

# Funding for Research and Innovation

*Impact of EU Funding Programmes  
for UK Research and Industry*



Edited by **Vicky Ford MEP**

**R**esearch and innovation are key to the UK's competitiveness and vital to our economic growth. Since being elected as an MEP in 2009, I have travelled around the East of England and further across the UK meeting world-leading researchers and companies. From food to health to energy, transport and communications, there is a great deal to be proud of in British science and engineering.



There are more UK-based scientists, researchers and companies involved in European funded research programmes than from any other country. Projects are often collaborative, bringing together researchers from many different countries, with industry and academia working together. Individual research projects can also be funded. The high success rate of UK bids is partly due to the fact that funds are awarded on the basis of excellence, so only the best and most able participants receive grants.

This is one of the few areas where the UK financially gets back what we contribute to the EU budget. It is also a huge budget, €52 billion in the current seven year period from 2007-2013. This public money often leverages additional investments from private and charitable sectors.

When meeting researchers or engineers, some say that the UK would be better off stopping its contributions to EU research and innovation programmes and instead using the money to increase our own national schemes, often citing the bureaucracy of EU programmes. However, many others say that working in collaboration has forced them to think outside the box and has improved their work. Others point out that some of the projects would never have been achievable by one country working alone.

As Conservative MEPs we want to help British scientists and innovative companies to make sure that they can access money from Brussels, reduce their bureaucratic burden and lead the way in R&I for the future.

This publication aims to explain what European Research and Innovation funding may look like for the next seven years. The contributions will give readers a taste of some of the fantastic world-class research taking place in the UK and across Europe at the moment, including honest feedback from project participants. Readers will also find information on the services provided by the UK Research Office (UKRO) who offer invaluable support to British universities and research organisations to engage in EU research.

Finally I would like to say a huge thank you to the many people who have contributed to this brochure.

A handwritten signature in black ink that reads "Vicky Ford". The signature is written in a cursive, flowing style.

**Vicky Ford MEP**  
Conservative Spokesman  
for Research & Industry

## Foreword

The UK's research base is the strongest in the world after the US and, on some measures, the most efficient pound for pound. With one per cent of the world's population and four per cent of researchers, we produce six per cent of the world's academic articles and fourteen per cent of the most highly-cited ones. Our strengths are broad, with world-class research in dozens of universities and clusters of expertise all over the country and ever-increasing levels of international co-operation.



Our strong research base rests upon the talents of smart individuals, funding decisions that focus on excellence and autonomous institutions free to set their own priorities. We have protected the £4.6 billion annual research budget and committed to £2.5 billion of capital up to 2015, so that researchers, institutions and funding councils can plan ahead.

We have eschewed radical reform of the system as it works well, but we have sought to strengthen some weaker areas. So, while we have maintained the level of support for blue-skies research, we are strengthening links with business through seven new Catapult Centres and a new £100 million fund for universities working on projects that can also attract industry funding. We are investing more in the Technology Strategy Board, which helps commercialise the fruits of research. And we are promising a new era of open access for research results, to benefit independent researchers, members of the public and SMEs.

A remaining challenge is how to balance competition and collaboration. Our research environment has been intensely competitive. That brings real benefits, but researchers tell me it has sometimes worked against useful collaboration. That is why we are now also working to eradicate any artificial barriers against collaboration, for example in grant-making procedures.

The evidence brought together here by Vicky Ford and her fellow Conservative MEPs confirms beyond all doubt that the UK's future success must rest upon secure funding, excellent research and collaboration across frontiers. EU investment will be vital for all three. That is why we have said research and innovation should account for a higher proportion of a smaller EU budget.

EU programmes add value to the efforts of individual nations by supporting world-class fundamental research and cross-cutting new technologies, delivering finance for innovative high-growth SMEs and offering strategic co-ordination between national programmes.

It is vital that UK researchers receive the best deal we can get from Europe and I know that is what all Conservative MEPs are striving for.

A handwritten signature in black ink that reads "David Willetts". The signature is written in a cursive, slightly slanted style.

**David Willetts MP**

Minister of State for Universities and Science

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## What is Horizon 2020?

The EU Framework Programmes have been going since 1984, as five or seven year programmes. Horizon 2020 is the Framework Programme for 2014-2020 and it brings together existing EU funding streams for research and innovation into one programme. It is the successor to the Framework Programme 7 (FP7), which comes to an end in 2013.

The European Commission has proposed a new structure for Horizon 2020, centred around 3 sections. The first is for fundamental, academic-led research such as “Marie Curie” grants for PhD researchers and European Research Council awards for frontier research; the second is to help support innovation in industry; the third looks to address some of our biggest long-term challenges, such as health and demographic change, food security with an ever-growing world population, and clean, efficient and secure energy.

In Europe, one of the biggest challenges is turning excellent basic research and great ideas into innovative solutions.

By bringing research and innovation together under one programme, Horizon 2020 intends to support the whole of the innovation cycle, from basic research to marketable products and services.

The Commission has come up with a single set of rules that will apply to all types of projects with the aim of simplifying application to and participation in EU R&I projects.

The final budget is yet to be agreed as part of the negotiations on the overall EU



**Kay Swinbourne MEP with Professor Derek Jones, Director, Business and Strategic Partnerships, Andrea Greve and Professor Adrian Harwood, Deputy Director of Neuroscience and Mental Health Research at Cardiff University**

budget, but the Commission has proposed €80bn<sup>1</sup> for Horizon 2020.

The draft legislative proposals were published in November 2011 and they are currently being scrutinized and amended by the European Parliament.

Over 3000 amendments were tabled by MEPs to Horizon 2020. Therefore the negotiations are likely to take many months. In the interim, UK researchers should be aware that there are still considerable grant amounts to be awarded under the existing FP7 programme.

<sup>1</sup> Constant 2011 prices. Approx. €87bn taking into account estimated inflation.

## ***Problems and Solutions***

EU funding programmes are notoriously bureaucratic. During our own research into European funding for research many have contributed suggestions on how to reduce the red tape and time delays, especially for smaller companies and for academic organisations.

At the time of writing we are in the midst of lengthy negotiations on the details of Horizon 2020 in the European Parliament. Conservative MEPs have submitted over 200 amendments to the legal texts, largely to try to reduce the bureaucracy of the programmes, but also to make sure that the principle of excellence is maintained over the next decade.

Our amendments focus on three key areas:

### **1. Simplification**

The Commission is often criticised for being too slow to pay money owed to participants and in some cases they have not been paid at all. This is not acceptable. It is a top priority for Horizon 2020 to ensure that there are mechanisms in place so that when someone completes work they have been contracted to do, they are paid in a timely fashion. Simplification is especially important for small and medium-sized businesses.

We have proposed a Commission Code of Best Practice. This code outlines how the Commission should act in order to reduce time to pay and time to grant; it asks the Commission to set up a formal complaints procedure for all parts of the process so that participants know who to turn to if there is a problem; and it calls for Commission communication networks to be transparent for participants.

### **2. Excellence**

It is essential that the principle of excellence is maintained so that only the very best research is funded, much of which takes place in the UK. Increasing participation in countries who traditionally do not participate much in the Framework Programmes must not be at the cost excellence.

### **3. Specific themes**

We want to ensure that areas of research that may have been neglected in the Commission's proposals receive sufficient focus, such as degenerative diseases, nuclear fusion, energy storage, crop research and plant science.



***As the Conservative Group Co-ordinator on the Industry, Research & Energy Committee, Giles Chichester MEP has campaigned on behalf of small and medium sized businesses for many years. Conservative MEPs believe simplification is key to enabling SME's to participate in collaborative research programmes.***

## **Contributions from UK Universities**

### **What does EU funding mean to Cambridge University?**

*By Dr Jennifer Barnes, Pro-Vice-Chancellor for International Strategy, Cambridge University*

The University of Cambridge is a major participant in EU-funded research. It is the leading university recipient of funding under the Seventh Framework Programme (FP7). Funds from EU sources account for ten per cent of Cambridge's total research income. EU research funding is complementary to other sources and is therefore irreplaceable.

European Research Council (ERC) grants for fundamental research are particularly important, since frontier research often leads to the most significant innovation. ERC grants support early-career and senior scholars, as well as research teams; Cambridge currently hold 85 ERC grants, making it the biggest university recipient of ERC funding.

Cambridge holds 167 grants under Marie Curie Actions (MCA), the programme to encourage researcher mobility. MCA grants are highly effective in promoting cross-border collaborative research, since recipients typically maintain their research links when they return to their home countries. Holders of MCA grants at Cambridge have also gone on to found small and medium-sized businesses, contributing to innovation and employment.

Numerically, awards under the FP7 Cooperation Programme (CP) represent the majority of Cambridge's EU grants. However, Cambridge coordinates just 27

out of the 210 CP projects in which it is involved, reflecting both the heavy administrative burden and the lack of any financial compensation for project coordinators.

In general, the administration of EU grants is resource intensive, so the simplification agenda promised under Horizon 2020 is to be welcomed. The EU reimbursement rate for overheads poses a financial challenge, so the European Parliament's proposal to allow a full economic cost model under Horizon 2020 is also welcome.



*Malcolm Harbour MEP and Vicky Ford MEP with Professor Sir Mike Gregory, Head of the Institute of Manufacturing at the University of Cambridge*

### **Knowledge-based sustainable management for Europe's seas (KnowSeas)**

*By Dr Emma Jackson, University of Plymouth*

Europe's four regional seas (Baltic, Black, Mediterranean and NE Atlantic) have suffered severe environmental degradation due to human pressure. Existing measures to manage pressures have proven inadequate and the European Commission has responded by proposing a new policy (Maritime Strategy Blue Book) and environmental legislation

(Marine Strategy Framework Directive), both currently close to adoption. These instruments rely on the Ecosystem Approach, a management paradigm that encompasses humans and the supporting ecosystem. But the science base for this approach needs strengthening and practical tools must be developed and tested for policy implementation. This is the primary objective of the KnowSeas consortium.

The KnowSeas project is supported by the European Commission under the Environment Theme of FP7. The four year project started in April 2009, has 32 partners from 15 countries and is coordinated by the Scottish Association for Marine Science. The total cost of the project was €7,413,699 (of which the UK comes to £2,756,469 and the University of Plymouth £485,000).

Here in the UK, we are examining highly topical case studies such as wind farm location in the North Sea and fishing impacts on deep water coral reefs. The research on these UK EEZ case studies is providing a basis for assessing changes to natural systems and their human causes. Also by examining and modelling economic and social impacts of changes to ecosystem goods and services and costs, the benefits of various management options available through existing and proposed policy instruments are being examined, making the whole process more cost-effective. On a practical level we are developing and testing an assessment toolbox through regional liaison groups and a multi-sectoral Project Advisory Board, to help managers make decisions on the best available evidence.

The KnowSeas project is fairly unique in

that it brings together not just marine biologists, but also economists and social scientists to take a truly holistic look at the entire ecosystem including the human dimension. In addition to the idea stimulating multilingual discussions between partners from the 15 different countries, it has also been interesting to learn that economists, ecologists and social scientists all speak their own language too. Having the experiences of all these partners to draw on makes tackling the complicated issues and objectives we have set ourselves just that little bit easier.

### **University of Essex: Human Centred Robotics**

Human Centred Robotics puts humans in the centre of technological developments and represents a vision of the future where robots will coexist with humans to provide services. The technologies developed by Essex robotics research enable robots to operate in unstructured environments and serve people in need, especially the elderly and disabled, with a significant social impact. Both assisted living and environment protection are two major application areas focused on by the HCR research at Essex.

To complement a number of national grants, the University of Essex has also secured several European grants under FP7.

They have received over half a million Euros for the “SHOAL” project, where the Essex robotics team has been working with five European partners to develop a shoal of robotic fish that can detect and analyse contaminants in sea water and produce a real-time map of pollutants without human intervention. It is the first



**Essex University's robotic fish being tested in Spain earlier this year as part of the SHOAL project.**

project of its kind in the world. At present there are no fully autonomous systems for monitoring pollution in ports worldwide. It will bring the benefit to Europe on the water monitoring process that is currently costing an estimated €350 million per year in the EU.

In addition, the university secured nearly €400,000 from FP7 towards its work on the development of intelligent wheelchairs for the elderly and disabled, led by Prof. Hu. Electric-powered wheelchairs are traditionally controlled by users via joysticks and cannot satisfy the needs of elderly and disabled people who have restricted limb movements. To solve this problem, novel hands-free human-machine interfaces (voice, gesture, brain-wave, muscle signals, eyeball and lip movements) and autonomous navigation functions have been developed at Essex.

## **The Fight for Sight**

*By Prof. Carandini, Institute of Ophthalmology, University College London*

Prof. Carandini obtained an Advanced Investigator award from the ERC in 2008, the first year these awards were instituted. The grant covers the period 2008-2014, and is titled “Computations by neurons and populations in visual cortex”.

The project focuses on the region of the cerebral cortex that receives visual inputs originating in the eyes and processes it so it can be accessed by the rest of the brain. This brain region comprises hundreds of millions of neurons, and the main goal of the project is to understand to what degree these individual neurons operate independently or as part of a large ensemble. In a musical analogy, the question is under which conditions do they play as soloists versus as members of the orchestra.

The grant was extraordinarily useful in that it allowed Prof. Carandini to continue, and indeed to expand in the UK, research



**Charles Tannock MEP on a tour of the UCL Institute of Ophthalmology**

which he had started in the United States. In this respect, it has certainly helped Europe to be competitive with the United States. The project is going very well, thanks to a talented multi-national team of young investigators under the direction of Prof. Carandini. The project has already resulted in high-profile publications and more are expected.

However, a major question, is whether these ERC grants will be, at least in principle, renewable. Will the project have to be interrupted, and the team have to be disbanded in 2014 when the grant period is over? Or will the ERC contemplate the possibility of prolonging or renewing the funding of successful projects?

### **Flexible funding for laser research at Aston**

*By Prof. Sergei K. Turitsyn, Director of the Aston Institute of Photonics Technology*

Aston Institute of Photonic Technologies is involved in eight live FP7 projects including Marie Curie International Research Staff Exchange Scheme (IRSES), Intra-European

and International Incoming Fellowships, Co-operation projects and a European Research Council (ERC) Advanced Grant. The Advanced Grant was awarded in 2010 to the director of the Institute Prof. Sergei Turitsyn. The five year grant – ULTRALASER – is concerned with the development of a radical new outlook on lasers. The novelty of the concept is to use lasers in the communication applications as a transmission medium rather than as a source of radiation. The project presents an area of interdisciplinary research at the interface of high-speed communications, laser physics, optical signal processing, nonlinear science and mathematical theories of wave turbulence and disordered systems.

The ERC grant gives research freedom to pursue an ambitious project without worrying about next year's funding and without intrusive project management. The flexibility in management and budgeting given to the project coordinator is a refreshing and timely addition to the otherwise inflexible management expectations on other EU programmes. The expectations set by the ERC show the need for more trust to be placed in research coordinators in managing their projects. It is well known that many great discoveries extremely important to society were not pre-planned. I understand that public money cannot be handed out with an absence of management and budgeting regulations, however there are possibilities that provide maximum flexibility and probity, as evidenced by the ERC approach.

Our experience is that EU funding brings excellent opportunities for research and international collaborations and we are looking forward to Horizon 2020.



ogists, attached to Moorfields Eye Hospital

## Imperial College: Participating in the Climate-KIC

By Prof. Richard Templer,  
Director, Climate-KIC UK

Imperial College London and ETH Zurich formed the nucleus around which a successful bid for a Knowledge Innovation Community (KIC) in climate change innovation was formed in 2010. The EIT funding flows to five national centres that work together to create new ways to speed the path from innovation to commercialisation of products and services that mitigate or adapt to climate change impacts. The UK centre brings together companies of all sizes, universities, research centres and governmental bodies.

Over its first three years, the Climate-KIC has received around €48 million of funding, of which roughly a fifth has flowed to the UK. The KIC model is enabling the development of a generation of innovators and entrepreneurs to flourish on a European stage, opening markets and networks that have previously been hard to access.

However, being in the vanguard of the EIT's development has had a cost for all the players as the model for working together and the rules of engagement have been developed de novo. Removing or simplifying restrictive regulations that apply in other Commission actions has not been as easy or rapid as the KICs would have liked, but over the past year much progress has been made, though there is still work to be done.

From Imperial College's perspective the effort required to create Climate-KIC has allowed us to do a number of valuable

things, including developing unique educational programmes to train entrepreneurs and innovators, one of which has, in its first two years alone, created six student companies who have found competitive external funding. We have also been able to work with Lloyd's of London and others in the reinsurance sector on a framework to enable climate catastrophe modelling.

Although there has been a great deal of effort required from within Imperial College to get to the stage where exciting activity is occurring, a hidden but vital aspect of its participation in the KIC is the way it allows the college and its partners to run experiments in how to improve innovation and business creation in this young and diverse sector. We believe that such experiments are key to the ambitions of Horizon 2020 and to enabling Europe to raise its game in the race to high end economic growth. It has at times been a struggle, but one that we feel is key to the UK and Europe's future.



**Emma McClarkin MEP at Nottingham University's Creative Homes project. Research into energy savings is one of the priorities of Horizon 2020 supported by Conservative MEPs**

## What is the EIT?

*The European Institute of Innovation and Technology (EIT) was established in 2008 with the aim of improving Europe's capacity for innovation, specifically looking at translating R&D results into commercial opportunities, improving entrepreneurship in Europe and encouraging different regions and thematic areas to work together.*

*The EIT is structured around the so-called Knowledge Triangle of Higher Education, Research and Business by way of Knowledge and Innovation Communities (KICs). The €308.7 million budget for the 2008-2013 period has been used to set up three KICs: Climate-KIC, EIT ICT Labs and KIC InnoEnergy (on sustainable energy).*

*A significantly increased budget of €2.8 billion has been proposed for the period 2014-2020. As well as maintaining the three original KICs, the Commission suggests setting up three new KICs in 2014 (Innovation for healthy living and active ageing; Raw materials: sustainable exploration, extraction, processing, recycling and substitution; Food4future: sustainable supply chain from resources to consumers) and three further KICs in 2018 (on the themes of urban mobility, added-value manufacturing and smart secure societies).*

*Given that the EIT is still in a very early stage of development, Conservative MEPs believe that the almost ten-fold increase in the budget is not justified and that better value for money may be achieved by utilising existing funding programmes. Nevertheless, it will be important to encourage increased UK participation in the KICs to tap into these resources where possible.*

## **DEPLOYTECH at the University of Surrey: Large deployable technologies for space**

*By Professor Vaios Lappas,  
Surrey Space Centre, University of Surrey*

The University of Surrey is a world leading centre for excellence in space engineering specialising in small, low-cost space missions. They formed the highly successful spin-out company SSTL and have a strong track record of funding from UK research councils and the European Union.

The university is a partner in the European DEPLOYTECH project aiming to advance the technology readiness level of space deployable technologies. The ability to build larger space structures cost effectively is one of the greatest challenges and possible game-changers in the growth of the space market. The UK space sector has been growing by nine per cent a year for the last decade. Large deployable space structures are needed as the backbone of, and as an integral part of, large reflectors. These include earth observation satellite antennas and radars, radiators, sun shields and solar arrays for various space systems. Advances in launch vehicle design have been limited to date and have not resulted in an increase in 'fairing' size in the last three decades. Deployable structures come with the promise and capability of substantially reducing mass on spacecraft, a major factor in the cost and risk of launching satellite systems, and allowing for very compact systems to be stored during the launch phase.

There is a growing need for larger apertures, solar panels, thermal shields

and gossamer sails. It is therefore important that large deployable structures are further developed and de-risked. The Technology Readiness Level (TRL) of a great part of these technologies is still very low, in the order of 2-3. Thus, the objective of DEPLOYTECH is to develop three specific, useful, robust, and innovative large deployable space structures to a TRL of 6-8 in the next three years.

## **Networking is the name of the game**

*By Xavier Rodde,  
University of Birmingham*

Dr Pierre Purseigle is a Senior Lecturer in Modern History at The University of Birmingham. Networking has always been at the heart of Pierre's activities but never more so than in the Seventh Framework Programme did it prove critical. Being an early career researcher, Pierre also felt that he had to increase his visibility and connection in Europe.



*Vicky Ford MEP and Malcolm Harbour MEP with Professor Xu, Chair of Energy and Automotive Engineering, School of Mechanical Engineering, University of Birmingham.*

His effort led him to get involved in an FP7 collaborative proposal called CENDARI in 2010 which was eventually funded. This is a project that provides funding access to archives and resources in Europe for the study of medieval and modern European history and research associated with it.

Importantly, the CENDARI project has provided substantial funding that no other funder can offer – it allowed for 14 top organisations throughout Europe to work together. This early success led Pierre to consider FP7 again. The networking made him visible to post-doctoral researchers that led to two more applications to FP7 in 2011; this time, however, he applied for Marie Curie fellowships in order to have one researcher from the USA and one from France to come and work with him at the University of Birmingham. Yet again, Pierre was successful in securing funding

Whilst his networking also led from one thing to the other, Pierre was able to build his research independence and build critical mass around him in the space of a few years. No other funder would have enabled Pierre to achieve this.

## **Shaping the next EU funding programme for research**

*By Dr. Christian Yeomans,  
Policy Advisor, UK HE International Unit*

The UK higher education sector has been working hard to ensure that UK institutions are in the best possible position to secure funding from Europe. Over the past two years, two organisations in particular, Universities UK (UUK) – the umbrella body representing UK universities – and the UK Higher Education International Unit (IU), based at UUK, have been talking to the European Commission, the European Parliament and the UK government so that EU funding continues to be a major source of research funding for UK institutions.

Earlier this year the IU and UUK developed a sector-wide position paper on Horizon 2020, setting out the changes UK institutions wanted to see in Horizon 2020. The majority of policy positions set out by the UK higher education sector as desirable for the future of European research and innovation policy have been taken on board by the European Commission and are represented in the Horizon 2020 proposal.

## **Contributions from Research Organisations and Institutions**

### **JET – Europe’s fusion experiment**

*By Chris Warrick, Culham Centre for Fusion Energy, Abingdon, Oxfordshire*

The release of energy when light (hydrogen-like) nuclei fuse is behind the sun’s production of heat and light – harnessing this fusion to make electricity here on earth would provide abundant, safe and clean electricity for millions of years. But it is not easy – the hydrogen fuels have to be heated to temperatures of 100-200 million degrees centigrade before they start to fuse and release energy.

The world’s largest ‘tokamak’ experiment (where powerful magnetic fields are used to control the hot gas or ‘plasma’ of fusion fuels) is the European JET device based at Culham Centre for Fusion Energy (CCFE) near Oxford. JET enables fusion scientists from all over Europe (led by the European Fusion Development Agreement or EFDA) to undertake key experiments to optimise plasma performance and test new engineering concepts.

Cementing Europe’s positions at the forefront of fusion research, the international next step tokamak and successor to JET – ITER – is being constructed in Europe at Cadarache in the south of France. This larger and more powerful device – a collaboration between Europe, Japan, China, USA, South Korea, India and Russia – will test engineering concepts required for the first true fusion power stations.

JET operation is primarily funded by EURATOM through the Framework Programme and its work is very much focussed on ITER – with the aim of saving time and money when it starts up in 2020. A new interior wall was recently installed in JET – and results from this are so encouraging that ITER will almost certainly adopt this from day one of operations – potentially saving €400 million in operational time. Not bad for an annual budget of €50 million for JET.

Continued operation of JET through EURATOM and the forthcoming Horizon 2020 framework programme is essential if Europe is to retain its highly skilled fusion researchers, maximise the benefit from its investment in ITER and maintain its lead in this crucial technology.



***Richard Ashworth MEP and Vicky Ford MEP visiting the Culham Centre for Fusion Energy with Francesco Romanelli, Leader of the European Fusion Development Agreement (EFDA)***

## **Plants for health – exciting breakthroughs in food and vaccines**

*By Dr Matthew Hills, Head of Operations, Norwich Research Park, Norfolk*

The importance of plants in human health now goes much wider than the food we eat, for instance producing vaccines for animals and humans. Our understanding of the vital role of some foods in reducing risk of chronic disease such as cancer or heart disease is increasing, greatly due to research led from Norwich Research Park (NRP).

A revolutionary new method to produce human and veterinary vaccines using virus like particles (VLPs) in plants has been developed by Professor George Lomonosoff at the John Innes Centre located on NRP. In this radical approach, production of vaccine candidates is possible within two to three weeks from cloning the relevant genes. This will help make plant-produced proteins a commercial reality. A significant advantage of using plants to produce vaccines is that they cannot become contaminated with external animal pathogens as can occur in mammalian cell cultures. It is envisaged this method will enable the development of low cost vaccines for use in livestock and, ultimately, humans.

Through the EU FP7 PLAPROVA project, coordinated by Prof Lomonosoff, a consortium of labs across Europe, Russia and South Africa have evaluated potential vaccines against a number of diseases of importance to the EU, Russia and South Africa. Of particular note is the successful production of Bluetongue virus VLPs, and the demonstration that such VLPs are able to raise antibodies against Bluetongue virus when injected into sheep.



***Vicky Ford MEP learning about plant genetics at the John Innes Centre, Norwich Research Park. The centre recently received a five year \$10 million grant from The Gates Foundation recognising its vital importance in global plant research.***

The system has already been licensed to Medicago Inc (Quebec, Canada) for the production of vaccines against influenza viruses. Medicago's plant-expressed influenza vaccine has recently successfully completed phase II clinical trials, opening up the possibility of the deployment of a plant-based vaccine within the next five years.

Prof Lomonosoff won the UK's Biotechnology and Biological Science Research Council's 2012 Innovator of the Year competition for his work in developing this system.

## Why are five fruit and veg a day important?

It has been known for some time from epidemiological studies that certain plant foods play a role in preventing chronic disease. In particular there is growing evidence that bioactives such as flavonoids which occur naturally in plants have beneficial effects on a number of important risk factors associated with cardiovascular disease, cancer and age-related degenerative disorders.

Flavonoids are found in fruits such as blueberries, blackcurrants and blood oranges, vegetables such as aubergine and blue sweet corn and dark chocolate.

There are hundreds of such flavonoids in our food and a better understanding is required of which of these are most important and how flavonoid modifications are related to bioavailability effectiveness. A Framework 7 funded project (ATHENA), coordinated by Prof Cathie Martin at the John Innes Centre based on Norwich Research Park seeks to provide a robust scientific foundation for improved dietary recommendations. Whilst cellular studies show particular flavonoids are linked with decreased risk of disease, there have been very few high quality studies which establish that flavonoid consumption causes reductions in risk, or the efficacy of flavonoids compared to other dietary polyphenols.



The project leads on from a highly successful FP6 study called FLORA. It combines world leading expertise in the genetics of flavonoid synthesis in plants to produce food suitable for human and animal studies. This project is geared towards generating the information required to meet these needs and to design a strategy for the improvement of the health-related properties of food both before and after processing.

The primary target in Professor Martin's laboratory is creating a platform to produce flavonoid compounds in food which are then being tested through trials in humans by Dr Paul Kroon at the Institute of Food Research (also on Norwich Research Park) and through in vitro and animal studies by project partners in France and Italy.

## UK Leadership in essential agricultural research

*By Darren Hughes, Head of Communications and External Affairs at Rothamsted Research, Hertfordshire*

Rothamsted is the longest running agricultural research station in the world, delivering science and innovation to develop more environmentally sustainable solutions for food and energy production. It has a history of delivering innovation through research and has shaped modern agricultural practice through its experiments that have been running continuously now for up to 169 years. It has received European funding for many projects. Some examples include:

- Developing a “push-pull” companion planting system for resource-poor small holder farmers in East Africa which has



**Wheat trials at Rothamsted Research in Hertfordshire**

reduced pesticide use, improved soils and increased maize yields in East Africa by over 300 per cent. In collaboration with its African partner ICIPE, this project only receives a small amount of EU funding and would greatly benefit from an increased grant to implement more widely.

- Using its expertise in mathematics and computer modelling, Rothamsted Research is part of the European funded ATOPICA ([www.atopica.eu](http://www.atopica.eu)), which assesses health risks resulting from severe environmental changes and designs suitable adaptation policies.
- Scientists at Rothamsted Research are also using their expertise in understanding insect behavior to prevent female mosquitoes biting humans and transmitting the malaria parasite, which is responsible for the

death of one child every 30 seconds. They are part of the European funded Network for Advanced Research on Olfaction for Malaria Transmitting Insect Control (ENAROMaTIC).

- The EU also provide Rothamsted Research funding through the ExpeER (Experimentation in Ecosystem Research) project, to fund visiting scientists to utilise the wheat, barley and ecology experiments that have been continually running there for nearly 170 years.

The future demands for energy, water and food with the underlying threat of climate change has been described as a “perfect storm” with agriculture in the eye of the storm. Agricultural research projects are often long term and it may take a decade for a concept to become a useful tool, rightly so, as tests must be methodical, accurate and responsible. Agricultural research must feature prominently under Horizon 2020 as it is vital to address the challenges over the next 20-40 years.

### **Using the growing understanding of genetics for health solutions**

*Wellcome Trust Sanger Institute, Hinxton, Cambridgeshire*

**Breast cancer research** The BASIS project is an international collaboration that is genetically characterising the most common class of breast cancer. This form of breast cancer (known as ER+, HER2-) is responsible for approximately 40 per cent of all cases of the disease and the knowledge the study generates is being rapidly released with minimal restrictions to power research to develop new diagnostic tools and treatments.



**Jacqueline Foster MEP with Amro Ahmed-Ebbiary, a research scientist specialising in kidney cancer at the Liverpool Cancer Research UK Centre**

In Europe, there are extensive, well-annotated collections of breast cancer cases that are unparalleled. The BASIS study combines 500 samples with the long-standing expertise of European researchers to discover all the forms of mutations found in ER+, HER2- breast cancer genomes. To enable further understanding of the biological processes of the cancer, complementary catalogues of changes to genome structure, gene expression and gene control are also being generated.

The study involves many different nationalities, which can make harmonising communication methods and terminologies challenging. To ensure the smooth running of the project regular, clear communication between the partner institutions is vital so that everyone clearly understands their role and delivery outputs. In addition, the administrative load associated with managing the application process and financial reporting is demanding. To make these processes as efficient as possible, it is necessary to closely scrutinize all guidance relating to documentation and double-check all submissions before they are sent.

**Malaria research** The Wellcome Trust Institute is an integral part EVIMalaR (European Virtual Institute of Malaria Research), a joint research FP7 Network of Excellence, funded by the European Commission. The project supports a network of 62 malaria research labs from 51 institutes in Europe, Africa, India and Australia. It seeks to integrate malaria research to further basic knowledge of the parasite, its mosquito vector and the interactions between the parasite, humans and mosquitoes.

EVIMalaR enables malaria laboratories to share knowledge and resources extensively and provides small amounts of totally flexible funding to each group. This allows researchers to respond nimbly to new opportunities, for example by rapidly setting up pilot projects or providing vital training.

One major success is the annual 'Biology of Malaria' conference that allows discoveries and ideas to flow freely. Another vital component is the 'virtual' PhD school that is training up the next generation of malaria researchers. Each of the 21 students is supervised in at least two different countries so that they gain wide experience of research approaches and also build collaboration between laboratories.

One challenge of participation was the need to learn the EU's language of 'clusters of activities' and 'work packages', which was confusing early on. In addition, structuring all projects into deliverables and milestones proved to be somewhat contrived at times.

The researchers found that hiring an administrator with good communication skills was the best way to overcome these challenges. That simple move alleviated

everyone's reporting burden almost overnight and was more successful than using specially written reporting software packages.

EviMalaR is a great success story of European research integration achieved through funding by the European Commission. We are now working with our colleagues at other European research institutes and universities to create an organisational framework for sustained European collaboration in malaria research. We are looking to the next framework programme for ways in which this can be supported.

### **European Plant Science Organisation: Why international coordination is vital to achieve our goals**

*By Dr. Karin Metzloff, Executive Director European Plant Science Organisation*

Europe has an enormous potential and responsibility to be one of the leading science forces globally addressing food security – an opportunity and urgent need to enable European plant scientists to join and lead longer term global partnerships for food security.

The European Plant Science Organisation (EPSO) is made up of members from 30 different countries, including the University of Warwick, the University of York and five other members from the UK.

European plant scientists feel very strongly about their essential, yet partly underutilised, contributions to food security (supply of sufficient, nutritious and affordable food) in developing countries. The EPSO is engaging in collaborations with the UN's Food and Agricultural Organization (FAO) to jointly

develop long term partnerships of stakeholders in the plant sciences for sustainable intensification of agricultural production in developing countries. Focus areas include 'Under-utilised fruits and vegetables in Sub-Saharan Africa', where Europe could take the lead and the 'Cassava value chain' in which Europe should become a strong player.

EPSO members are active in the European Commission's and in Member States' partnering initiatives in the 7th Framework Programme with Latin America and with India, as well as in discussions with the Strategic Forum on International Cooperation (SFIC). These are all good starting points for establishing a much greater role globally.

Going forward, European scientists urgently need a clear path – for instance in the European Commission's Horizon 2020 and in Member States' programmes – providing the resources that will facilitate their timely and critical engagement and even lead in a number of major global efforts. Some countries, like Germany, have already started a harmonisation/consolidation process to streamline international agricultural research for development. Within Horizon 2020 we need to include a highway for major, and arguably essential, global research efforts to be supported with the required critical mass and resources in a timely and focused manner.

### **Vicky Ford MEP: Understanding stem cells**

I recently organised an event on “Understanding the Science of Stem Cells” in the European Parliament in May 2012 with three other MEPs from different countries and different political groups. Five expert scientists (pictured below) from four different countries were invited to speak to explain what stem cell research is and some of the benefits it can bring for vital research into diseases such as Parkinson's, diabetes and blindness. I believe it is important that people are informed and aware of what this kind of research can achieve. I think it is necessary that the status quo established in FP7, whereby research can be funded by Europe, provided that it is legal in the Member States participating in the project, is maintained under Horizon 2020.



*Left to right: Prof. Julie Daniels, University College London, Prof. Elena Cattaneo, University of Milano, Kent Johansson MEP, Maria Da Graça Carvalho MEP, Cristina Gutierrez-Cortines MEP, Prof. Austin Smith, University of Cambridge, Vicky Ford MEP, Prof. Daniel Pipeleers, Brussels Free University-VUB, Teresa Riera Madurell MEP, Prof. Anders Bjorklund, Lund University.*

## **Contributions from Industrial Companies**

### **Rolls-Royce: The Clean Sky Project**

Aeronautic industry's research and development (R&D) needs are long-term and capital intensive. In 2011 Rolls-Royce spent £908 million on R&D. Public R&D funding helps us to increase the speed, efficiency and value of aeronautics research in the EU, thus ensuring competitiveness in a challenging global business environment.

Rolls-Royce has been a major supporter of European-funded research programmes for nearly 20 years. In the late 1990s increased EU funding for aeronautics allowed Rolls-Royce to build its first engine demonstrator dedicated to validating new technology. New Rolls-Royce engines comprise components based on technologies developed in EU-funded programmes with partners across Europe.

In 2008 the EU decided to launch Clean Sky with a budget of €1.6 billion. This is a

50/50 public-private partnership between the EU and the industry and represents the most ambitious aeronautical research programme ever launched in Europe. Its mission is to develop breakthrough technologies significantly increasing the environmental performance of airplanes, resulting in less noisy and more fuel efficient aircraft. It has allowed Rolls-Royce to introduce new technologies, materials and manufacturing processes that have enabled the Trent engine family to maintain global leadership.

With a budget share of 40 per cent going to SMEs Clean Sky is also proof that SMEs can – directly or indirectly – profit from EU funds.

Rolls-Royce is committed to research and innovation in the UK and in Europe and the continuation of Clean Sky. We welcome all measures aimed at simplifying the process to obtain funding. Simplified rules are key to encouraging industry participation which leads to innovation, jobs and growth.

*Left to right: Rhydian Jones, Manufacturing Manager, Ashley Fox MEP and Francis Kearney, Director Customer Business at Rolls-Royce in Bristol, pictured with an EJ200 Afterburner Turbofan which propels the Typhoon Fighter at speeds of up to 1,550mph.*



## **GARNET-E: The GMES and Africa regional network for information exchange and training in emergencies**

*By Astrium UK*



**Julie Girling MEP supporting design and innovation at Beagle Aerospace, Dorset**

GARNET-E aimed to assist African countries in building up their own capabilities in the use of satellite-based monitoring for emergency response. The initiative realigned the emergency response services within Europe's flagship environmental monitoring programme, Global Monitoring for Environment and Security (GMES), from technical activities focused purely on risk reduction and response using European resources "for Africa", to activities directed towards building sustainable local capacities in Africa. Seventeen partners were led by the Astrium division Infoterra from the UK and were supported by €1 million of EU funding which started 1st May 2010 and ran for 24 months.

GARNET-E was a significant step forward in making it possible for African communities to build emergency response services of their own. Core objectives included enabling and enhancing the ability of African states to use satellite Earth observation for the management of natural and man-made

humanitarian emergencies and developing a 'network of networks', bringing together EU and African organisations and users to build economic, technical and commercial capacity within African states.

GARNET-E has been a collaboration between European and African organisations and should have a major impact on the development of GMES services within Africa, as well as other related initiatives in the emergency area, such as the International Charter for Space and Major Disasters and the new programme for Monitoring the Environment and Sustainability in Africa MESA (Monitoring for Environment and Security in Africa).

## **The EuroLiion Project: Lithium-ion batteries for electric cars**

*By E.M. Kelder, Project Coordinator, Faculty of Applied Sciences, Chemical Engineering, Delft University of Technology, The Netherlands*

EuroLiion is a two year collaborative project that aims to develop a new lithium-ion (Li-ion) battery cell to power electric cars. Batteries need to have high energy density and low costs, yet the best possible safety to enable them to be used in the car industry.

The Li-ion concept has great potential, but considerable R&D is still required. This project has benefitted from the results of an earlier European project on Advanced Lithium Energy Storage Systems, which was extended into a European Research Institute (ALISTORE-ERI).

Academic partners together with several of the ALISTORE-ERI industrial members joined forces to form a consortium to

carry out the EuroLiion research. There are 13 partners in the project, including Volvo, Renault and the University of Cambridge, and the composition of the consortium covers the whole spectrum of R&D, manufacturing and testing.

Novel materials were developed and are now the basis for the new Li-ion cell.

Among these are silicon at the anode, new electrolyte salts, and high voltage cathode materials. The industrial partners contribute to the production methods for the cell components, whilst research institutes such as the Athlone Institute of Technology are involved to characterise the battery's performance and safety.



***Vicky Ford MEP, Robert Sturdy MEP, Marina Yannakoudakis MEP and Geoffrey Van Orden MEP visiting Ford's global research and development facility for diesel engines in Dunton, Essex, with Stephen Metcalfe MP and Mark Francois MP***

### **Vicky Ford MEP: The importance of reducing red tape**

*One of the ambitions of Horizon 2020 is to improve the participation of small and medium-sized businesses (SMEs) in European-funded research programmes. Whilst many SMEs have participated in framework funded programmes in the past, participation rates are still low and as an MEP I have heard from many SMEs who have struggled with bureaucracy and time delays. Therefore I believe that to enable these smaller companies to participate we must try to address their problems.*

*Following consultation with a number of these companies I have proposed a Commission Code of Best Practice to accompany Horizon 2020 which aims to improve the way the Commission deals with the administration of research projects.*

*Martin Lawrence is one of the small business owners who came to me facing problems with his framework grant.*

## **Contribution from a Small Business**

### **EU projects: issues to be resolved**

*By Dr. Martin Lawrence, Cambridge Optical Sciences*

Cambridge Optical Sciences, a technology SME, has had involvement with two larger-scale EU collaborative projects each of about three years duration, one in FP4 and one in FP6. Both projects used the company's expertise in nanotechnology, particularly packaging, alignment and fixing. The goal of the company in becoming involved was to lever the funding to assist in new product development and at the same time work with new potential customers.

Only limited success can be reported. Apart from the payment problems (well known around the UK SME community) the reporting and accounting requirements occupied too much time and the overall management of the first

project led to significant over-runs and additional costs. The second project, smaller, also came under pressure and although the management coped with this better the administrative costs were again simply far too high. Neither project was able to go remotely far enough technically to reach the aim of being able to clearly define a product specification.

For universities and large companies, with multi-million pound turnovers and with dedicated administration offices used to dealing with large-scale corporate reporting and accounting then there is some benefit to be gained. However for the SME sector the return on capital everywhere has to be positive or the company fails. As these framework programmes stand at present the overhead recovery is inadequate and the risk:reward ratio far too poor for the majority of UK SMEs to become involved.

## **Contribution from a Local Government Partner**

### **Hydrogen Transport in European Cities**

*By Simona Dinu, London Hydrogen Partnership Support Officer, Greater London Authority*

The HyTEC project (Hydrogen Transport In European Cities) runs from September 2011 to December 2014 and will see up to 15 iconic London black fuel cell taxis, five fuel cell scooters and a new H2 refuelling station operational in London by the end of the project. The overall funding for it is €11.9 million with €8.6 million for the UK.

The origins of the project can be traced back to work carried out by Element Energy on behalf of the London Hydrogen Partnership (LHP) to develop a strategy to deliver the vision for hydrogen vehicle and infrastructure rollout in London. Through this study and subsequent meetings, the LHP catalysed the formation of a consortium to deliver hydrogen demonstration projects in London and Copenhagen, supported by funding from the FCH JU (EC).

The project is a collaboration of 16 partners, from five European member states. For London, Element Energy are in charge of general project management, with Air Products being in charge of the H2 fuelling, LTI and Intelligent Energy of the vehicle supply and BAA and TfL of end use and operation. The Greater London Authority acts as dissemination partner along with Cenex for the UK and with Hydrogen Link for Denmark and HyER on European level.

The project expands the existing European

network of hydrogen demonstration sites in two of the most promising early markets for hydrogen and fuel cells, Denmark and the UK. The capital cities of Copenhagen and London are deploying 30 next generation hydrogen fuel cell passenger vehicles in fleets of three different vehicle classes – taxis, passenger cars and scooters. These state-of-the-art vehicles are to be used in day to day urban fleet operations, thus taking a step forward from technology demonstration projects, towards fuel cell vehicles in the hands of real users. New publicly accessible fuelling stations begin the roll-out of genuine refuelling networks covering each capital city. These are appropriate for expanding the pre-commercial roll-out of hydrogen vehicles.



**Vicky Ford MEP test driving a hydrogen fuel cell London taxi developed by Lotus in Norfolk**

The project includes an extensive research programme to assess the technical performance of the vehicles over a two year demonstration period, a life cycle impact assessment of the vehicles to demonstrate the overall well to wheels impacts and social studies to investigate non-technical barriers.

The results of the project will inform future commercialisation and infrastructure roll-out planning by policy makers and industry players. The project's dissemination campaign will improve public awareness of the potential for hydrogen vehicles as a future low carbon transport solution.

The HYTEC project creates genuine links between the new and existing European hydrogen demonstration projects, with a view to informing ongoing strategic planning for hydrogen roll-out and also ensuring a 'common voice' towards the expansion of the hydrogen vehicle fleet in Europe.



**Geoffrey Van Orden MEP** visiting the **European Bioinformatics Institute** at Hinxton, Cambridgeshire

## **Contributions from Individuals**

### **European Research Council Starting Grant Scheme**

*From the Wellcome Trust Sanger Institute, Hinxton, Cambridge*

Dr Eleftheria Zeggini has been awarded a €1.5 million European Research Council Starting Grant award to conduct independent study of the genetics of common diseases. The grant supports up-and-coming research leaders in the early stages of their career to allow them to consolidate the work of their research teams. Dr Zeggini will be using the award to study isolated populations in Greece to identify genetic variants associated with complex traits, such as blood sugar and lipid levels, weight and blood pressure. This work will also produce new analytic techniques and tools that will enable fellow researchers to further understand human disease.

Dr Zeggini has found the experience of applying for EU funding and finalising the grant agreement a positive one. In particular, the process was clear, albeit long, with reasonable expectations of researcher involvement. Throughout the process, she found the level of communication to be helpful.

### **Benefits of an ERC grant: collaboration, support and success**

*By Dr. Patrik Jones, Department of Biology and Centre for Biotechnology, University of Turku, Finland*

I received a European Research Council (ERC) Starting Grant (consolidator category) that commenced in 2011. In parallel, as a coordinator, I was also

granted an FP7 collaborative project with eight other partners. These projects collectively aim to contribute towards methods and understanding that will allow future biotechnological systems to convert solar energy, water and CO<sub>2</sub> into infrastructure and engine-ready fuel. In the hopefully reasonably near future, such a technology would be one option among many in a broad range of different renewable energy technologies that rid our reliance on fossil fuels.

The ERC grant was essential for me to continue as an independent researcher. Although important financially, I suspect

the side-effects of the grant status paid off more than the funds it came with. Starting from practically nothing, I was able to build a group of 14 scientists, a sufficient mass to allow most of my ideas to be pursued and an exciting collaborative network to pair it up with. Through this network I was recently invited as partner to two new FP7 projects (ITN, STREP) that now have been invited for negotiation. A snowball-effect most likely.

Science in Europe would be far less interesting without the funding support EU provides.

*Patrik Jones is co-ordinator of DirectFuels Consortium which includes researchers at Manchester University, the University of Michigan USA, and industrial and academic researchers in Germany, Denmark, Italy and the Czech Republic. He recently took part in an exchange scheme between scientists and MEPs. Vicky Ford's trip to Finland enabled her to meet with scientists from four different Nordic countries where she heard many of the similar complaints about bureaucracy to those made by UK scientists. This formed part of the background work Vicky Ford MEP and Giles Chichester MEP undertook before preparing amendments to the Horizon 2020 proposals.*



**Vicky Ford MEP in the laboratory at the University of Turku**

## **UK Research Office: Support and Services**



The UK Research Office (UKRO) is the European office of the UK Research Councils. UKRO's mission is to promote effective UK engagement in EU research, innovation and higher education activities. The office is based in Brussels and operates on a membership basis, receiving subscriptions from over 130 universities and other research organisations.

UKRO provides the UK research community with information on the latest developments and opportunities for participation in EU research programmes. In addition, the Office contributes to supporting UK input into European research policy development through effective liaison with the appropriate bodies in Brussels and the UK. While remaining focused on Framework Programme 7 (FP7), for which the last round of calls have now been launched, UKRO ensures that sponsors and subscribers are kept up to date on progress that is being made in relation to the next Framework Programme, Horizon 2020, which will start in 2014.

UKRO aims to constantly develop and maintain a range of quality services that meet the needs of sponsors and subscribers, who benefit from annual briefing visits by their European Advisor, a query service, and news updates and information on EU funding on the UKRO Portal.

In addition to services targeted at sponsors and subscribers, UKRO offers a

suite of services that are open to non-subscribers. As UK National Contact Point (NCP) for Marie Curie Actions and the European Research Council (ERC), UKRO is contracted by the Department for Business, Innovation and Skills to provide advice and guidance on these schemes to the wider UK and international research community for researchers wishing to come to the UK. While the UKRO briefing visits are targeted at sponsors and subscribers only, UKRO's Annual Conference and the majority of training courses are open to all. Further details and registration is available on the UKRO website, which also offers a link to 'European RTD Insight', a monthly publication produced by UKRO. This publication, funded by the British Council, includes information on the latest developments in EU research and policy, as well as on education, training and culture, external collaboration, events and awards, and new publications and on-line resources.

Any UK university, charity or public sector research organisation can subscribe to UKRO. Associate membership may be available for other organisation types. Further information about UKRO, including its Annual Report is available at: <http://www.ukro.ac.uk/aboutukro/Pages/index.aspx>

In addition to NCP services for the Marie Curie and ERC schemes that UKRO delivers, the UK Government funds also NPC helpdesks across FP Co-operation, Capacities, and Euratom programmes. The Technology Strategy Board (TSB) hosts a national helpline for general EU enquires and manages the FP7 UK Community Network, which links to the NCP helpdesks: <https://connect.innovateuk.org/web/fp7uk/>

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