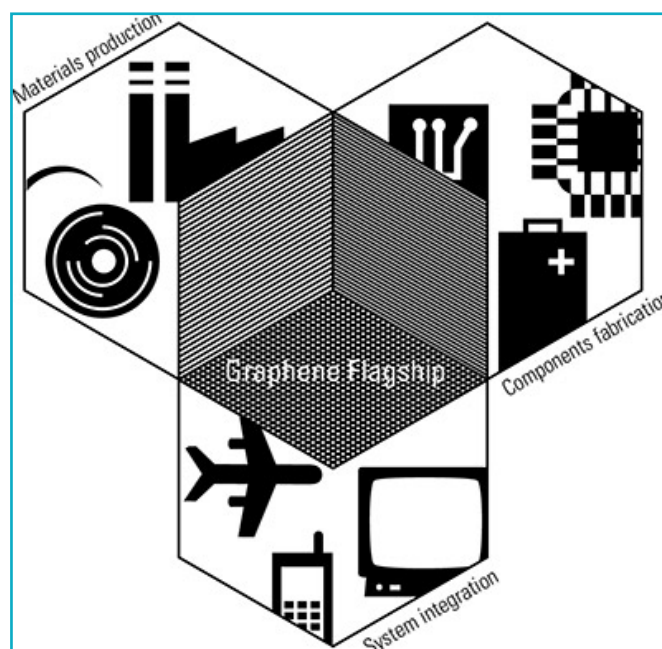
'Graphene production is obviously central to our project,' said Prof. Kinaret at the launch, but key

applications to be looked at include fast electronic and optical devices, flexible electronics, functional lightweight components and advanced batteries. Examples of new products enabled by graphene technologies include fast, flexible and strong consumer electronics, such as electronic paper and bendable personal communication devices, as well as lighter and more energy-efficient aeroplanes. In the longer

term, graphene is expected to give rise to new computational paradigms and revolutionary medical applications, such as artificial retinas.

Setting sail: graphene as FET flagship

Described by European Commission Vice-President Neelie Kroes as a 'daring venture', the 'Future and emerging



technologies' (FET) Flagships are visionary, large-scale, science-driven research initiatives which tackle scientific and technological challenges across scientific disciplines. These new instruments in EU research funding foster coordinated efforts between the EU and its Member States' national and regional programmes, are highly ambitious, and rely on cooperation among a range of disciplines, communities and programmes — requiring support for up to 10 years.

Following the start-up phase, running until March 2016 under the EU's current Seventh Framework Programme for research (FP7), the work will continue under the next programme, Horizon 2020, with an expected EUR 50 million per year for the Flagship project.

Graphene was chosen as a Flagship following a competition between six pilot projects to investigate the areas with the greatest potential for sustained investment. According to Mrs Kroes, 'Europe's position as a knowledge superpower depends on thinking the unthinkable and exploiting the best ideas. This multi-billion competition rewards home-grown scientific breakthroughs and shows that when we are ambitious we can develop the best research in Europe.'

The Flagship pilot for graphene, the GRAPHENE-CA² project, looked at how developments in this carbon-based material could revolutionise ICT and industry. The pilot project established a comprehensive scientific and technological roadmap to serve as the basis for the research agenda of the GRAPHENE Flagship — covering electronics, spintronics, photonics, plasmonics and mechanics, and supporting areas such as graphene production and chemistry. And this was the basis on which it was selected.

Now the Flagship is up and running, it already comprises a research team of dizzying scope. There are universities from Louvain in Belgium, Aalto

in Finland, Lille and Strasbourg in France, Bremen, Chemnitz, Dresden and Hamburg in Germany, Ioannina in Greece, Dublin in Ireland, Trieste in Italy, Minho in Portugal, Barcelona and Castilla-La Mancha in Spain, Basel, Geneva and Zurich in Switzerland, Delft and Groningen in the Netherlands, and Cambridge, Manchester and Oxford in the United Kingdom. These are complemented by polytechnics and institutes of technology from Austria, Denmark, France, Germany, Greece, Italy, Poland, Spain, Sweden and Switzerland. In addition, there are industrial partners such as Nokia, Thales, Alcatel Lucent, Philips Technology, Airbus and ST Microelectronics. And this list accounts for only part of the participating organisations.

Their mission is to take graphene, and related layered materials, from the academic laboratories to society — revolutionising multiple industries and creating economic growth and new jobs in Europe.

'The Commission, and all the academic and industrial partners of the GRAPHENE Flagship, are all in this together. It is an unusually long-term commitment, and there will be challenges, let's be clear about that,' said Carl-Christian Buhr, member of Mrs Kroes' Cabinet. 'We need to bring in industry in such a way that ideas are taken up and lead to new products and markets. That's the whole idea of the Flagship.'

Indeed, it includes a comprehensive set of complementary activities to achieve this, such as:

- An ERA-NET type of project, FLAG-ERA³, to support the Flagship in the coordination of national research initiatives on graphene.
- A range of initiatives focused on spreading knowledge about graphene to the wider world. The Graphene Week, for example, is an annual forum bringing together

hundreds of researchers to share their latest developments across disciplines — the next will be held in Gothenburg, Sweden, in June 2014. It aims to be a 'gathering of the graphene tribe', where discussions of fundamental science can meet exciting new applications.

- Graphene Connect is an interaction platform for academia and businesses promoting scientists to think outside the box and industries to develop end-user products based on graphene — this will include a number of industrial workshops, and sessions for business angels, entrepreneurs and venture capitalists to discuss potential graphene investment opportunities.
- Graphene Study is a European winter school on graphene that will help build a new generation of graphene researchers, as well as new direct communication channels between young researchers and academia-industry players. The first will be held in the Austrian Alps, on 2-7 February 2014.

Early results

Some of the EU's previously funded graphene research is already delivering. The GRAND⁴ project, which ended in December 2010, looked at whether graphene would still work its wonders when integrated with the silicon CMOS process.

Led by AMO in Germany, the project team set out to assess whether graphene really could bring conventional semiconductor technology into the Beyond CMOS era. The GRAND consortium developed ways of fabricating 2-dimensional graphene nanostructures (with widths of only 5 nm across) for use in electronics components. It was important to show that not only could such components function, but that they could be fabricated in a way that

could be scaled up to industrial quantities.

As a result, the team designed a new type of transistor — with the concept published in the renowned journal *Applied Physics Letters* — that could open new routes for graphene-based high-speed electronic and optoelectronic devices.

As part of the GRAND project, graphene has also been integrated into a non-volatile memory device that could be reduced to molecular sizes — a graphene memory measuring just 1x1 nm that retains the information stored in it even when power is turned off. The team fabricated more than 10 such devices — indicating their scalability.

Led by the Chalmers University of Technology, Sweden, the CONCEPTGRAPHENE⁵ project set out to unlock the potential of depositing a thin layer of graphene on to a silicon carbide (SiC) base — aiming to develop scalable electronics with potential applications in spintronics and ultra-accurate measuring devices. The team worked on fabricating large-scale graphene wafers that would allow for high-density electronic devices to be manufactured on a single silicon wafer. This type of technology will be needed for full-scale industrial manufacture of graphene-based components and devices in a way that is compatible with current industry techniques.

Having ended in September 2013, the project launched a start-up company that will produce graphene wafers. Graphensic AB is located in Linköping, Sweden. The company is a spin-off from Linköping University and produces high-quality, highly uniform, graphene on silicon carbide (SiC) using a patented 'High-temperature graphene process' — a growth method which produces a thin layer of graphene, even a single layer of atoms, on SiC.



IT AND TELECOMMUNICATIONS

More where that came from

But graphene is not the only innovative material that could transform electronics — the 2D-NANOLATTICES⁶ project, ending in May 2014, is working on other graphite-like molecular-lattice structures based on different elements. These 'nanolattices' also have great potential to pave the way to ever-smaller, and more powerful, nano-electronic devices. In particular, 'silicene' (or 'germanene'), the silicon or germanium equivalent of graphene, if they exist, may offer

better compatibility with silicon processing.

Led by the National Center for Scientific Research 'Demokritos', in Greece, the project team aims to find ways to induce and stabilise the silicon and germanium and prove for the first time that silicene has a physical existence. By producing alternating layers weakly bonded between one another, each consisting of a single layer of atoms, this new material could serve as the elements of gates and other components

in new, miniaturised 2D semiconductors.

Perhaps we are still in the early stages, but these look to be the first steps in a transformation of the way electronics devices are made — and in their abilities — with the potential to similarly transform the European high-tech industry and economy.

- 1 'Graphene-based revolutions in ICT and beyond'.
- 2 'Graphene-based nanoelectronic devices'.
- 3 'A flagship-supporting ERA-NET'.
- 4 'New electronics concept: wafer-scale epitaxial graphene'.
- 5 'Coordination Action for graphene-driven revolutions in ICT and beyond'.
- 6 'Strongly anisotropic graphite-like semiconductor/dielectric 2D nanolattices'.

The projects featured in this article have been funded under the FP7 specific programme 'Cooperation' under the research theme 'Information and communication technologies' (ICT).
http://cordis.europa.eu/result/story/rcn/12056_en.html

Using video games to enhance recovery from stroke

The use of motion-oriented video games in rehabilitating stroke victims can also be more fun, perhaps contributing to their success.

Stroke, characterised by a lack of blood flow to the brain, affects a large percentage of the population, reducing their quality of life. Most commonly seen in stroke aftermath is weakness (paresis) or paralysis on the side of the body opposite to the cerebrovascular brain event. While regular physical activity is important for recovery and prevention of recurrence, studies show that many patients are not active enough.

Thanks to EU funding of the project VR STROKE REHAB¹, scientists are assessing the effectiveness

of group video game therapy in motivating stroke patients to achieve greater activity. Experimental groups play video games in sets of two, with games matched to their motor abilities. Control groups are subjected to conventional interventions such as movements, exercises and functional tasks using balls, blocks and cones. All participants receive a pre- and post-intervention clinical assessment and a three-month follow-up evaluation.

Video game therapy has not previously been attempted in a

group setting. This new approach hypothesises that the social interaction and friendly competition foster more animated participation when compared to conventional techniques. In addition, movements associated with engagement in virtual reality (VR) settings are more active and purposeful than those played out in conventional types of rehabilitation.

To date, researchers have completed the first experimental protocol, community-based VR, and are in the process of analysing the data. Interestingly, a questionnaire administered to the study patients following the therapies showed that almost all VR-session participants rated

their enjoyment as 'very much - extremely'. In comparison, only two-thirds of those subjected to traditional interventions gave similar ratings. Furthermore, measurement of speed and duration of movements with accelerometers revealed that VR participants demonstrated five times more repetitions of active, purposeful movements. The data therefore supports the use of VR in clinical outpatient settings to aid recovery from stroke-induced paresis.

Completion of the VR STROKE REHAB project and associated analyses promises to provide scientific justification for the use of VR video games in stroke rehabilitation. Increased patient movement, accompanied by more enjoyment, once again establishes a link between physical and mental health.

The project was coordinated by Tel Aviv University in Israel.

- 1 'Virtual reality intervention for stroke rehabilitation'.

Funded under the FP7 specific programme 'People' (Marie-Curie actions).
http://cordis.europa.eu/result/brief/rcn/12192_en.html



Empowering Europe's SMEs online

A group of European researchers have joined forces to build an advanced digital information space. They are offering small businesses the opportunity to better access and leverage online user-generated content.

Funded by the EU, the LINKED2MEDIA¹ project is facilitating standardised access to available online information and data resources. The initiative strives to help small and medium-sized enterprises (SMEs) perform corporate brand reputation management and market sector reputational analysis. The consortium comprises SME associations, SMEs, and research and technological development (RTD) performers from Bulgaria, Greece, Ireland, Italy, Romania, Spain and Turkey.

Project activities are focused on the development of an open linked data platform for European Member States and Associated Countries. The tool will support them in publishing, linking, discovering, combining and accessing multilingual resources and information found across the World Wide Web. Amongst other objectives, LINKED2MEDIA seeks to promote the social sharing and collective analysis of European SMEs' knowledge and experience in brand reputation management. The goal is to close the

information, knowledge and collaboration gap among the continent's SMEs.

To date, the project team has identified existing social media resources and drawn up a knowledge map. Requirements for a brand reputation tool have been determined, analysed, made uniform and prioritised. Furthermore, LINKED2MEDIA has finalised work on conceptual modelling and architecture, and developed a semantic model. The latter supports the project's approach and constitutes the basis upon which software subsystems (spaces) will be built.

Other project achievements include the design of the strategy and methodology that LINKED2MEDIA will offer SMEs for reinforcing and strengthening their brand image and for analysing market sector trends. Moreover, social-media-linked data space components have been designed, and data space implementation has commenced in accordance with data space definitions.

A first release of the toolkit for opinion modelling and extraction space has been published,

and a social sharing and visualisation space designed. Project members have also published a first release of the framework components. The LINKED2MEDIA integrated technical architecture is being designed, based on the software components and in line with the project's overall objectives.

Project efforts will thus have an impact on European SMEs, enabling them to listen to customers, identify trends and better inform their marketing strategies. This should translate to enhanced services, profitability and happier consumer segments.

The project is coordinated by the Association of Turkish Travel Agencies in Turkey.

- 1 'An open-linked data platform for semantically-interconnecting online social media leveraging the corporate Brand and Market Sector Reputation Analysis and Response Optimization Services'.

Funded under the FP7 specific programme 'Capacities' under the theme 'Research for the benefit of SMEs'.
http://cordis.europa.eu/result/brief/rcn/12172_en.html



© Tetra Images, Thinkstock

Complementary detection system for safer borders

Law enforcement and customs authority representatives from around Europe are developing a mobile network of low-power chemical, biological, radioactive, nuclear and explosive sensor systems. The proposed technology solution will complement the role played by dogs as part of the detection process at airports and border crossings.



© Photodisc, Thinkstock

The HANDHOLD¹ project is a response to the challenge defined in the 'Artificial' Sniffer — Capability Project call under the Seventh Framework Programme's (FP7) Security theme (SEC-2011.3.4.2). The aim is to provide a one-stop shop integrating different technologies for the detection of hidden persons and illegal substances. This move will streamline the current ad hoc use of several disconnected devices.

Comprising nine partners with complementary expertise in all the required related fields, the consortium has outlined a three-layer work plan to achieve its goals. The central layer involves development of a reconfigurable modular sensor platform mimicking the operational characteristics of the sniffer dog. This will be deployed for stand-off detection for time periods of up to eight hours, and will operate on battery power alone.

To facilitate surveillance of the platform over a complete area, a surveillance room software component will be included — the so-called upper layer of the work plan. The third layer of project work is focused on development of state-of-the-art sensors for 'chemical, biological, radioactive, nuclear and explosive' (CBRNE) detection.

HANDHOLD's system will operate by integrating



IT AND TELECOMMUNICATIONS

seamlessly with existing commercial sensors and the project-developed sensor. The system can also carry out offline data analysis to support decision-makers in remotely coordinating field operations.

Project partners propose a three-layer architecture: the sensors system layer, a communication network layer, and a control centre system layer. The sensor platform is to be developed in two phases, with the first-phase prototype to be

produced in month 24, and the second-phase prototype to be demonstrated at the end of the project period (month 42).

Work has advanced in system integration and testing, power supply, GPS location and the platform framework, and application software and the operating system. Research has also been conducted on explosives sensors and bio-sensors. Other ongoing efforts are directed at the design and development of a radiation- and

nuclear-detection module. The latter is to be integrated into the HANDHOLD platform, and will comprise different detectors based on the selected technologies and other operating components.

HANDHOLD developments and research results stand to make a significant contribution to detection and surveillance systems. The proposed system is one more step towards ensuring a more secure Europe.

The project was coordinated by Queen's University Belfast in the United Kingdom.

1 'Handhold - handheld olfactory detector'.

Funded under the FP7 specific programme 'Cooperation' under the research theme 'Security'.
http://cordis.europa.eu/result/brief/rcn/12157_en.html

Sharpening the blur in remote imaging

The video quality of remote imaging used for monitoring and surveillance purposes is usually poor. An EU-funded project is coming up with creative and novel video compression techniques that enhance the definition without demanding greater space.

'Unmanned aerial vehicles' (UAVs), terrestrial-based sensor networks and other remote-sensing technologies are increasingly used for civilian and military surveillance, reconnaissance and intelligence gathering. These systems have benefited from advances in communications and computing technology, which have lowered costs and boosted capabilities.

But technological progress does not stand still, and an EU-funded

project is striving to take remote-sensing technology to the next level. The CS-ORION¹ project is working to overcome the limitations imposed by current video coding methods used by remote-sensing devices. Currently, these only offer the user low-quality streaming video.

The project is developing 'compressive sensing' (CS) architectures that will provide high-quality video acquisition and delivery capabilities of

remote-sensing devices for both aerial and terrestrial surveillance.

CS-ORION has designed a video compression technique able to overcome the limitations of MPEG and MJPEG compression. It combines a simplified encoding process with a refinement phase based on inter-frame prediction. The project has also developed and implemented a novel approach to video classification that directly exploits the properties of linear random

projections in the framework of CS.

In addition, CS-ORION has created an active range imaging system that can reconstruct high-quality depth from significantly fewer frames. The project has also experimented with high-dynamic-range imaging, which dramatically reduces the number of images required. Moreover, CS-ORION has used CS to perform accurate localisation based on signal strength measurements.

On completion in the summer of 2014, CS-ORION will help advance the application of video imaging in transport, security and environmental monitoring.

The project is coordinated by the Foundation for Research and Technology - Hellas, Greece.

1 'Compressed sensing for remote imaging in aerial and terrestrial surveillance'.

Funded under the FP7 specific programme 'People' (Marie-Curie actions).
http://cordis.europa.eu/result/brief/rcn/12215_en.html





Fostering internet innovation

The internet has become a victim of its own success — its size and scope makes further development very difficult, holding back innovation. Changes to improve today's internet or to add new services must be introduced slowly, in an incremental manner, with even minor changes only being made through the accretion of point solutions that embed knowledge in the network, optimising today's applications at the expense of those of tomorrow.



© Iona, Shutterstock

The EU-funded project CHANGE¹ is working to speed up the introduction of core technologies across the network, and also to enable completely new developments — resulting in a better, more efficient internet for everyone.

While the internet is intrinsically flow-based, CHANGE researchers are creating a novel, flow-processing network architecture, making it possible to perform specific processing for some flows but not for others. This will allow developers to overcome the major barriers to the internet's evolution.

One very important aspect of the project is that the platforms being developed can be built from standard hardware that is scalable, powerful and flexible. Open-standard

technology will direct traffic flows that need special processing through a set of these platforms, allowing faster innovation and the deployment of new network technologies.

The team's long-term goal is the development a broad internet architecture that combines multiple communicating flow-processing platforms, on which application-specific virtual networks can be constructed, without affecting other network services or traffic.

This will boost the development of innovative products and services on the internet and help reduce network costs. CHANGE's flow-processing platform future uses could include the virtualisation of internet service provisioning; dynamic network

troubleshooting and re-locatable maintenance; targeted, on-demand network monitoring; dynamic intra- and inter-network traffic shaping; workable, targeted quality of service control of network traffic; and shippable attack mitigation.

These features will make it easier for application developers and network operators to understand and control the resulting end-to-end behaviour of the internet and applications. For the rest of us, it will mean a more diverse and innovative yet still seamless internet experience.

The project's team will validate the new architecture by testing it with novel applications and services.

The CHANGE project was coordinated by the European Institute for Research and Strategic Studies in Telecommunications in Germany.

1 'Enabling innovation in the internet architecture through flexible flow-processing extensions'.

Funded under the FP7 specific programme 'Cooperation' under the research theme 'Information and communication technologies' (ICT).
http://cordis.europa.eu/news/rcn/36297_en.html
 Project website:
<http://www.change-project.eu/>

INDUSTRIAL TECHNOLOGIES



© bilderberg, Shutterstock

Achieving chameleon-like adaptability in the machine-tool sector

Machine tools make products by shaping, cutting, grinding and shearing metal and other materials into usable objects. Their efficient deployment is key to achieving operational efficiencies, especially where mass production is concerned.

Furthermore, the machine-tool sector is a crucially important economic sector. The economic crisis and growing international competition have led to rapid specialisation.

This can be seen in the rapid growth of mechatronics — a combination of mechanical engineering, electrical engineering, control engineering and computer engineering — which aims to integrate intelligence into mechanical structures. The objective is to achieve increased performance and greater flexibility.

The EU-funded CHAMELEON¹ project sought to ensure that European industry is at the forefront of this new innovative machine-tool technology. Completed in November 2011, the project put forward a new approach to exploiting active intelligent devices integrated into machine tools, in order to achieve completely configurable and adaptive production lines.

The main objective, in practical terms, was to equip machine tools with a variety of active intelligent devices. These enable a machine to be completely adaptable to different jobs, making it, in effect, a chameleon in the factory. For example, the same machine can now

be used for both roughing operations on hard steel and high-speed machining of aluminium. In the past, two separate machines would have been needed for these two very different tasks.

In addition, a total of 11 new devices with intelligent activity were developed. These include an active damper to eliminate vibrations, a hydraulic actuator capable of compensating for the deformations in the structure of the machine, a magnetic levitation electrospindle, an ongoing system to locate tool position by means of laser, and an artificial vision system for the automatic search for references in large parts.

Another advantage is the fact that the position of the machining tool tip is under constant control, while the devices also have the potential to increase machine-tool productivity by eliminating vibrations and increasing machine precision.

The CHAMELEON project, which received a total of EUR 3.6 million in EU funding, will help to sharpen Europe's competitive manufacturing edge and maintain its position at the forefront of technology. European companies

will be among the first to be able to apply the adaptation concept. This offers potential not only for machinery manufacturers but also for end-users, the companies which, thanks to the devices developed in the project, will be able to expand the range of manufacturing operations they will be able to undertake.

The final results have already been applied to two machines. Most of the devices are currently in their industrial process stage, and it is expected that the innovations developed will be gradually introduced into the European industrial base.

The project was coordinated by IDEKO S. Coop. in Spain.

1 'Production-dependent adaptive machine tool'.

Funded under the FP7 specific programme 'Cooperation' under the research theme 'Nanosciences, nanotechnologies, materials and new production technologies' (NMP).
http://cordis.europa.eu/news/rcn/36328_en.html
 Project website: <http://www.chameleonproject.eu/>

Building complex 3D micro parts

European researchers have developed a new platform for the large-scale production of micro devices. This cost-effective process will increase the EU's competitiveness in the massive global market for 'micro-electromechanical systems' (MEMS).

Currently, the mass manufacture of non-silicon micro devices cannot produce very complicated 3D parts and is not suitable for inorganic materials

such as ceramics and metals. A mass-market solution is required for producing very complex multifunctional 3D parts made from ceramics.

Fulfilling this need was the aim of the MULTILAYER¹ project, funded by the EU. This project used the concept of tape casting combined with advanced printing techniques for the mass fabrication of micro devices.

The project developed a solution that involves cutting the design of the micro device into several different layers, which are individually structured and treated before being assembled. This technology places no limitation on the complexity of the part to be designed, which is important for the miniaturisation of micro-structured parts.

In an effort to provide a reliable set of technologies, MULTILAYER first developed the technology platform needed for several fabrication routes. This novel platform was then evaluated for making different kinds of 3D multi-material products.

A set of six demonstrators was then produced to showcase

various applications and to validate the MULTILAYER platform. These were used to demonstrate the potential to address already existing and new markets, offering new products at extremely reduced costs.

Now complete, the MULTILAYER project has resulted in a novel approach to the manufacture of microsystems in Europe, which also has the potential to open up new market sectors. Consequently, it will increase job opportunities in existing European companies while promoting the set-up of new high-tech firms.

The project was coordinated by the Commissariat à l'énergie atomique et aux énergies alternatives (CEA) in France.

¹ 'Rolled multi-material layered 3D-shaping technology'.

Funded under the FP7 specific programme 'Cooperation' under the research theme 'Nanosciences, nanotechnologies, materials and new production technologies' (NMP).
http://cordis.europa.eu/result/brief/rcn/6818_en.html
 Project website:
<http://multilayer.4m-association.org/>



© iStock, Thinkstock

Smoother design processing

Researchers have applied 'isogeometric analysis' (IA) to geometric design. Their work shows how new techniques can reduce bottlenecks in the design process by closing the gap between numerical simulations and 'computer-aided design' (CAD) tools.

Only devised in 2005, IA is a technique for numerical simulation that can close the gap currently

existing between design tools and numerical simulations. This is achieved through the introduction

of common representative models for both simulations and geometry. In so doing, it has the potential to

eliminate time-consuming conversion processes in the design process of industrial applications.

The EU-funded PARADISE¹ project investigated challenging problems in applying IA methods to geometric design. A key area was the construction of locally refinable spaces for test functions.

Project members achieved a series of >



© iStock, Thinkstock

INDUSTRIAL TECHNOLOGIES

algorithms and data structures that allow for efficient implementation. Other significant results include the use of adaptive splines in isogeometric simulations, the characterisation of hierarchical spline spaces, and the construction of bases with optimal stability and sparsity properties.

Work done during the PARADISE project reflects the interdisciplinary nature of this topic, encompassing both theoretical and computational issues in a new vision of geometry-to-analysis. Its insights will be continued in future work that will promote the development of new,

innovative and efficient design processes.

The project was coordinated by University of Linz, Austria.

- 1 'Parameterization of computational domains for isogeometric analysis'.

Funded under the FP7 specific programme 'People' (Marie-Curie actions).
http://cordis.europa.eu/result/brief/rcn/12253_en.html

Optimising testing to produce better prosthetics

The use of orthopaedic and dental prosthetics is on the rise as the elderly population continues to grow worldwide. Scientists are developing a modelling platform to speed up development of improved materials for such devices.

Metals are commonly employed in the manufacture of prosthetics. However, the alloying and processing applied to achieve the desired mechanical properties often create biocompatibility issues in host tissues. The incorporation of nanomaterials that combine strength, biocompatibility and ease of machining offers a promising alternative.

Research on the nanostructuring of titanium and its alloys is still in its infancy. Experiments using cell cultures, mechanical and *in vivo* testing are expensive, time consuming and also require extensive animal testing. Replacing these

methods with accurate predictive models would provide a turbo boost to cost-effective development. Scientists working on the EU-funded project VINAT¹ are developing a multi-scale virtual modelling environment. This will be capable of analysing properties, testing hypotheses and predicting the mechanical and biological behaviour of nanostructured titanium.

Investigators have focused efforts on three types of titanium-based materials — pure titanium, titanium-neobium (Ti-Nb) alloys and super-elastic shape memory titanium-nickel (Ti-Ni) alloys. Shape memory

alloys (SMAs) are a novel class of metals that 'remember' their shape, with Ti-Ni alloys showing the most promise, for instance, for dental root canals and crowns, while nanotitanium appears to be an excellent material for implants. The team is developing models integrating descriptions at the atomistic, crystal and grain/microstructure levels through a variety of advanced computational methods.

Researchers made excellent progress in the development of multi-scale models of nanostructured Ti, ultra-fine grained Ti-Ni alloys and Ti-Nb-based alloys with super-elasticity.

They also performed an experimental validation of their results. Within the scope of mechanical properties and biocompatibility, models are being used to address virtual nano-indentation testing, including coating analysis, development and validation. Scientists are also evaluating their prospects with regard to patent applications and marketability.

VINAT outcomes are expected to significantly enhance the quality of life of the EU's ageing population by speeding the development process of titanium-based prostheses. The multi-scale modelling suite developed, covering both mechanical and biocompatibility virtual testing, will minimise the need for *in vitro* and *in vivo* testing. This in turn will increase the competitiveness of Europe's small and medium-sized enterprises (SMEs) working in the field.

The project was coordinated by the Technical University of Denmark.

- 1 'Theoretical analysis, design and virtual testing of biocompatibility and mechanical properties of titanium based nanomaterials'.

Funded under the FP7 specific programme 'Cooperation' under the research theme 'Nanosciences, nanotechnologies, materials and new production technologies' (NMP).
http://cordis.europa.eu/result/brief/rcn/12137_en.html



Bioreactors on the nano scale

Molecular biologists working as part of an EU-funded project have successfully developed a nano-scale bioreactor that can be controlled by adjusting the external temperature. Thanks to its small size and large surface area, the device can act as a versatile tool for tackling key medical, chemical, biological and environmental challenges.

The SMART¹ initiative developed a new generation of stimuli-responsive smart devices capable of self-switching towards advanced applications. These applications included on/off switchable biocatalysis in the fields of biology, food, health and the environment.

Scientists developed a new type of bioreactor capable of self-control in advanced applications. The reactor was designed to be able to respond positively by building unique 'zipper' nano-architectures. The zipper comprised a polymeric donor branch and a polymeric receptor branch, which were assembled with the aid of donor-receptor interaction.

At relatively low temperatures the active donor-receptor

interaction — resulting from ionic hydrogen bonding — coalesces, thereby restricting biosubstrates' access to the bioreactor. This causes a decrease in the diffusion of reactants, resulting in lower activity.

In contrast, at relatively high temperatures the hydrogen bonding is weakened and the biosubstrate becomes freely available to the bioreactor. Therefore, the external temperature acts as an on/off switchable model. The correct ratio of donor to acceptor monomers is essential for producing the optimal zipper.

Project partners designed, developed and tested the novel bioreactor platform which displayed self-control capabilities for advanced applications

such as switchable biocatalysis using nanotechnology. SMART scientists used the technology to conduct an investigation into stimuli-responsive zipper-like nanobioreactors, which respond positively to the substrate.

Researchers also explored the use of nanobioreactors in switchable biocatalysis and modulated protein processing. In addition, the consortium developed other novel methodologies and application strategies, including molecular self-assembly, monitoring of dynamic phase transition, and biocatalytic analysis and characterisations.

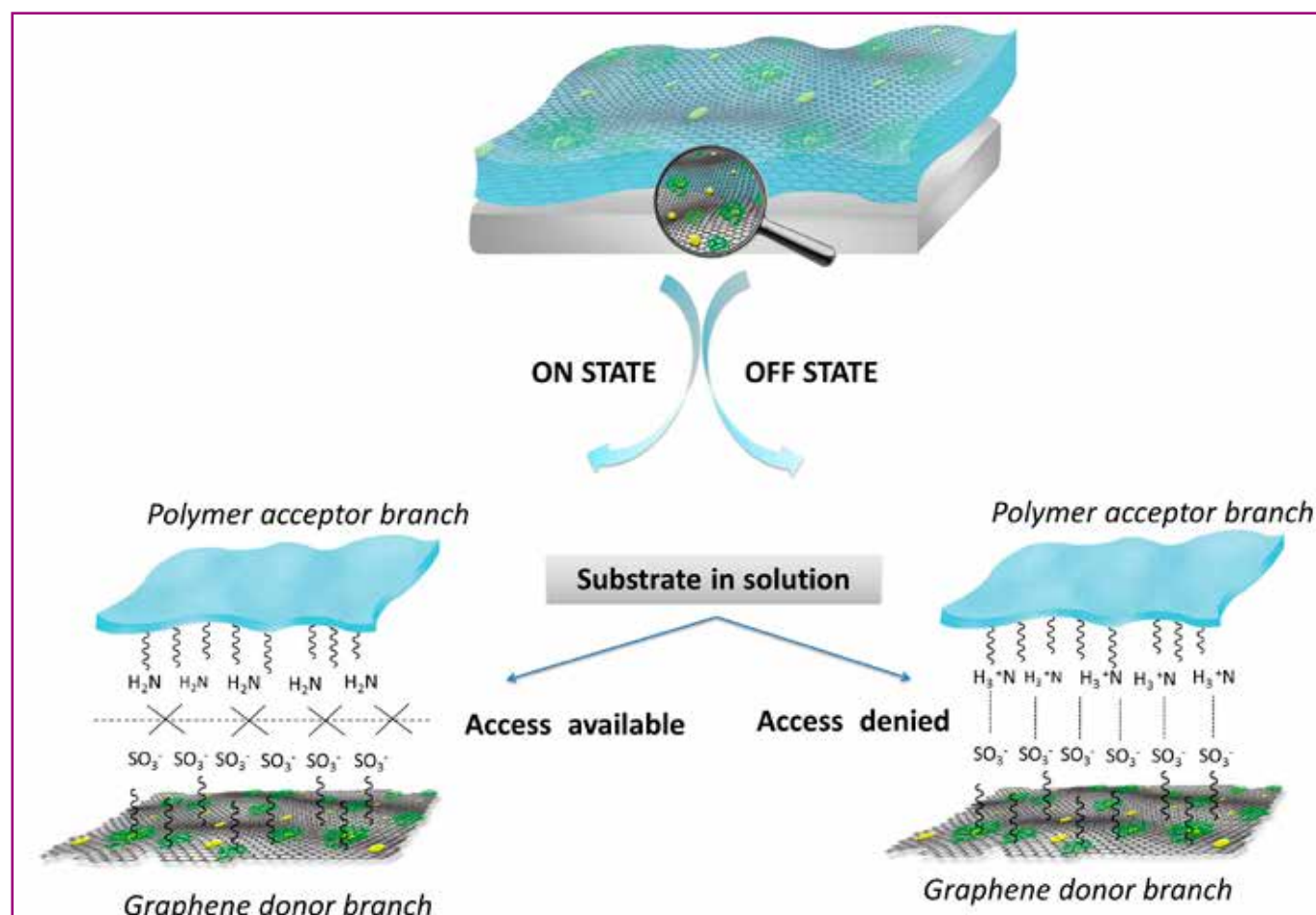
The SMART consortium successfully developed an inexpensive, stable yet

ultra-sensitive device that is fast and easy to use. This advanced technology will exploit a new generation of stimuli-responsive advanced nanomaterials to create smart nanobioreactors for use as novel biosensors.

The project was coordinated by Linköping University, Sweden.

1 'Stimuli-responsive zipper-like nanobioreactors'.

Funded under the FP7 specific programme 'People' (Marie-Curie actions).
http://cordis.europa.eu/result/brief/rcn/12293_en.html



SPACE



© tcl, Shutterstock



Improved port accuracy and safety through novel satellite technology

Galileo, the multi-billion-euro global navigation satellite system funded by the EU, will soon provide highly accurate and precise position measurements on Europe's roads. But the primary mode of international trade — the maritime industry, responsible for nearly 90% of world trade — still relies on outdated technology with limited precision capacity at a high cost and with low efficiency.

Eight research institutions from six European countries are involved in the DOCKINGASSIST¹ project, which set out to remove the guesswork from the docking and manoeuvring of container ships, bulk carriers and other large vessels through the development of a novel wireless network relying on a differential global navigation satellite system.

Manoeuvring large vessels is not an easy task, particularly for SMEs which represent the majority of the maritime sector. With sea

transport expected to double over the next 15 to 20 years, operators will come under significant pressure to increase their capacity and freight with larger, more frequent vessels as companies try to achieve economies of scale.

Large vessels usually enter the port with the assistance of trained pilots who are specialised in navigating in a particular port. In most cases, the pilot will use on-board equipment for navigating the vessel into a

port, comprising either an Electronic Chart Display Information System (ECDIS) or paper charts in conjunction with a GPS receiver. This leaves the vessel at a distinct disadvantage as the errors in such systems may not be known to the pilot.

DOCKINGASSIST's solution consists of two main parts: a base station (BS) installed at the harbour and a portable pilot unit (PPU) installed on the ship. The portable unit can be used by the pilot in charge of docking the

vessels in the port without requiring any expensive berthing systems.

This system makes it possible to increase accuracy of location and speed by means of a static base station that identifies errors and transmits them wirelessly to the receiver. In turn, this also permits transmission of the correction data and the exchange of other important information between the port and the vessels, including weather updates, the position of other vessels and tidal levels.

DOCKINGASSIST's technology will result in a reduction of transit time, thereby

improving port traffic management. The team claim that this will result in savings in time, fuel and operational expenses. Moreover, it will lead to a reduction in CO₂ emissions — consequently lowering the environmental impact of shipping.

To date, the partners have successfully proved the principal idea behind DOCKINGASSIST and transferred the technology from research and development activities to the consortium SMEs. The project has been disseminated by all partners nationally and internationally through workshops, exhibitions and various media.

The project was coordinated by the Catalanian Research and Innovation Centre (CRIC) in Spain.

- 1 'Improved port efficiency and safety using a novel wireless network and differential global navigation satellite system providing enhanced vessel navigation'.

Funded under the FP7 specific programme 'Capacities' under the research theme 'Research for the benefit of SMEs'.
http://cordis.europa.eu/news/rcn/36262_en.html
 Project website: <http://www.dockingassist.eu/>

Satellite monitoring of snow cover and glaciers

Seasonal snow cover and glaciers are important resources in that they supply major parts of Europe with water for human consumption, agriculture, hydropower generation and other economic activities. Researchers are working on ways to accurately monitor these resources using satellites.

In fact, satellite observations are the only efficient means to deliver precise and up-to-date information on snow, glaciers, lake ice and river ice with appropriate spatial coverage. The primary objective of the EU-funded CRYOLAND¹ project is thus to develop, implement and validate a standardised satellite service for snow, glaciers and lake/river ice monitoring.

Specifically, the project is geared towards developing a self-sustainable service to support the

better management and realisation of a wide range of economic and ecologic activities related to snow and ice. CRYOLAND exploits Earth Observation (EO) data from current optical and microwave sensors and will build on available tools and processing lines. The portfolio of snow and ice products will also be improved and augmented to better match user requirements.

Four workshops have already provided an assessment of the CRYOLAND products and

services. The system architecture and interface were subsequently designed and a pilot system was implemented.

The project team have since developed and implemented a near-real-time, pan-European, fractional snow extent map and snow water equivalent product. Retrieval algorithms and processing lines for generating lake-ice extent products have also been implemented and tested. Preparations are now under way for a second pilot edition, which

includes pan-European and regional snow products, glacier products, and lake- and river-ice products.

Services developed by CRYOLAND are highly relevant in water-resource management, hydropower energy production and various other sectors of the European market. The project is therefore expected to have a substantial positive impact on both the environment and the economy.

The project was coordinated by ENVEO-Environmental Earth Observation IT GmbH in Germany, and AST Advanced Space Technologies in Austria.



- 1 'GMES service snow and land ice'.

Funded under the FP7 specific programme 'Cooperation' under the research theme 'Space'.
http://cordis.europa.eu/result/brief/rcn/11418_en.html
 Project website: <http://www.cryoland.eu/>

EVENTS

Achieving Impact Socio-economic Sciences & Humanities (SSH) in Horizon 2020

A conference entitled 'Achieving Impact Socio-economic Sciences & Humanities (SSH) in Horizon 2020' will be held from 26 to 27 February 2014 in Athens, Greece.

The two-day conference aims to highlight the important role socio-economic sciences and humanities (SSH) have to play in achieving the targets set out in Europe 2020 — the EU's growth strategy for the current decade.

The conference sessions will address the creative and cultural industries, the European Social Model and social innovation. The event will be of particular interest to researchers from universities and research organisations in the field of SSH, civil society organisations and non-governmental organisations.

For further information, please visit:
<http://www.achievingimpact2014.eu/>

12th International Conference on e-Society 2014

The 12th International Conference on e-Society 2014 will be held from 28 February to 2 March 2014 in Madrid, Spain.

The e-Society 2014 conference aims to address both the technical and non-technical aspects of the Information Society. This event will cover topics including e-Society and the digital divide, e-Business, e-Learning and information management in the digital age.

For further information, please visit:
<http://www.esociety-conf.org/>

BIOIMAGING 2014

The First International Conference on Bioimaging (BIOIMAGING 2014) will be held from 3 to 6 March 2014 in Angers, France.

This conference aims to provide attendees with the latest insights in medical imaging. It will discuss the techniques and procedures used to create images of the human body, anatomical areas and tissue.

It will bring together a range of specialists working in bioimaging and closely related fields, including structural biology, biochemistry and biophysics.

For further information, please visit:
<http://www.bioimaging.biostec.org/>

Superbugs & Superdrugs — A focus on antibacterials

A conference entitled 'Superbugs & Superdrugs — A focus on antibacterials' will be held from 5 to 6 March 2014 in London, UK.

The growing threat of bacterial resistance has been widely documented by governments, medical personnel and academia alike. This conference targets ways of addressing this ever-increasing bacterial resistance. Further areas of discussion will seek to explore the main challenges facing pharmaceutical companies in terms of funding, skills and expertise.

The event will bring together industry leaders from pharma, biotech companies, regulatory agencies and academia to promote an interdisciplinary approach towards combating drug resistance.

For further information, please visit:
<http://www.smi-online.co.uk/pharmaceuticals/uk/conference/superbugs-superdrugs>

Save the Planet — Waste Management and Recycling

A conference entitled 'Save the Planet — Waste Management and Recycling' will take place from 5 to 7 March 2014 in Sofia, Bulgaria.

Growing waste is a huge challenge for the countries in south-east Europe. The 'Save the Planet' conference will present the most modern environmental solutions and practices for solving this problem. It will outline good opportunities for public-private partnerships between business and municipalities.

The fifth edition of this event will welcome keynote speakers from the European Commission's DG Environment, the European Federation of Waste Management and Environmental Services (FEAD), the Association of Cities and Regions for Recycling and Sustainable Resource Management (ACR+), the International Solid Waste Association, the European Network of Environmental Professionals (ENEP) and the Ministry of the Environment in Vienna. It will include sessions on waste administration, waste-to-energy, composting and waste-minimisation strategies.

For further information, please visit:

<http://via-expo.com/en/pages/waste-management-recycling-conference>

Lab-on-a-Chip European Congress

The 'Lab-on-a-Chip European Congress' will be held from 10 to 11 March 2014 in Berlin, Germany.

During the last decade, nano- and micro-technology has become an important industry. It is a rapidly growing, highly interdisciplinary field at the interface of physics, engineering, chemistry and biology.

The congress will bring together leaders from both academia and industry to discuss innovative developments and applications of micro-scale technologies with particular regard to medical practice.

For further information, please visit:

<http://selectbiosciences.com/conferences/index.aspx?conf=LOACEC2014>

International Symposium on Intensive Care and Emergency Medicine

The '34th International Symposium on Intensive Care and Emergency Medicine' (ISICEM 2014) will be held from 18 to 21 March 2014 in Brussels, Belgium.

The objective of this four-day symposium is to provide participants with an up-to-date review of the most recent developments in research, therapy and care of the critically ill.

The event will bring together health-care professionals from across the medical and pharmaceutical fields with an interest in critical care and emergency medicine. In a series of workshops and tutorials, participants will be invited to exchange knowledge and experiences in best practice intensive-care procedures.

For further information, please visit:

<http://www.intensive.org/index.asp>

Ninth European Breast Cancer Conference

The 'Ninth European Breast Cancer Conference' (EBCC-9) will be held from 19 to 21 March 2014 in Glasgow, Scotland.

Breast cancer diagnosis has been on the rise for many years in economically developed regions of the world. It is now one of the most common types of cancer found in women.

This conference will bring together health-care practitioners with a common interest in breast cancer to discuss this evolving disease. Participants will review new data and developments to establish the future of patient treatment.

For further information, please visit:

<http://www.ecco-org.eu/Events/EBCC9.aspx>

CORDIS launches Top Stories service highlighting EU-funded research results

CORDIS is undergoing a significant revamp, starting with the new 'Top Stories' service which brings together success stories from across the many projects and domains of EU research. The Top Stories tab replaces the former Results tab on the CORDIS website's new top menu.

An enhanced Projects and Results service now integrates the former Technology Offers, which have been rebranded as 'Results in Brief', providing multilingual overviews of project outcomes to a broader public and supporting the exploitation of research results.

Project periodic or final reports are also available as 'Report Summaries' (formerly known as 'Results') and complete the project information linked to each factsheet.

These changes reflect the role of CORDIS as the European Commission's primary public repository and portal to disseminate information on all EU-funded research projects and their results.



Free subscription orders and downloads

The *research*eu* magazines are free of charge.

To subscribe to either *research*eu results magazine* or *research*eu focus*, please go to:

http://cordis.europa.eu/research-eu/home_en.html



To order a single issue of a research* results magazine, please go to

http://bookshop.europa.eu/research_eu



for an issue of research* focus magazine, please go to

http://bookshop.europa.eu/research_eu_focus



Publications Office

- eur-lex.europa.eu • EU law
- bookshop.europa.eu • EU publications
- ted.europa.eu • Public procurement
- cordis.europa.eu • Research and development



Follow us on facebook and twitter:
facebook.com/EULawandPublications
twitter.com/myCORDIS
twitter.com/CORDISfunding