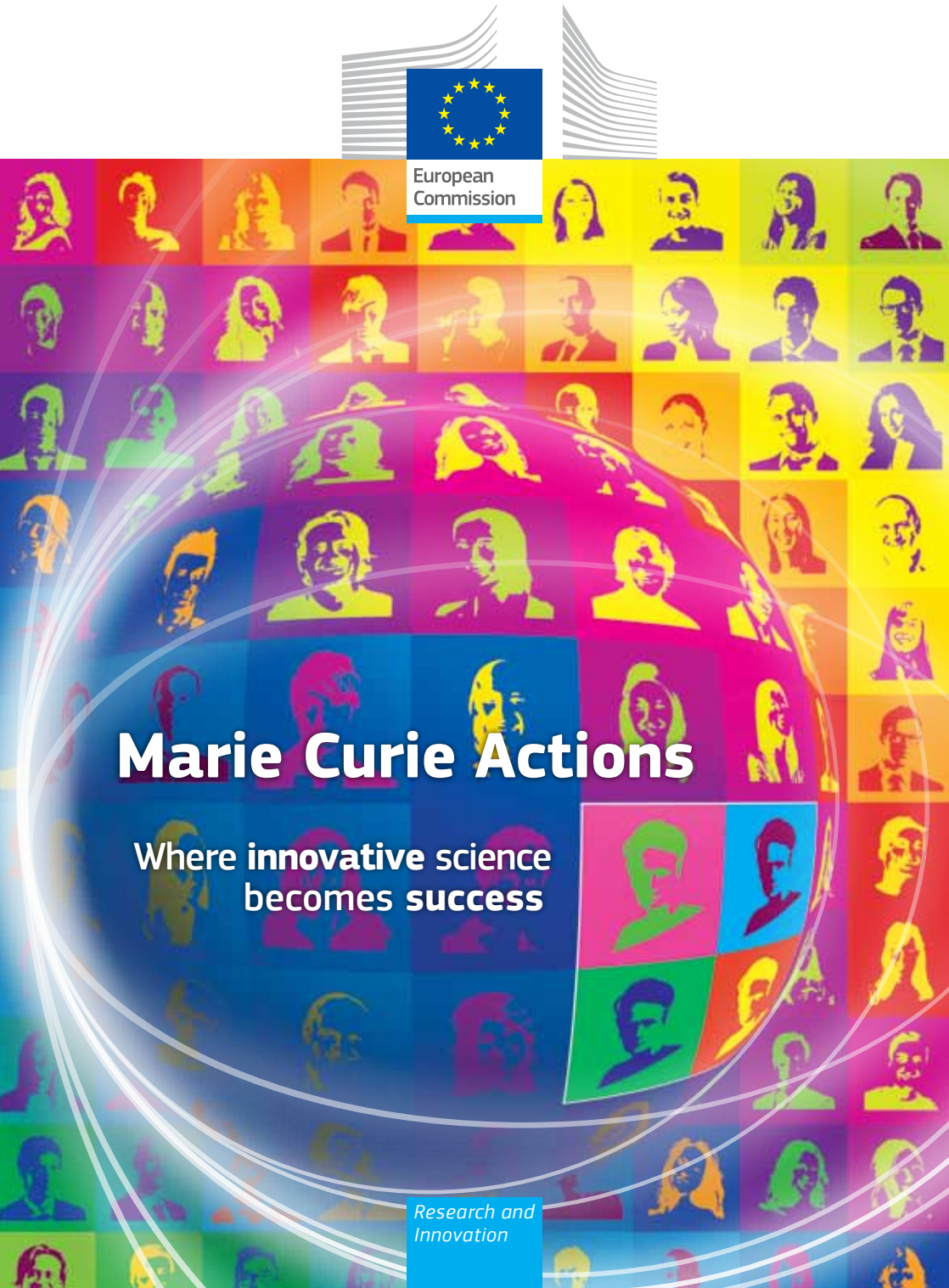
European
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Marie Curie Actions
Where innovative science
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Research and
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Marie Curie Actions

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FOREWORD

Image © European Commission, 2012

Science would stand still if young people never dared to become researchers: seeking the training they need, the skills they need, and the networks they need to push the boundaries of human knowledge. But the career of young researchers has traditionally been tough and full of hurdles, for instance, due to job insecurity or difficulties in reconciling professional and family life.

The Marie Curie programme, since renamed the Marie Skłodowska-Curie programme in recognition of the scientist's full name, has been working towards lowering these hurdles since 1996 by providing financial support to young researchers wanting to expand their horizons through a period of work in another European country. It has encouraged researchers to work together, fostered pan-European collaboration and built upon EU cultural and social diversity. In short: Marie Skłodowska-Curie Actions (MSCA) put individual researchers at the centre of policy and seek to address many of the issues they face.

Being a programme based on fellows, MSCA aim to support the professional development of those who decide to become scientists. Many of the criteria demanded from applicants, besides excellent science, are conceived to help fellows mature and grow. The opportunity to build experience and obtain scientific and transferrable skills enlarges their curricula vitae, demonstrates their flexibility and increases their employability.

This book profiles some of the Marie Skłodowska-Curie projects financed under the Sixth Framework Programme for Research and Technological Development and Demonstration (FP6). During the training period (2003-2012), funding was provided for almost 14,500 fellows coming from 121 Countries. The book therefore presents only a limited selection of the outstanding accomplishments of this multidisciplinary international research programme.

The 30 projects showcased on the pages that follow demonstrate, however, what the whole MSCA world - research fellows, project coordinators and participants, organisations, mentors - was able to achieve at the beginning of this century by investing in research and innovation.

The European Union's next research framework programme, Horizon 2020, will build on the experience gathered so far, helping Europe's brightest and most creative minds extend the frontiers of knowledge by strengthening activities, including Marie Skłodowska-Curie Actions, that support researchers' careers and mobility.

Marie Skłodowska-Curie researchers all have extraordinary stories to tell. We hope the successes illustrated here will inspire others to follow in their footsteps.

Máire Geoghegan-Quinn,
Commissioner for Research, Innovation
and Science.

INTRODUCTION

Among the various elements that contribute to the progress in knowledge and technology, mobility and training of researchers have undoubtedly a key role.

Science and technology appeared on Earth 2.6 million years ago, when first Homo habilis learnt how to modify stones for making tools. This knowledge spread around the world and it has never stopped to evolve faster and faster. With the Industrial revolution of the 19th century the face of the western world changed dramatically: in only 150 years, technology advanced more that in the all the previous years. By the end of the 20th century, the digital revolution has changed the world in a period shorter than a human life.

Science and technology evolved during the centuries, and so did the researchers, the global scientific community. For a researcher the exposure to different work environments, new methods, new ideas, and new discoveries is essential. When Marie Skłodowska-Curie moved to France she did not know that she would have been the first person honoured with two Nobel Prizes, in physics and chemistry. But that is the key.

The Marie Curie Actions (MCA) were launched in 1996. A mobility programme dedicated to the development of researchers career throughout Europe, one of the initiatives towards the creation of the European Research Area. The idea behind is very simple: the researchers should have a stable career, with decent employment conditions; they should have access to the necessary training and information for increasing the level of professionalism and giving them more power in a highly competitive and demanding world.

Today they are well known among researchers as one of the most prestigious schemes to support mobility of scientists across and outside Europe.

During the last 16 years Europe has witnessed the largest amount of mobility of researchers, creation of consortia, development of training schemes, improvements in the working conditions of fellows, and biggest quantity of scientific results in every branch of knowledge ever produced in the history of European science, and Marie Curie Actions (MCAs) were certainly among the key drivers.

Over two million years ago, by hitting one stone against another, our ancestors obtained a tool that improved their life. Today, a scientist can operate complex software for massive data analysis needed to search for the Higgs particle, as the researchers included in the ARTEMIS Marie Curie funded project.

We are currently witnessing the end of the last projects that have been supported by MCAs within the 6th Framework Programme for Research and Technology Development (MC FP6). Thousands of persons (academics, students, private entrepreneurs, stake holders) have been involved in 4,065 research projects funded by the European Commission with a budget of approximately 1,900 million euro. This investment in researchers contributes to many actions that underpin the emergence of a knowledge-based society in support of the Innovation Union. The scientific community, the enterprises, the stakeholders and the EU institutions have cooperated constructively to produce high quality outcomes that will impact our way of living.

Overall 561 consortia and 1.603 institutions from Member States, Associate Countries, and Third Countries, have got funding and trained around 14,500 fellows for participating in the research projects.

The large quantity of MC FP6 projects has resulted in new scientific data that has pushed forward the frontiers of knowledge. It has produced hundreds of technical developments, new methods for the treatment of diseases, progresses in social sciences. Thousands of young researchers moved throughout Europe and beyond and obtained high quality training.

On one side, the programme has allowed research institutions of less favoured regions of Europe to create networks with the most prestigious European universities and centres of excellence, allowing them to benefit from their installations, facilities, and the know-how of their staff, fostering the transfer of knowledge. On the other side, Member States with strong research capacities have benefited of the important flows of researchers mobility created by MCA. All the above-mentioned trends have grown conspicuously in Europe since the beginning of Marie Curie Actions in the 6th Framework Programme, contributing to structuring the European Research Area.

Being at the end of MCAs in FP6, this seems the moment to draw lessons from the efforts made by those who have been involved, bringing the result of their research before the scientific community and the general public.

The participants of the Marie Curie programme have contributed to write the most recent pages of the history of European science. A whole library would be necessary to include all their inputs. Therefore we can show here but a selection of success stories. No doubt that not all are present, but, all the present stories are a contribution to the success of MCA. They account for less than 1% of the total projects funded through the programme. Not all the contributions that deserved to be presented have been included and the choice was difficult. The criteria used for gathering these stories tried to take into account the diversity of MCAs such as geographic, thematic, as well as the different actions included in the programme.

Hence, the reader will discover how a MC FP6 project led by a scientist from Coimbra University, BICEP, has opened the door for creating a company that is making profit in the middle of the economic crisis and despite the recession. How? By devising ways to compare complex information processing systems.

One will also learn how projects contributed to the challenge of ageing in a healthier way by providing useful knowledge for fighting against diseases. The team of Canceromics established a world-class laboratory to develop unprecedented technologies for cancer profiling and analysis. The reader will find out how they came up with microarray technology for the rapid functional analysis of all genes and their role in cancer.

Those who are expecting to know more about the contribution of the programme to the different fields of knowledge, and in particular, those interested in social sciences, will be able to follow the steps of the members of the HEEAL project, which have obtained remarkable results through a highly multidisciplinary research. Their investigation, bringing together archaeology, ethnology, and natural sciences, has contributed to the knowledge of the long-term historical ecology of East Africa from pre-colonial times to the present, taking into account historical, anthropological, and environmental issues.

Diving into the pages of this book, the reader will discover that the future is already here. See how the 3D Anatomical Human project has made a reality of a series of techniques for tackling musculoskeletal problems that several years ago were only seen in science-fiction movies. The results of Bioseal project show how researchers try to make it possible to continue having a comfortable life being respectful of the environment, and how ecological products can be economically worthy.

The examples mentioned are only six out of the 30 projects collected for this publication. The success stories may help to learn how the ever accelerating world of science and technology is ready to go fast through the 21st century, how the persons who participated in Marie Curie projects in FP6 are the main actors of the contemporary history of European science, throwing the arrow of time towards the future, and paving the way for the next chapter, the recently launched new Programme for Research and Innovation: Horizon 2020.

http://ec.europa.eu/research/mariecurieactions/

3D Anatomical Human

A network of European researchers helps improve medical imaging

Participants

Switzerland *(Coordinator), Italy, United Kingdom France, Belgium, Denmark*

http://www.miralab.ch							
FP6	*Proj. N°*	*35763*	***EU contribution:***	*€ 2 625 000*	*Duration:*	*from:*	*Oct. 2006*
						to:	*Sept. 2010*

Medical imaging has considerably advanced in recent decades. Where once there was just the standard X-ray, doctors can now use MRI (magnetic resonance imaging) and CT (computed tomography) scans to visualise organs and bones at all depths within the body, even watching some changes in real time.

The limitation of these techniques is that the patient must be stationary. Imaging the muscles, bones and joints of a moving person is impossible even with state-of-the-art technology. Currently, preventing musculoskeletal problems such as osteoporosis, joint injuries and muscle sprains relies as much on old-fashioned medical skills, like observation and touch, as it does on imaging.

But a network of European researchers has made impressive strides toward changing that, with the 3D Anatomical Human project (3DAH), funded by the Marie Curie Actions. The aim of the project, which ran from 2006 to 2010, was to create personalised, moveable computer models of the muscles, bones, ligaments and tendons of the human body. Using motion capture and MRI imaging, the researchers combined actual patterns of movement with the specific anatomy of each patient.

The multidisciplinary project brought together researchers from six European countries – Italy, Denmark, UK, Switzerland, Belgium and France – in a variety of specialties – from anatomy and medical imaging, through biomechanics, to computer animation. The structure of the Marie Curie programme allowed the crucial mobility for cross-pollination between disciplines, says project coordinator Dr Nadia Magnenat-Thalmann of the University of Geneva.

"Research fellows have to spend two months a year in another partner's lab, so at the end of the project we really had a team of people working together," she says. "What's nice as a research fellow is that you're not alone with your professor – you're in an extended multi-country team with a lot of know-how."

The 3DAH project not only broke new scientific ground, garnering substantial international media coverage along the way, but it also had considerable impact in preparing research fellows for their subsequent careers.

"Doing a PhD in one place with one professor, it's more difficult to find a job," Dr Magnenat-Thalmann says. "These Marie Curie students have been in many places and have built up not only knowledge but a network, so they know better what is going on at the leading edge of the field."

This wealth of experience, plus many opportunities to publish, made it easier for PhD students to successfully apply for professorships after their involvement in this Marie Curie Action. One 3DAH research fellow, Jerome Schmid, immediately became a professor of applied medicine in Geneva, while research fellow Gwenael Guillard took a job at leading medical imaging company Imorphics in England and was quickly promoted to senior researcher.

Teams in the UK and France are continuing the 3DAH work, while the Centre for Sensory-Motor Interaction in Denmark is integrating the open-source components of the research into commercial software. Dr Magnenat-Thalmann's group is building on the results in their current Marie Curie Action, "MultiScaleHuman", which aims to add cellular and molecular details to the 3D anatomical models.

Ultimately, the researchers want to create a clinical tool that doctors could use to quickly visualise movement patterns and counsel the patient to prevent injury. With musculoskeletal conditions – including chronic pain, arthritis and bone fracture – being the leading cause of disability in the European Union, that goal is all the more pressing.

ADAM

Research that gives physicists vital independence and flexibility

Participants

Germany *(Coordinator)*

http://cordis.europa.eu/projects/ (search for REF=84299)							
FP6	Proj. N°	24440	**EU contribution:**	€ 158 000	Duration:	from:	Nov. 2005
						to:	Oct. 2007

Electrons, the particles that zip around the nucleus of an atom, are unimaginably small and unimaginably fast. Take a photo of one, and you could unlock some of the secrets of the universe. Go one better, and manipulate one with the briefest flash of light, and you can potentially revolutionise electronics and information technology.

That's the challenge being taken on by ADAM – Advancing Attosecond Metrology – which, through the European Union's Marie Curie Actions programme, supported the postdoctoral research of Eleftherios Goulielmakis at the Institute for Quantum Optics, part of the Max Planck Institute in Garching, Germany. Goulielmakis is currently a research group leader of the Institute's Attoelectronics group.

"It's the same as trying to take a picture of a car in a race," he explains. "To capture a moment you don't just need a good camera, but you need a camera fast enough to make sure that the picture is not blurred. We are developing what we call attosecond laser pulses, which act as ultra-fast cameras that allow us to capture this motion."

But the most exciting aspect of ADAM is what follows – actually manipulating the motion of those electrons. "We can send a weak light burst to take a snapshot, but if we make a stronger pulse that can exert very precise forces on these electrons, it can control their motion," says Goulielmakis. "If you think from the point of view of electronics, which is all about transferring electrons from a computer chip, here we are actually moving electrons from one corner of a single atom to another corner. As you can imagine, one day we will be able to define and perform very, very miniscule actions essential to computer science."

The research is considered critical toward the future development of electron-based information technologies – in particular, advancing these technologies so that they can reach their ultimate speed.

A native of Greece, Goulielmakis is a two-time recipient of a Marie Curie fellowship. "I consider myself particularly privileged to have been in contact with the Marie Curie funding," says the 37-year-old, who received his first fellowship when he moved to Munich as a post-doc in 2005.

"Marie Curie has been an essential benefit for me," he says, as he counts up the various unique elements of the funding. "First of all, you are independent. That means you can select where you want to go without the restriction you would have if, for example, your host institution doesn't have funding. Mobility is a great advantage."

This independence from host institutions gives Marie Curie fellows more than simple financial freedom – it also gives them a kind of intellectual freedom. Because of the funding, Goulielmakis could attend conferences and interact with scientists outside his immediate area of research. "It allows you to go to conferences without thinking, "How can I justify this with the budget that my boss has set aside?"

"I remember something along those lines when I went to a conference for Marie Curie fellows in Belgrade. In the beginning, you think, 'What is this going to give me?' but then you realise it's a unique opportunity to see how other fields are evolving and to get feedback."

But the Marie Curie Actions funding also offers other, more basic, essentials. "The salary is very respectable, regardless of which country you go to," he notes. "That is also very important, because it coincides with a time – just after the PhD – when many are starting a family."

The programme works in conjunction with other EU funding schemes, such as the re-integration grant, which offers scientists the chance to continue their work after the two years of the Marie Curie fellowship elapsed.

"After several years of research, the re-integration grant actually followed up from the Marie Curie grant, and helped me make sure that I could really harness the efforts of several years," says Goulielmakis. "It is all part of the European community strategy to help a scientist on his first post-PhD steps towards being part of a big project."

AdaptUnpredict

Study of game theory models paves the way for better financial market management

Participants

***United Kingdom** (Coordinator)*

http://cordis.europa.eu/projects/ (search for REF=83617)							
FP6	*Proj. N°*	*41121*	***EU contribution:***	*€ 493 000*	*Duration:*	*from:*	*Apr. 2008*
						to:	*Mar. 2010*

Game theory sounds like something more relevant to chess than economics, but it could hold the key to understanding the market failures that trigger financial crises.

Implementing new models, like those developed during Prof. Peter Hammond's time as Marie Curie Excellence Chair at the University Warwick, UK, could improve the way the financial sector handles such issues in the future.

Game theory models consider the interactions between several "players", whose decisions will be influenced by their expectations of the others' strategies. This means they are inherently unpredictable.

Since giving up playing chess seriously over 40 years ago, Professor Hammond had been interested in the shortcomings of game theory models. In 2007, the once-in-a-lifetime opportunity mobilised him with the offer of the Marie Curie Excellence Chair at the University Warwick, UK, mobilised him. He took early retirement from Stanford University to return to Europe.

"Sometimes you want to do something that seems really adventurous," he explains. The Marie Curie grant for the AdaptUnpredict project gave this talented researcher the chance to "do something I'd never really quite had the courage to tackle head on".

Financial markets are often regarded as multi-players games, with economists striving to understand and improve the "rules" governing how governments, producers, and consumers interact.

But unpredictable events can render these models "inadequate in various ways," explains Professor Hammond. "Their validity is only ever temporary."

Using the Eurozone crisis as an example, Professor Hammond explains that rigid rules can break down catastrophically if faced with unforeseen circumstances. For this reason, economists need to think about how to create more robust institutions, with more relaxed game theory rules. The idea is that they should be able to change if the unpredictable consequences of previous decisions require it.

AdaptUnpredict began a pioneering inves-tigation of so called "enlivened models". These models are constructed to ignore any built-in flaws that would often cause others to fail. They do this by adapting to previous decisions.

Professor Hammond hopes that they will be incorporated into the financial marketplace, but acknowledges that this will not happen overnight, which is why he continues write papers, give talks and encourage colleagues to pursue related ideas.

In recognition for his career achievements Professor Hammond was elected as a Fellow of the British Academy in 2009, and is now an Emeritus Professor at Stanford and a part-time Professor at Warwick.

ARTEMIS

A training network to search for the Higgs particle

Participants

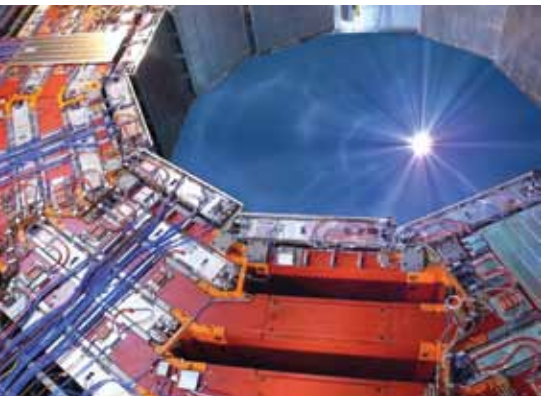
France (Coordinator), United Kingdom, Greece, Italy, Germany

www.cea.fr

FP6	Proj. N°	35657	EU contribution:	€ 2 570 000	Duration:	from:	Oct. 2010
						to:	Sept. 2010

The search for the Higgs particle (also known as "The God particle") using the Large Hadron Collider at Europe's particle physics laboratory CERN in Geneva is the largest and most complex experiment ever performed. Finding this particle will resolve one of the most fundamental questions in physics: why do the particles that make up matter have mass? It is also the only remaining elementary particle predicted by theory to be discovered.

Today, a successful particle hunter has to have an extensive theoretical understanding of particle physics, advanced electronics and complex detector technology, automatic systems, and the use and even design of complex software tools for data storage, processing and analysis. And, above all, the researcher has to collaborate with a large number of colleagues working together on the same detector experiment.



These are the skills the ARTEMIS Research Training Network developed in a small group of physicists who now all play key roles in the search for the Higgs particle. Launched in October 2006 with 7 partners, the project was funded by the European Commission under the Marie Curie Actions for the period 2006 to 2010 with € 2.7 million.

"We wanted to create a flexible, smaller and close-knit research group," explains Rosy Nikolaidou. As a researcher for France's Nuclear Energy Agency (CEA) in Saclay, Nikolaidou is a member of the ATLAS collaboration and the coordinator of ARTEMIS. She reports that 13 researchers were offered contracts by the project. Six graduate students preparing their PhD's received 3-year contracts, and seven post-docs joined for two years.

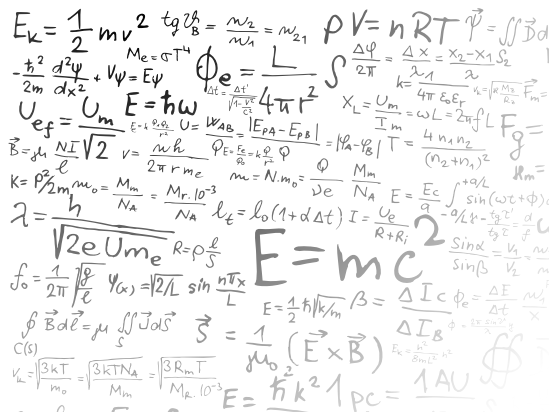
Now some of them are hired by CERN directly, while others work in several physics departments at universities that participate in the ATLAS experiment.

Besides direct involvement in the ATLAS experiment (where they participated in the testing and calibration of the many components of the detector), the researchers gained theoretical and practical knowledge by taking part in workshops, specialised schools and training sessions. Their work, which earned them a certificate in the understanding of all the components of the ATLAS experiment, gave them an excellent preparation for what they are doing today: the analysis of the data stream emerging from the ATLAS detectors. They also contributed to the fundamental aspects of the experiment: "We had an important impact on the preparation of the analysis and the understanding of the detector," says Nikolaidou.

Interestingly enough the members of the group acquired many other skills now required for a promising career. "We trained them to have an active role in our organisation, so that they could acquire management skills," says Nikolaidou.

They also honed their presentation skills, giving them more visibility among the 3000 people in the collaboration.

Although their work seems to have little connection with the preoccupations of the large majority of people, they acquired skills that gave them new mobility, opening doors to many other areas. "The software skills they acquire can be used in banking, data mining, for medical applications, such as imaging, and statistics. One of the participants has been offered a position in the development of medical imaging technology. Depending on the market, they can always switch to a non-academic career," says Nikolaidou.



BiCEP

New research into processors promotes careers and businesses

Participants

Portugal *(Coordinator)*

http://bicep.dei.uc.pt							
FP6	Proj. N°	46478	**EU contribution:**	€ 80 000	Duration:	from:	Jun. 2007
						to:	May 2009

Nowadays, thanks to a computer program known as complex event processing systems (CEPs), financial market traders use machines to buy and sell stocks, banks can detect fraud instantly, shops know the second stock is running low and computers can make decisions almost instantaneously.

Thanks to FP6 Marie Curie Reintegration Grant, in 2007 Pedro Bizarro returned to his native Portugal from the US, to investigate CEPs. The project eventually led to him founding a successful company.

At that time, little was known about the various systems on the market, so Bizarro led the BiCEP (Benchmarking Complex Event Processing Systems) project, which devised ways to compare the machines. After the project's completion in 2009, the small group of researchers led by Bizarro created a spin-off company, which turned a profit after only two years of operation.

CEPs allow companies to analyse vast amounts of data in real time, spotting anomalies straight away. Bizarro explains: "It is an evolution of data processing. "Instead of analysing stored data after an event has happened, the data is processed as events occur. You have to react quickly."

Demand for CEPs is growing as companies want more from their computer systems. While computer hardware still seems to obey Moore's law (which states that the processing power of computers doubles roughly every two years), companies are more than doubling their data processing requirements. They want to track hundreds of thousands of variables in real time, and receive alarms if anomalies appear. From tracking traffic flow to novel baggage handling systems, CEPs are vital for the modern world.

Manufacturers of CEPs in academia and industry made various claims about the speed of their products, but these claims could not be easily compared. Based at the University of Coimbra, BiCEP put about ten CEPs through their paces, to produce ways of rigorously comparing one to the others.

As well as training five Master students and two PhD students – who are still working on the project - Bizarro published three papers from the project and produced a free framework to test CEPs. It was during this process that Bizarro realised he could do better.

"I realised that not only was there lots of room for improvement in terms of performance of the engines in the market, but most of the time the engines were also complicated to use," he says. "They were either too complex to set up or the query language was too complex for the normal business user."

So with two partners, Bizarro founded FeedZai, which now has clients in Europe, the US and Dubai. Initially it provided consulting systems, optimising businesses' existing CEPs, but in April 2011 the FeedZai team launched their own CEP software FeedZai Pulse.

Where others struggled to survive, FeedZai flourished. It began operations in the aftermath of the credit crunch, and Pulse hit the market at the same time as the Eurozone debt crisis.

In April 2011, FeedZai, which currently employs 22 people, was the only non-US company to receive Gartner's "Cool Vendor" award in Analytics and Business Intelligence. While other so-called "business appliances" require expensive hardware to run, FeedZai Pulse uses normal servers at a much lower cost, a benefit Bizarro credits to the results of BiCEP.

BioPolySurf

Young researchers deliver breakthroughs in nanotechnology

Participants

Spain (Coordinator), Turkey, Greece, Switzerland, The Netherlands, Germany, Finland, France

http://cordis.europa.eu/projects/ (search for REF=72962)

FP6	Proj. N°	5516	**EU contribution:**	€ 3 474 000	Duration:	from:	Oct. 2004
						to:	Sept. 2008

Nanotechnology, the manipulation of matter on a molecular scale, brings together different sciences. It is not just about the physics of atomic arrangements, but also about the chemistry of each element involved. The mix becomes yet more complex when living organisms interact with the tiny structures. But by embracing this complexity - bringing together chemists, physicists, biologists and engineers - a research project has provided new insights into nanotechnology.

The project, BioPolySurf, gathered 30 PhD students to study the relationship between novel materials and nanotechnology. "The aim was to bring ideas and concepts inspired from biology to the existing cutting-edge polymer-based nanotechnology," says BioPolySurf's project coordinator José Carlos Rodríguez-Cabello, a biomaterials and nano-biotechnology researcher at the University of Valladolid in Spain.

BioPolySurf was set up thanks to the Marie Curie Actions, which are European Commission grants supporting the mobility of researchers. That enabled it to receive a €3.47 million grant from the European Commission during its four-year run from 2004 to 2008. "Living systems display an amazing set of properties at nano-level," says Rodríguez-Cabello. "The idea was to better understand how nature works at those scales. The multidisciplinary team of biologists, biotechnologists, chemists, physicists and engineers was essential as their combined view could answer the right questions and arrive to the adequate explanations".

Working with universities in the Netherlands, Germany, Greece, France, Finland, Switzerland and Turkey, BioPolySurf focused on studying marketable nanotechnology applications. These included tissue engineering and bone regeneration, drug delivery, lab-on-a-chip systems, and devices for agriculture, food packaging, and cosmetics.

As well as studying and training, the students delivered some research breakthroughs that led to papers in eminent publications, patents, and even prompted Rodríguez-Cabello to start a spin-off company. "Part of the knowledge generated within the project is a significant part of our actual know-how in the company", he says.

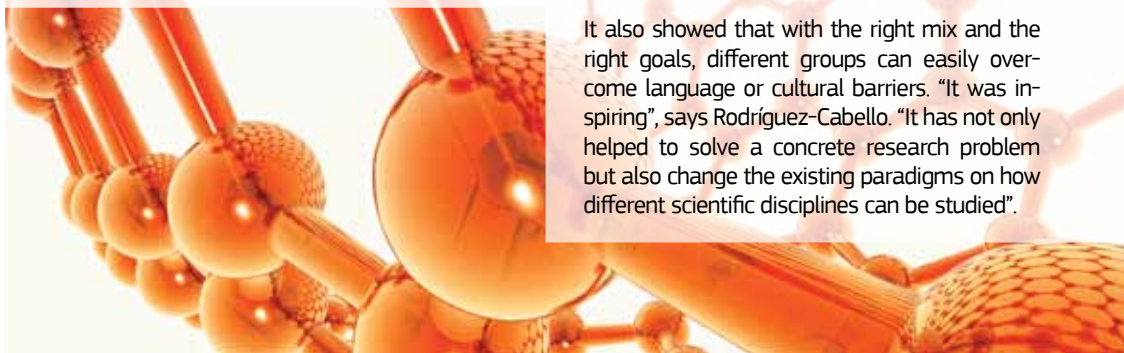
Rodríguez-Cabello says the project was able to create new materials that revealed properties never seen before. "We are proud to see how our ideas could be a source not just of a business but also the seed of new therapies and products directed to solve health problems in hot areas, such as regenerative medicine", he says.

But BioPolySurf's most lasting legacy is how it brought students from such varied disciplines together to develop new ways of looking at nanotechnology. Rodríguez-Cabello says the complementary views yielded a power that was more that the mere sum of the individual parties.

"From the very beginning, it was clear that synergies would open research possibilities", he says. "The young researchers moved comfortably between areas - like biology, physics, chemistry, and engineering - that are traditionally quite disconnected. They have acquired the "translation" capacity to understand and communicate between scientists of quite different expertise. And that is a peculiar but valuable ability in their CVs. "Most of them now work in industry and academia in areas connected to BioPolySurf, including two who went back to Poland and Portugal, their home countries, to become university researchers.

And even though the project is over now, they built up key professional and personal contacts. "This experience, and the research generated in BioPolySurf, put them in a very good starting position for a research career", Rodríguez-Cabello says.

It also showed that with the right mix and the right goals, different groups can easily overcome language or cultural barriers. "It was inspiring", says Rodríguez-Cabello. "It has not only helped to solve a concrete research problem but also change the existing paradigms on how different scientific disciplines can be studied".



BIOPTRAIN

European researchers make sense of genetic data

Participants

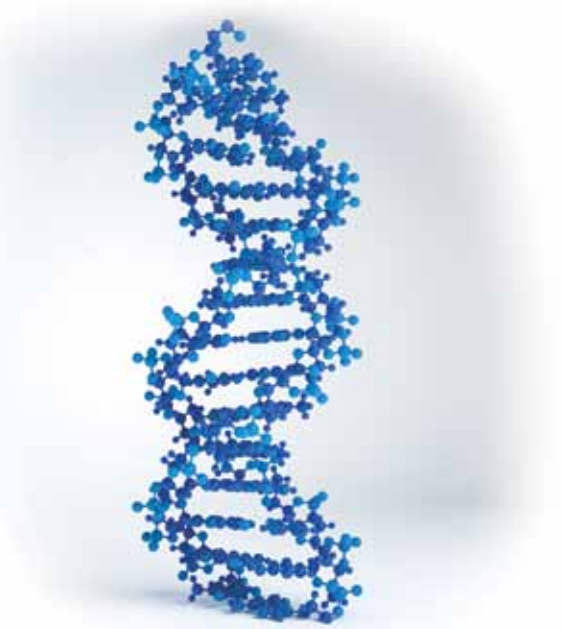
United Kingdom *(Coordinator), Italy, Belgium, Sweden, Poland*

http://bioptrain.org/index.php/Main_Page

FP6	Proj. N°	7597	**EU contribution:**	€ 2 121 500	Duration:	from:	Sept. 2005
						to:	Ago. 2009

It is one of the greatest research breakthroughs of our time: the decoding of the 25,000 or so genes needed to make a healthy human being. But more than a decade after the human genome project laid bare the building blocks of life, scientists have still to figure out how the DNA strings fit together to produce everything from hearts and minds to knees and kidneys. It is a challenge that goes beyond biology and into data analysis, and one that PhD students have been dealing with thanks to a European research project.

The project, BIOPTRAIN, looked at ways to process the vast amounts of genetic data that molecular biologists today have access to. "We now have billions of pieces of data about the genome, but the problem is that we don't know how to use them for clinical science", says University of Nottingham professor Jon Garibaldi, BIOPTRAIN's project coordinator. "We need to analyse the data to understand how it all fits together. So we need to train computer scientists to help the doctors".



The four-year project was realized thanks to the Marie Curie Actions supporting the mobility of researchers. Launched in September 2005 with a €2.1 million EU grant, BIOPTRAIN involved partnerships with Poznan University of Technology in Poland, the Catholic University of Leuven (KUL) in Belgium, University College of Borås in Sweden, and Italy's University of Florence.

The project looked at the fast emerging field of bioinformatics, which is the application of information technology in molecular biology.

BIOPTRAIN's aim was to train the next generation of European scientists in the latest advances in bioinformatics, including the ever-more sophisticated computational algorithms used to process genetic data.

Garibaldi says BIOPTRAIN looked ahead to the day in the not-too-distant future when anyone can have their entire genetic code mapped and enjoy personalized medicine. "We need to link biomedical and bioinformatics data", he says, adding that by better understanding how the DNA fits together, researchers will be able to improve disease diagnosis and treatment for a whole range of maladies. "Some day, perhaps, you'll be able to take a blood test and find out whether you're likely to develop Alzheimer's, cancer or other diseases. We probably won't cure these diseases in our lifetimes, but this project could help our efforts to find targeted drugs, improve treatment, and extend lives".

Eighteen research students from across Europe received PhD training in the project. "We're trying to build up a new set of academics, and they will in turn train a new generation afterwards", says Garibaldi.

The project delivered a number of breakthroughs. For example, in Garibaldi's Nottingham University, home to some of the world's top breast cancer specialists, researchers analysed a 20-year database of over 1,000 people and were able to identify seven different subtypes of breast cancer.

But the most important result, Garibaldi says, was that it helped build a multidisciplinary knowledge base in the emerging bioinformatics field, and one that has already led to new careers in academia and industry, with one researcher working in Imperial College, London, another taking a research position in Luxembourg, while another moved to the US. "We brought together researchers from different backgrounds and perspectives and started to form a European approach to the problem, gaining new insights and spreading good practises", he says. "This is the new breed of scientist comfortable in different domains and with a new way of looking at problems that straddle different domains".

Bioseal

Research project on smarter detergents forges new career prospects

Participants

Belgium *(Coordinator), Austria, Portugal, Italy, United Kingdom*

http://cordis.europa.eu/search/index.cfm?fuseaction=proj.document&PJ_RCN=9617094							
FP6	Proj. N°	19885	**EU contribution:**	€ 1 039 800	Duration:	from:	Nov. 2005
						to:	Oct. 2009

When it comes to detergents, consumers insist on the most powerful cleaning agents, but also expect their washing products to be easy to use, lightweight, low energy users, safe for the environment and reasonably priced. It's a full menu, but one that multinational Procter & Gamble (P&G), which produces a wide range of household detergents, recently tried to meet by bringing in expertise from student researchers across Europe.

"We wanted to create more sustainable detergents, blending our historical know-how with ideas from young European scientists to really build a new revolutionary product", says Johan Smets, a P&G research fellow. Smets helped with the start of Bioseal, a project funded by the European Commission grants supporting the mobility of researchers known as Marie Curie Actions. The project set up fellowships for seven PhD students to design more effective and environmentally friendly detergents.

The four year project, which began in November 2005, received € 1.04 million in EU funding, and helped link academic and commercial partners from across Europe - including P&G and the universities of Birmingham in the UK, Minho in Portugal, Leuven in Belgium, and Graz in Austria - to design the detergent of the future. "We felt the best way to achieve this was with a Marie Curie programme that combined different centres of excellence with academic expertise to bring the product alive", says Smets, the project coordinator, P&G's former principal scientist in charge of developing novel technologies for consumer good products.

The process involved intense two-three day workshops every six months to analyse the results and steer the program and two-month summer secondments in P&G to help the students understand the detergent industry and the latest research.

The research looked at a number of key issues for modern detergents:

- Compaction: this reduces the environmental footprint by cutting packaging waste and increasing transport efficiency;
- Enzymes: these biomolecules act as catalysts inside a washing machine. They are biodegradable, help reduce energy use by enabling lower washing temperatures and shorter washing cycles, and are derived from renewable sources;
- Surfactants: these keep stains in the water and prevent their return to the fabric. But they are often derived from petroleum, and the research looked at developing naturally-derived surfactants.
- Odours: crucial since perfume is often the top consideration for consumers.

"The project gave us new insights into how dirt and stains are encrusted in the fabric, and how chemistry stains faster and better", says Smets. By leveraging new enzyme technologies, a better understanding of cleaning phenomena at the fabric surface, and an improved understanding of the interplay between enzymes and surfactants in the detergent formulation, the Bioseal project delivered a detergent with increased environmental profile. "The result was a detergent prototype that delivered the same cleaning performance with just one third of the volume", Smets says.

But Bioseal did more than just produce a new detergent. It also helped train the students, resulting in 15 academic papers and two patents. After the project, the researchers found challenging jobs in academia and the chemical industry. They include: working for P&G; working for Danish enzyme supplier Danisco; doing research at the University of Gembloux on biosurfactants; completing a PhD at the University of Birmingham in the UK; working for a pharmaceutical company, Novartis, in Spain; working at an incubation centre at the University of Minho in Portugal, and working at the Austrian Centre of Industrial Biotechnology in Graz.

And by forging key relationships, it established a potential life-long network of academics. "Bioseal helped develop innovation at the interface of science and industry", says Smets, who says the experience of coaching such a variety of people and ideas was one of the most satisfying moments in his career. "We developed a strong scientific approach: knowledge and capability in Europe to innovate on sustainability combined with better products for our customers".

Canceromics

New technologies in cancer profiling

Participants

Finland *(Coordinator)*

http://cordis.europa.eu/projects/ (search for REF=82013)							
FP6	Proj. N°	2728	**EU contribution:**	€ 1 806 500	Duration:	from:	Ago. 2004
						to:	Jul. 2008

Advances in microarray or lab-on-a-chip technologies have significantly improved our ability to study human cells and tissues. However, in order to develop novel therapies to combat such diseases as cancer, understanding the underlying molecular mechanisms is required and this is only made possible by developing new technologies.

The team at the Canceromics programme established a world class laboratory to develop unprecedented technologies for cancer profiling and analysis. It has in particular come up with cell microarray technology for the rapid functional analysis of all genes and their role in cancer.

Canceromics was a €1.8 million Marie Curie Actions joint research project between the VTT Technical Research Centre of Finland and the University of Turku. Started in August 2004, the four year project was also supported by the City of Turku and its Technology Development Company, Turku Science Park Inc. Canceromics is in fact unique in that a public university and state technology research institute started a joint project with the local government.

In order to attract only the best candidates to Finland, job opportunities were published in top tier scientific journals such as Nature and Science as well as a whole host of relevant websites. The Marie-Curie Excellence Grants allowed for this proactive recruitment strategy which resulted in scientists who held senior positions at major US centres of excellence returning to Europe to launch and, indeed, maintain ambitious research programmes. Canceromics is thus a prime example of mobility in action.

The programme itself was also extremely multi-disciplinary, which has helped Europe compete with major US-based centres in the field. The team's track record in setting up new technologies has also been important for the EU innovation chain.

"The biological focus driving our technology development was the identification of causative gene targets in cancer cells, which we believe will form a basis for effective development of novel anti-cancer agents", says Canceromics Project Coordinator, Prof. Olli Kallioniemi.

The integrated analysis of cancer systems biology has been the main overall goal of Canceromics. However, as Kallioniemi is eager to point out, his team, in collaboration with the host institutes, "has also established itself as a major European site for the development and application of these technologies".

"We are well on the road to generating valuable research clues on disease mechanisms, as well as starting points for drug development", says the Professor. The fact that several multinational pharmaceutical companies have also become involved in the work adds clout to his statement.

The establishment of Canceromics has been crucial for the long-term training of scientists in important fields, such as biotechnology, drug development, cancer research, genomics and bioinformatics. Overall, Canceromics has started a chain of positive developments, which continues to this day. The project has led to international recruitment, counteracted the EU brain drain, generated major public-private partnerships and above all, come up with technologies and scientific findings that help us understand and hopefully one day cure cancer.

The programme has also proven extremely beneficial to the local job economy with the vast majority of those hired under Canceromics still working in the same laboratory – many now on permanent contracts.

CelluCart

Industry-academia partnership for novel treatment of knee injuries

Participants

The Netherlands *(Coordinator), Switzerland*

http://cordis.europa.eu/projects/ (search for REF=85086)							
FP6	Proj. N°	42418	**EU contribution:**	€ 164 000	Duration:	from:	Sept. 2007
						to:	Ago. 2009

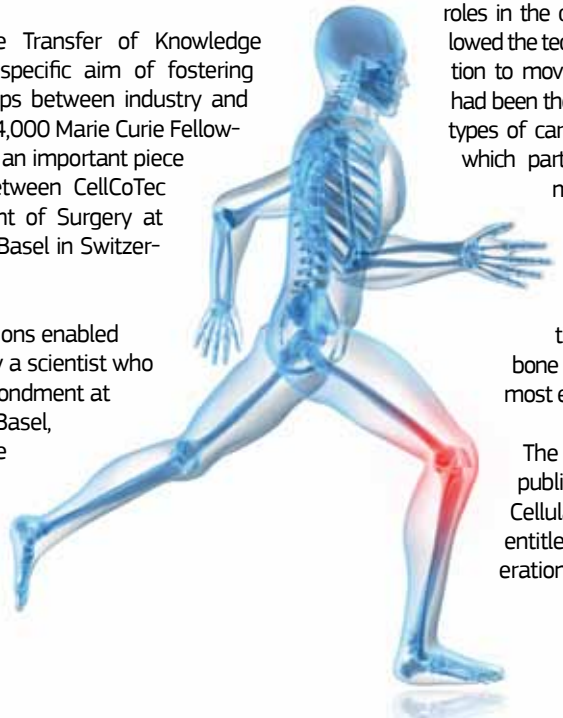
Marie Curie Actions played a pivotal role in progressing the careers of two young medical researchers, bringing new hope of speedy recovery to millions of future sufferers of knee cartilage damage, and enabling a medical start-up company based in the Netherlands to develop a ground-breaking cartilage-repair technology and speed up its progress towards clinical trials and the eventual prospect of commercialisation.

At the heart of the project, entitled CelluCart, was the concept of "Cellular Cartilage Instruction", a technique discovered by a development-stage orthopaedic company in the Netherlands called CellCoTec. The technique is based on the observed capability of healthy cartilage cells, taken from the patient's own body, to interact with stem cells taken from the patient's bone marrow, to "instruct" the formation of new cartilage tissue.

In the words of the CelluCart project co-ordinator, Dr Jens Riesle, who is also CellCoTec's Chief Scientific Officer and Executive Director, the Marie Curie Fellowship, designed to attract and support the mobility of talented young researchers, was "a very helpful step" in the successful development of the Cellular Cartilage Instruction process.

Granted under the Transfer of Knowledge scheme, with the specific aim of fostering strategic partnerships between industry and academia, the €164,000 Marie Curie Fellowship was the key to an important piece of collaboration between CellCoTec and the Department of Surgery at University Hospital Basel in Switzerland.

The Marie Curie Actions enabled CellCoTec to employ a scientist who spent a year on secondment at University Hospital Basel, acquiring knowledge of effective cell sources, while a researcher from Basel was able to spend a period working within CellCoTec and subsequently transfer knowledge about Cellular Cartilage Instruction back to University Hospital Basel.



The two Marie Curie-funded scientists played lead roles in the central piece of research which allowed the technique of Cellular Cartilage Instruction to move ahead. The key issue to resolve had been the need to establish which particular types of cartilage cells (articular or nasal) and which particular types of stem cells (bone marrow or adipose tissue) were the optimal combination to achieve new cartilage tissue generation. The work of the two researchers, with others, provided the verification that articular cartilage cells and bone marrow stem cells provided the most effective combination.

The results of the research were published in a paper in the Journal of Cellular Physiology in February 2011, entitled Enhanced Chondrocyte Proliferation and Mesenchymal Stromal Cells Chondrogenesis in Coculture Pellets Mediate Improved Cartilage Formation, with the two researchers, Chitrangada Acharya and Adetola Adesida, named as lead authors.

The Cellular Cartilage Instruction technique has been granted a series of patents in Europe, the USA and Australia and is now undergoing a 30-patient clinical trial following a successful 10-patient pilot clinical trial which was completed in 2011.

Following on from the success of the CelluCart project, Adetola Adesida has been appointed Assistant Professor of Surgery at the University of Alberta, Canada, and Chitrangada Acharya is now a Post Doctoral fellow at the University of California, Davis, Medical Center at Sacramento.

At CellCoTec, Dr Riesle looks back on the outcomes of CelluCart, not only in terms of the practical benefits it brought to his company, but also in terms of the scientific outcome, the knowledge exchange, and – not least - the ultimate benefits to knee cartilage patients. "It really was a win-win situation", he concludes.

CityNet

Energy efficiency project advances a promising career

Today, more than half of the world's population lives in cities, a figure that will continue to rise even as energy prices elevate and pressures on energy supplies grow. With a mix of real-life case studies and laboratory modelling, the European Union-supported research project, CityNet, worked to make cities in the future as energy efficient as possible with the help of young researchers like Dilay Kesten.

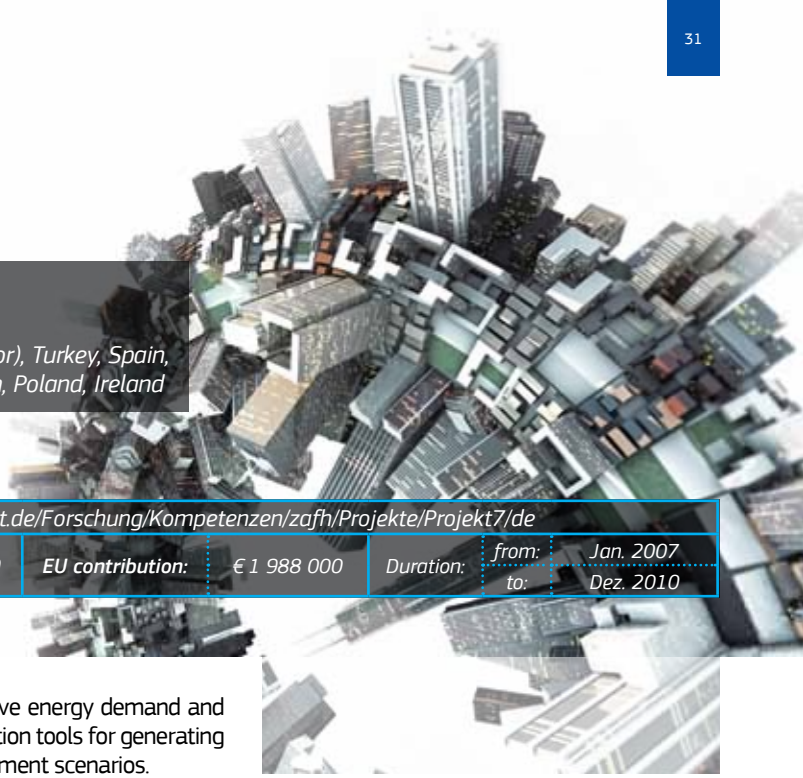
Originally from Turkey, Kesten earned bachelor's and master's degrees in architecture but she had long been interested in energy and building technology. While earning her master's at the University of Applied Sciences in Stuttgart, Germany, she studied under Professor Ursula Eicker, an expert in a multidisciplinary field known as building physics. "That was so interesting for me – much more scientific than architecture", Kesten said. "Professor Eicker and I had a good synergy."

After returning to Turkey, and during the first year of her PhD programme in Istanbul, Kesten began to look for more possibilities in Europe. Following Eicker's advice, she applied for a Marie Curie Actions fellowship, an EU grants scheme supporting the mobility of researchers, which she received for the period 2007-2010 to continue her studies in Stuttgart. For Kesten and her academic career, the Marie Curie fellowship was a game-changer.

"If I stayed in Turkey, I would have had to support my studying by working at night and on the weekends. Thanks to the fellowship, I was able to spend all of my time in Stuttgart doing research. This was really a great opportunity".

Once back in Stuttgart, Kesten joined CityNet's team of PhD students working to develop a sophisticated energy management tool for urban areas. Unlike other energy management projects that assess individual buildings or complexes, the CityNet project analysed the energy performance of entire city neighbourhoods. Additionally, CityNet looked at both demand-side issues, namely energy efficiency measures, and supply-side issues, such as the use of renewable forms of energy.

Importantly, CityNet has developed an online monitoring, simulation and visualisation platform to assist other researchers in their own energy management work.



Participants

***Germany** (Coordinator), Turkey, Spain, Italy, United Kingdom, Poland, Ireland*

http://www.hft-stuttgart.de/Forschung/Kompetenzen/zafh/Projekte/Projekt7/de

FP6	Proj. N°	33489	**EU contribution:**	€ 1 988 000	Duration:	from:	Jan. 2007
						to:	Dez. 2010

The platform provides live energy demand and supply data, and simulation tools for generating custom energy management scenarios.

Kesten was joined by other architects as well as building physicists, and mechanical and electrical engineers. "It was truly interdisciplinary", Kesten said. "Our main challenge was to study energy consumption at the city scale and look at how we can minimise energy use. Importantly, we looked at both the supply and demand sides".

For her part, Kesten's task focused on maximising the use of daylight in order to improve energy efficiency and reduce energy consumption for lighting and cooling, particularly in glazed office buildings. She worked on a case study of an urban neighbourhood with several office and commercial buildings of varying heights and densities.

Kesten said one of the strengths of CityNet was the professional and geographic diversity. "We got to know people from many different disciplines, universities and cultures. And every four months we attended a meeting at a different partner university. We made so many new contacts".

In Kesten's case, the Marie Curie fellowship fulfilled its promise ideally. "Because of the programme, I now have 18 conference papers and four journal articles", she said. "Five years ago, if someone would have asked me whether I had the chance to live and work in Europe, I would have said it was pretty small. Now, I'm here."

Kesten has continued her research in the field of energy efficiency. She went on to study heating, cooling and electricity use in residential areas in Ludwigsburg, a medium-sized baroque city near Stuttgart. "Most likely I will stay in this field", she said, "and also maybe do some teaching."

Eicker, who coordinated the project in Stuttgart – where an artificial sun was built to study passive heating techniques – said CityNet was not only revolutionary in how it examined energy management on a larger scale, but also for how it trained PhD students to be more independent.

COSY

Researchers help improve hydrogen storage

Participants

***Germany** (Coordinator), Italy, France, The Netherlands, Spain, United Kingdom, Switzerland*

www.cosy-net.eu							
FP6	Proj. N°	35366	**EU contribution:**	€ 2 467 000	Duration:	from:	Nov. 2006
						to:	Oct. 2010

Hydrogen is an abundant resource that can be produced from a variety of conventional and renewable energies. However, its storage requires large, high-pressure vessels which can cause safety problems as they can easily explode.

The €2,5 million Marie Curie Actions Training Network: Complex Solid State Reactions for Energy Efficient Hydrogen Storage (COSY) which ran from November 2006 to October 2010 aimed at solving this problem. It focused on characterising and optimising novel light weight hydride composites which have the required high storage capacity for hydrogen.

COSY comprised 13 research institutions from France, Germany, Italy, the Netherlands, Spain and the United Kingdom and was coordinated by Dr. Klaus Taube from Helmholtz-Zentrum Geesthacht in Germany. The project's results form the basis for the further optimisation of such materials for mobile hydrogen storage applications, such as tanks for emission-free cars.

The network offered training and research experience to young researchers by giving them the opportunity to spend three years in a foreign country during their studies as part of an international high-quality research project. The grants under the programme were thus essential to attract only the best talent from across the world and encouraged mobility.

In addition, a detailed career development plan including an exchange programme between the partners was a significant part of the work contract for each position.

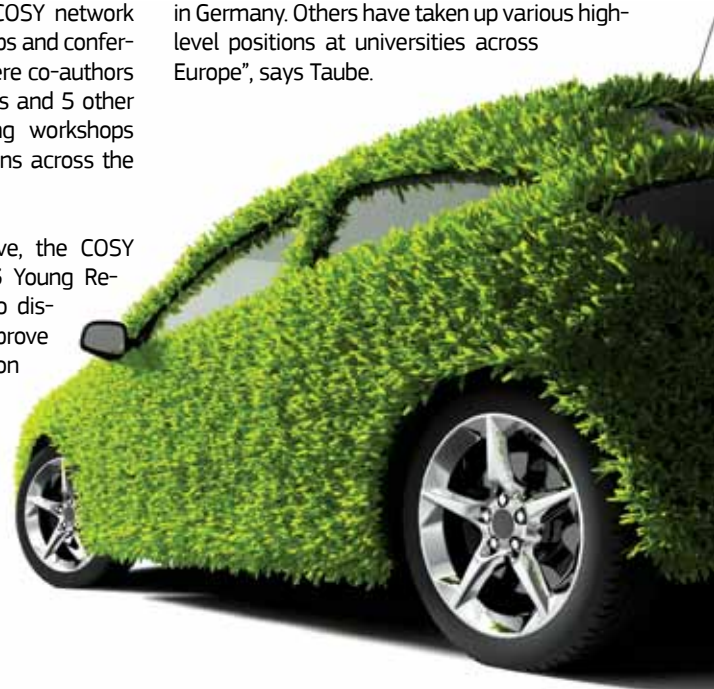
In total, COSY trained 13 early stage researchers (ESRs) and 5 experienced researchers (ERs). Real progress in the field of hydrogen storage in Reactive Hydride Composites was achieved by breaking the traditional academic mould. The programme educated a new breed of experts who worked across a myriad of disciplines. "This was achieved by an unprecedented inter-disciplinary training programme comprising ex-perimental physicists, chemists and materials scientists, surface chemists and computational materials science experts", says Dr Taube.

In addition, the network not only opened up possibilities for researchers in the EU member and associated states, but also for those from member states and non-European countries such as Brazil, Japan and Nigeria, adding a truly international dimension to proceedings.

The young researchers of the COSY network participated in some 83 workshops and conferences. They also presented or were co-authors at 23 conferences, 55 workshops and 5 other meetings. Meanwhile, 7 training workshops took place in various key locations across the network.

Showing signs of great initiative, the COSY fellows themselves organised 3 Young Researchers Workshops in order to discuss their scientific work, improve their presentation and discussion techniques, and add to their know-ledge of energy-related topics. Finally, 14 joint publications of the COSY partners were published during the project, with 28 appearing in top tier journals.

The Marie Curie experience has benefited the vast majority of those involved. "Several fellows have gone on to hold various postdoc positions in respected institutions such as the Helmholtz Zentrum Geesthacht Centre for Materials and Coastal Research and the Leibniz Institute for Solid State and Materials Research in Germany. Others have taken up various high-level positions at universities across Europe", says Taube.



ECESVP Summer School

Summer School increases the mobility of veterinary researchers

Participants

The Netherlands *(Coordinator)*

http://cordis.europa.eu/projects/ (search for REF=73023)							
FP6	*Proj. N°*	*13162*	***EU contribution:***	*€ 402 500*	*Duration:*	*from:*	*Dez. 2004*
						to:	*Nov. 2008*

Veterinary pathologists contribute vital expertise to a wide range of fields, particularly food safety, the monitoring of animal health and welfare, the diagnosis of new, emerging diseases, animal models for human diseases and the development of new drugs.

Veterinary pathology has a long tradition in Europe, but in the past each country established its own training and postgraduate qualifications. In order to harmonise the profession, the European Society of Veterinary Pathologists initiated the European College of Veterinary Pathologists (ECVP) in 1995, explains Anja Kipar, a Professor of Veterinary Pathology at the University of Liverpool in the United Kingdom and currently the ECVP Secretary.

In 1999, the ECVP, now one of the 23 veterinary specialist colleges recognised by the European Board of Veterinary Specialisation (EBVS), introduced an examination for a European qualification in veterinary pathology (ECVP diploma). However, to avoid only a few centres in Europe providing adequate training and to encourage training towards the ECVP diploma in universities throughout Europe, the ECVP initiated an annual Summer School in 2003.

"At that stage, the funding opportunity from the Marie Curie programme of the European Commission came up. This was perfect for us, because it allowed us to invite people from the whole field across Europe to attend". Kipar became the coordinator of the ECVP/ESVP Summer School in Veterinary Pathology, which was set up jointly with the European Society of Veterinary Pathology (ESVP).

A four-year cycle of 11-day annual events was organised from 2005 to 2008 with more than 90 participants each year, and was supported by a Marie Curie Actions grant of €402.000. "This was really an impetus for us, and the professional community strongly supported the initiative", says Kipar. A total of 293 participants have now gained a ECVP diploma. This achievement would not have been possible without financial support from the Marie Curie programme.

The same is true for another aim of the ECVP, which is to support pathologists from countries without an appropriate training environment (in particular in new and candidate member states) in their ambition to gain European accreditation.

Kipar explains: "To support these colleagues, the ECVP has recently set up its 'Ambassadorship Initiative'. Our current ambassador is an Assistant Professor from Bucharest who was able to attend his first, grant-supported Summer School in 2006. There he was introduced to senior pathologists in ECVP recognised training centres where he subsequently spent training periods and is now supported by the ECVP to undertake a 12-month intensive training in preparation for the ECVP examination and thereby achieve his goal of becoming an ECVP diplomat and setting up the first internationally recognised training centre in Romania."

"The diplomas of the ECVP are globally recognised accreditations, and the Summer School is a unique worldwide training opportunity for veterinarians who aim to achieve such a qualification. As a consequence, the School attracts colleagues from many different backgrounds from both European and non-European countries", says Kipar.

"The summer school is now supported by the ECVP, the ESVP and the participating institutes funding their own students, but has retained its momentum and format", says Kipar. Every year more than 80 students take part. Training modules cover all relevant areas and are comprised of state-of-the-art lectures, complemented by hands-on practical training. Biannual simulation exams help students prepare for the ECVP examination. Students can take the ECVP exam after a 3-year period of dedicated training and revision in their home institutions. "This is the door that opens access to the international job market and to working in research", says Kipar.

Not only do the exams improve the mobility of veterinarians, but the Summer School provides an opportunity for them to join with colleagues and create international research networks. "There is a shortage of veterinary pathologists in the world, and I hope that our summer school can help alleviate this problem", says Kipar.

EdRox

An international research network with a focus on bio-nanotechnology

Participants

The Netherlands *(Coordinator),Italy, United Kingdom, Israel, Portugal*

http://www.edrox.eu/							
FP6	Proj. N°	35649	**EU contribution:**	€ 2 220 000	Duration:	from:	Nov. 2006
						to:	Nov. 2010

Redox reactions involve the transfer of electrons between the living cell and the inanimate world. Monitoring these reactions is both scientifically and commercially important. It would lead to detecting trace amounts of pollutants and catching diseases at an early stage. This would in turn have a positive impact on both the environment and indeed our health.

Starting on 1st October 2006, EdRox was a four year, €2 million Marie Curie Actions research training network that provided advanced and in-depth training in bio-nanotechnology to early stage researchers (ESRs) and experienced researchers (ERs).

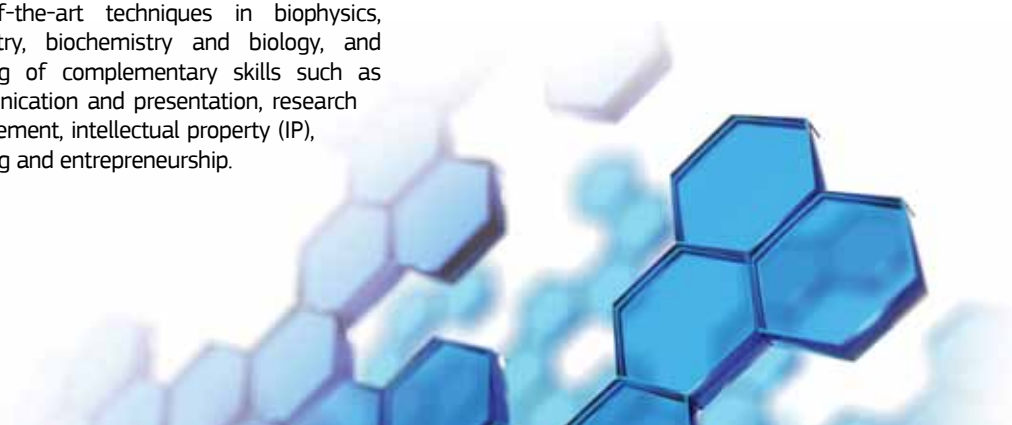
The research programme focused on the implementation of a novel concept known as "Fluorox" that monitors redox reactions by using fluorescence detection. Detection levels are as a result, a lot more sensitive than those provided by conventional electrochemical methods. Enzymes are studied at the single molecule level which is key to understanding them even better.

"This method is a lot more sensitive than for example, a glucose sensor that monitors diabetes", says EdRox project coordinator and Professor of Biophysics at Leiden University, Thijs J. Aartsma. "By using the Fluorox method to monitor the fish, we could see the increase of histamine levels which are indicative of the degree of spoiling. In other studies we were also able to accurately measure oxygen and cholesterol concentrations, which if you think about it, has huge potential for various applications".

EdRox takes pride in its training and research programme which included instruction in state-of-the-art techniques in biophysics, chemistry, biochemistry and biology, and teaching of complementary skills such as communication and presentation, research management, intellectual property (IP), teaching and entrepreneurship.

In addition, the programme is unprecedented in that it guarantees that all 8 researchers will gain a fully funded Ph.D. "Most Ph.Ds are only funded for three years. This was however not the case in the EdRox programme - each participating university paid for the extra year", says the Professor.

EdRox was led by the University of Leiden in the Netherlands with other key partners in Israel, Italy, Portugal and the United Kingdom. Educational programmes and goals, including personal career development plans, were individually tailored for each ESR and ER fellow in the network and each received training in at least two laboratories.



The Marie Curie grants were vital for EdRox as they attracted talented young researchers to the programme and encouraged an impressive degree of mobility.

Asked about what the researchers are doing now, Aartsma explains that one ER has moved on to a postdoctoral position in Japan, while another has a permanent research appointment at the CEA research centre in Saclay, France. Meanwhile, four ESRs are completing their PhD theses and at least two have moved on to a postdoctoral position in academia or to a research position in industry.

Various network meetings and workshops were organised over the duration of EdRox, offering excellent networking opportunities with other bright minds from across Europe and beyond.

"These meetings of the minds were important as they will no doubt lead to future collaborations between the top world's physicists, biochemists and biologists that may well shape the future, especially when it comes to discovering more about the enzymes that are life's machinery", concludes Aartsma.

ELSA

How researchers prepared for the Gaia space mission's scientific harvest

Participants

Sweden *(Coordinator), Greece, Spain, Belgium, United Kingdom, The Netherlands, Switzerland, Germany, Finland, Italy, Slovenia, France*

http://www.astro.lu.se/ELSA/							
FP6	*Proj. N°*	*33481*	***EU contribution:***	*€ 2 790 000*	*Duration:*	*from:*	*Oct. 2006*
						to:	*Sept. 2010*

August 2013 will see the launch of Gaia, a five-year space mission packed with scientific ambition that is quite literally astronomical. The European Space Agency (ESA) aims to chart about one billion stars, or roughly 1% of the Milky Way. It is expected to discover thousands of new celestial objects, from extra-solar planets to failed stars called brown dwarfs. It is an extraordinary endeavour, taking astrometry to a new level of complexity and precision, but it will mean little if Europe's science community cannot handle the volume of data that Gaia space mission is expected to send back to Earth. And this is where ELSA comes in.

ELSA, or the European Leadership in Space Astrometry project, has trained young researchers for the challenge of processing the data and eventually creating a comprehensive sky catalogue. The four-year project was funded by the European Commission's Marie Curie Actions supporting the mobility of researchers. Launched in October 2006 with a €2.79 million EU grant, ELSA involved partnerships with universities and institutes from across Europe to help 15 PhD and post-doctorate students collaborate on the astrophysical, instrument modelling, algorithmic, numerical and software engineering aspects of the mission.

"ELSA has helped prepare for the creation of the Gaia catalogue", says project coordinator Lennart Lindegren, from Sweden's Lund Observatory. "It has also provided invaluable training for the next generation of researchers in this unique European specialty".

Gaia's scientific mission is not just about mapping the galaxy but also about testing theories of star formation and evolution, and conducting stringent new tests of Albert Einstein's general relativity theory. Lindgren says the complex data analysis needed requires a mix of specialist skills in space astrometry, software engineering, numerical methods and instrument modelling. "ELSA offered training in a combination that is rarely found at a single institute and never in current PhD programmes", he says.

The projects undertaken by the ELSA fellows included development of improved models of stars, their spectra and spatial distributions, and methods to solve the complex mathematical equations required to determine their positions.

Gaia will map the stars from the L2 Lagrange Point, 1.5 million kilometres from Earth, where it will be fully exposed to charged particles from the Sun. One key contribution from ELSA was to model this particle radiation on Gaia's optical detectors, the Charged Coupled Devices (CCD) cameras, and minimize its impact on the measurements.

ELSA also helped strengthen the collaboration between the various participating teams in Gaia, which in turn improved the quality of their research. "The research was of outstanding quality and some of it could probably not have been done without the infrastructure provided by the ELSA network in the form of generous travel grants, workshops, secondments and informal personal contacts", Lindegren says.

As for the young researchers that took part, Lindegren says they relished the chance to be part of the wider Gaia community. "They have made invaluable contacts for their future careers and, on a more personal level, developed a great sense of solidarity and friendship". And he points out that when ELSA project ended in 2010, some of its researchers transferred to a related initiative, the Gaia Research for European Astronomy Training (GREAT) project.

ESoA

The European Antenna School: bridging a technology gap

Participants

Italy *(Coordinator), Denmark, Sweden, Spain, Czech Republic, France, Germany, Croatia, United Kingdom, The Netherlands, Switzerland, Finland*

http://www.esoa-web.org/index.html							
FP6	Proj. N°	46042	**EU contribution:**	€ 251 600	Duration:	from:	Jan. 2007
						to:	Dez. 2009

Over the last few decades the use of wireless devices such as cell phones, car keys, and GPS systems has increased enormously. All these devices transmit and receive data at high speed through antennas. "Antennas are where the bottle neck is in all these communication technologies, and with a better antenna you can transmit more data", says Stefano Maci of the Department of Information Engineering at the University of Siena in Italy. This is why students at technical universities and engineering departments of universities need courses in the theory and application of antennas.

But because of their highly specialised nature, the courses were not cost effective. "At each university there were few PhD students interested in or who have the background to follow an advanced antenna course. Also, software technology in the engineering field squeezed out other areas, and this got us into trouble," explains Maci.

The solution was to simply create a geographically-distributed post-graduate school on antennas and their applications, says Maci. "We found that it´s better to prepare our PhD students by bringing the best teachers together at the best facilities in Europe and attracting students from all over the world".

This idea resulted in the creation of the European School of Antennas (ESoA) in 2004. The school was part of the "Antenna Centre of Excellence" initiative of the 6th Framework Research Programme of the European Union. It was an immediate success: 11 courses in the first year attracted 244 participants.

At the beginning this initiative proved costly because of the travel involved, and there were fears that the project would not survive beyond the funding period by the EU, recalls Maci, who is the coordinator of ESoA. "Actually, things turned out very differently", he says. "Flights are now very cheap, and researchers like to teach at an international level, and they are financially supported by their own institutes".

The school was funded by the EU in the form of study grants awarded to the participating students. From 2007 to 2009 the school received supplemental support from the Marie Curie Actions, with 140 students receiving grants over that period. Also, for the supporting institutes, now numbering 33, this arrangement is interesting because they can send their students to the ESoA and don't have the expense of setting up a course themselves. Currently, the school is supported by registration fees and grants from research networks that are part of the current 7th Framework Research Programme and of the European Science Foundation.

The school now offers 32 different courses taught by 150 professors. Courses range from the theory of electromagnetism, computational models, and wave propagation to all antenna topologies and practical applications in wireless systems, including the recently emerging metamaterials and terahertz technology. The courses are for graduate students, but researchers from industry who already have a PhD are also attracted. The courses include lectures, practical work and exercises, and round-table discussions of important papers pertaining to a specific course. Students come mainly, but not only, from the participating institutions. "30 percent of our students are from non- European countries, from China and the United States, for example", says Maci.

The benefits for the students are important. The accreditation, obtained after an exam at the end of the 5-day course gives the students more mobility, opening doors to research positions at universities and jobs in industry. Maci reports that he is asked by various companies in the industry for lists of participants on specific courses. "They catch the best talent, and make offers to the students" says Maci. But industry is not only interested in hiring staff, they are also interested in the courses themselves. In some of the courses dealing with antenna applications, 25 percent of the participants are working engineers, reports Maci. Maci expects that with time the school will be an economic asset for the European communications industry, promoting innovation. "In perhaps ten years we will see a great improvement in research and technology in this industry".

EURECON

Ground-breaking research redefines economic analysis

Participants

United Kingdom (Coordinator)

http://cordis.europa.eu/projects/ (search for REF=80943)							
FP6	Proj. N°	514913	**EU contribution:**	€ 178 000	Duration:	from:	Sept. 2004
						to:	Apr. 2007

What economic and non-economic factors determine an individual's well-being? And how can these be applied when assessing the convergence of Europe's regions in terms of performance? These were the key questions addressed by Professor Luisa Corrado under the EURECON project - "Regional convergence clusters across Europe: methodological issues and empirical evidence".

The project undertaken from 2005 to 2007 at the University of Cambridge and supported by the Marie Curie Actions looked at the economic and non-economic determinants of well-being across Europe and asked what level - individual, regional or national - matters most for individual well-being and whether the key underlying drivers differ within and between these different levels.

The results revealed a more varied set of drivers underlying individual well-being across regions in Europe than previously assumed. For certain non-economic variables, regional factors have a very significant effect of an individual's position.

"The topic of my research is currently quite central to the European Policy debate", Professor Corrado explains. "The analysis of 'subjective well-being' continues to gather momentum as governments have shown an increasing interest in moving beyond just economic indicators to gauge national performance."

"More importantly my research did find disparities both in income and subjective well-being both across nations and across regions in Europe. If economic cohesion is to be achieved across European regions then just targeting economic variables is not enough. Paying greater attention to subjective well-being at the regional level could have significant implications for social intervention and even for economic policy", she suggests.

For the research achievements of the EURECON project Professor Corrado was awarded the Marie-Curie Excellence Award in 2008 and she was commended by the jury as "an outstanding young researcher who is working in a field of great interest to the public, a model candidate for the Marie Curie Award".

The results of the EURECON project, particularly the research on the determinants on individual well-being, received widespread media coverage worldwide provoking a lively debate in professional circles.

With articles published in leading academic journals such as The Economic Journal, Journal of Regional Science, the Journal of Economic Geography, Regional Studies and many more, the project results have received great visibility in the research community. "Without the Marie Curie Fellowship I would have never been able to achieve such remarkable results – both in terms of visibility and of quality of the research output", Professor Corrado says. "The fellowship gave me for the first time total autonomy and the opportunity to achieve leadership in my research area".

The success of the project and the mobility afforded under Marie Curie Actions helped secure her current position as Associate Professor at the University of Rome Tor Vergata, Faculty of Economics (Department DEDI). The EURECON project has also given her the opportunity to establish long terms collaborations with several research centres in Cambridge. She has been appointed Research Associate at the Centre for International Macroeconomics and Finance (CIMF), the Centre for Microeconomics (CReMic), and associate of Cambridge Finance (CF), an interdisciplinary research centre at the University of Cambridge.

Her ground-breaking work continues with particular focus on more fundamental research questions regarding cross-country and interpersonal comparability in subjective well-being and developing a statistical framework for such research which can feed into public policy responses.

HEEAL

Team of researchers deepen our understanding of eco-logical development in Africa

Participants

United Kingdom (Coordinator)

http://www.heeal.eu/							
FP6	Proj. N°	42704	**EU contribution:**	€ 1 753 500	Duration:	from:	Apr. 2004
						to:	May 2011

For Dr Paul Lane of the University of York in the UK, the co-ordinator of the four-year HEEAL (Historical Ecology of East African Landscapes) project, the significance of Marie Curie Actions which made the project possible was immense.

"It allowed me, for the first time, to run my own research group", he says, "with post-doctoral and early-stage researchers working under my direct management with a focused set of research questions". It also led to a number of subsequent opportunities and collaborations for both Dr Lane and the individual members of the team, as well as providing important knowledge to support future sustainable development in Africa.

The primary objective of HEEAL was to understand the factors which have shaped the landscapes and ecologies of East Africa over the last 500 years. It is widely believed, explains Dr Lane, that many of today's environmental crises facing East Africa have their roots in the 19th century and late pre-colonial period, when the region was opened up by large-scale trading, including the trades in ivory and slaves. "But there are a number of gaps in our understanding", says Dr Lane – in particular because East Africa is a region where written historical records only go back a maximum of 150 years, whereas ecological cycles of growth-decline-recovery can take up to 400 years to complete. The purpose of HEEAL was to fill these gaps by "putting an archaeological eye" on the issue.

Supported by a Marie Curie Excellence Grant, essential to attract talented young researchers and support their mobility, Dr Lane assembled a team at York consisting of two post-doctoral researchers and three early-stage researchers, to implement a highly innovative programme of archaeological research in selected areas of Tanzania and Kenya. Drawing on techniques of bioarchaeology, archaeozoology and palaeoecology, the team was able to investigate phenomena such as soil erosion, agricultural intensification and ivory extraction, and detect their historical patterns over hundreds of years.

The results challenged many of the prevailing assumptions about the ecological development of the region. As Dr Lane emphasises, this understanding is of great significance for modern policy measures to improve land use and sustainability. If the original causes of degradation are misunderstood, the interventions that are chosen – and the money to finance them – may be wasted, or even harmful. For example, far from starting in the 19th century as previously assumed, the project showed that agricultural intensification and soil erosion showed clear signs of having been in existence for up to 2,000 years, while there was also evidence that the trade caravans had not placed the strain on natural resources that many had thought.

As the world's largest donor of development aid to Africa, it is crucial for Europe to improve its understanding of these issues – an idea emphasised in the European Union's Strategy for Africa.

As a result of the project, the 6 HEEAL researchers gave a total of 48 presentations around the world. In addition, 8 papers directly related to the project were published in leading journals, an edited book on the project is in preparation and 9 more papers are in the pipeline. Approximately 12 more papers, while not directly related, were assisted by the project. HEEAL also contributed to the better dissemination of knowledge between Europe and Africa by establishing links with related projects such as KITE (the York Institute for Tropical Ecosystem Dynamics) and the PLATINA (People, Land and Time in Africa) group in Stockholm.

Following on from the HEEAL project, one of the early-stage researchers has since taken up a teaching post at Dar-es-Salaam University, as Tanzania's first-ever Archaeozoologist. Another has moved on to take up a Lectureship in Anthropology at Goldsmith's College, London, and the remaining team members are developing their own research projects. For himself, Paul Lane says, HEEAL has led to a number of new opportunities. These include collaboration on a University of Pretoria landscape historical ecology project around the area of Great Zimbabwe and its precursor, Mapungubwe, as well as being invited to participate in the EUROTAST Marie Curie Initial Training Network focusing on the legacies of the Transatlantic slave trade.

In the case of HEEAL, it is clear, the Marie Curie grant paved the way not only for an improved understanding of the ecology and landscape of East Africa, but also the development of several individual academic careers.

I-Sense

New hazard-detection technology promotes research careers and enterprises

Participants

The Netherlands *(Coordinator), United Kingdom*

http://cordis.europa.eu/projects/ (search for REF=85138)							
FP6	*Proj. N°*	*42835*	***EU contribution:***	*€ 584 600*	*Duration:*	*from:*	*Oct. 2006*
						to:	*Sept. 2009*

In today's world, there has never been a greater need for quick and accurate ways to detect explosives, toxic chemicals, illegal drugs and other potential hazards to public safety and health. Contributing to this effort is a European Union-funded project that has united a Russian-born physicist working at a Dutch university with a private company in the UK.

The I-Sense project has not only achieved major breakthroughs in two types of detection methods, but it has also led directly to the formation of two new companies, trained post-doctorate fellows, and won a tender to develop detection equipment for rescue workers in the Netherlands.

One of the driving forces behind I-Sense is physicist Yuri Udalov, a two-time recipient of funding from the EU's Marie Curie Actions programme for the mobility of researchers. A PhD recipient from Moscow's prestigious Lebedev Physics Institute, which has produced nine Nobel Prize winners, Udalov moved to the Netherlands as part of an exchange programme in 1990. He has lived there ever since.

While working at the Netherlands Centre for Laser Research in 2000, he received Marie Curie funding to support two research fellows. Five years later, Udalov was working as a researcher at the University of Twente in the field of high-power pulsed electron beams when another opportunity arose. "I was looking for funding for another project – in the field of de-mining and unexploded ordnance, and the inspection of luggage", Udalov said. "I knew some people in the UK, so we designed an industry-academia project and applied for Marie Curie support".

The project became known as I-Sense, and in April 2006 it was approved for €585,000 in Marie Curie funding for the period 2006-2009, Udalov said. The funding supported research in two directions, Udalov said – an advanced, high-power X-ray imaging technology known as "backscatter", which can detect subsurface objects such as landmines; and "ion mobility spectrometry", or IMS, which can find traces of explosives, chemical weapons and illicit drugs.

Among the project's breakthroughs, the X-ray backscatter equipment produces high-intensity beams and is much safer than existing devices, and the IMS features high air throughput, high resolution and very high sensitivity. "We have made tremendous improvements", Udalov said.

"The progress made by I-Sense has a multitude of benefits for public safety and security", Udalov said. Firefighters will be able to use mobile devices to detect potential hazards before they enter buildings. Police can drive through cities and search for "meth labs" and marijuana operations. Chemical weapons can be detected earlier than it was the case with other systems. And X-ray equipment will be more compact, meaning that large trucks will no longer be needed to carry them into the field.

The project also stimulated substantial knowledge transfer. Udalov spent time at the UK company Ex-Beams Ltd. to learn about IMS technology, and British researchers went to the Netherlands to study X-ray techniques.

The commercial success of the Marie Curie-funded initiative is impressive. The British team members founded Ex-Beams, which is involved in the detection of landmines and explosives. And a Dutch company known as Steray has been founded to bring the IMS technology to market. Both companies are negotiating with private investors and are in the process of adding new staff members, Udalov said.

"In this sense, the Marie Curie programme has been extremely valuable", Udalov said. "These technologies could be used anywhere in the world, but we prefer to start the commercialisation in the European community. The project was supported by European taxpayers, and we want to pay something back to them".

MicroGen

How European researchers are building biofuels with bacteria

Participants

Ireland *(Coordinator), Germany, Portugal, The Netherlands*

http://www.nuigalway.ie/microbiology/microgen.html

FP6	Proj. N°	42802	**EU contribution:**	€ 996 000	Duration:	from:	Dez. 2006
						to:	Nov. 2010

Most people associate bacteria with disease and contamination, leaving the microorganisms with few saving graces. Yet their reputation could be about to change over the next few years: researchers are engineering bacteria to provide alternative energy sources to replace fossil fuels. And if they succeed, it will be thanks to projects like MicroGen, a European Union research project looking at new ways to generate renewable fuels from microorganisms.

The four-year MicroGen project, which began in December 2006, was one of the EU's Marie Curie Actions, a programme supporting the mobility of European researchers. The aim was to build research capacity around the National University of Ireland (NUI) in Galway to explore the potential for microorganisms to generate energy from organic sources like wastewater. "We felt that novel microbiological approaches could be combined to create energy efficient and sustainable wastewater treatment and bioenergy systems", says MicroGen's project coordinator Vincent O'Flaherty, Head of Microbiology at NUI Galway.

Backed by a €1 million EU grant, NUI Galway worked with the Max Planck Institute for Marine Microbiology in Germany, the University of Minho in Portugal and Wageningen University in the Netherlands to provide advanced training to seven PhD-level researchers while investigating the fuel-making abilities of bacteria.

Engineered bacteria offer the prospect of alternative energy sources to replace fossil fuels and clean up pollution and toxic chemicals. This is a research area that has generated keen interest from the European food and water sectors, looking at ways to both cut their carbon emissions and meet environmental standards. "Anaerobic digestion systems could greatly reduce the costs of wastewater treatment", says O'Flaherty. "It could also benefit Europeans more generally by providing more secure and sustainable energy sources and by improving water quality".

MicroGen achieved some key breakthroughs, including the development of novel low-temperature anaerobic digestion technology from wastewater.

The researchers also showed that both biogas and electricity could be produced from biomass sources like ryegrass by combining anaerobic digestion and microbial fuel cells. This has opened up new potential routes for sustainable bioenergy production.

The research has already attracted the attention of the European Commission and the Environmental Protection Agency in Ireland, given its potential to support environmental and industrial development policy goals. "Arising from the project, we are now very interested in looking at different feedstocks and also the potential to produce valuable products, in addition to energy, from wastes and other organic residues, using mixed culture microbial biotechnology in a biorefinery setting", says O'Flaherty.

But the most important outcome of the project, O'Flaherty says, was that it contributed to the training of excellent researchers and laid the foundations for continued success.

"The project generated new links and collaborations", he says. That included work the researchers went on to, with two securing prestigious faculty positions where they set up their own independent research groups: Changsoo Lee at the Ulsan National Institute of Science and Technology (UNIST) in South Korea, and Krishna Katuri at King Abdullah University of Science and Technology (KAUST) in Saudi Arabia. Another, Denise Cysneiros, is now a senior research in Ireland's Technology Centre for Biorefining and Bioenergy (TCBB), an important industry-led initiative aimed at developing the indigenous bioenergy sector.

"MicroGen enabled us to create a strong and experienced team", O'Flaherty says. "We were able to build momentum and to make progress much more quickly that would otherwise have been possible. In turn, the researchers who came to Ireland brought skills and knowledge that NUI Galway lacked".

MOGLAD

European-Russian scientific collaboration to support environmental safeguards

Participants

United Kingdom *(Coordinator)*

http://cordis.europa.eu/projects/ (search for REF=83589)							
FP6	Proj. N°	40999	**EU contribution:**	€ 114 100	Duration:	from:	Sept. 2007
						to:	Sept. 2008

Marie Curie Actions were a key step in attracting a talented Russian physicist to Europe and stimulating an important strand of co-operation between European and Russian scientists and research institutes whose work could play an important role in advancing environmental monitoring and safety capabilities for the direct benefit of society.

When she applied for a Marie Curie Fellowship, an award specifically designed to support the mobility of gifted young researchers, Elena Romanova was a young professor at Saratov State University in Russia specialising in photonics. The work carried out by Professor Romanova had the potential ultimately to be used in the fabrication of portable spectroscopic sensors, or networks of sensors, to detect and measure contaminants and dangerous substances in air and water.

For this practical result to be achieved, Professor Romanova recognised that the next step in her professional development was to complement the purely theoretical, modelling aspect of her specialism so far with a detailed understanding of non-linear optical materials and novel technologies for processing those materials. In her own words: "I decided it would be interesting to create a bridge with real life".

With the support of her Marie Curie Fellowship, Professor Romanova was able to start that process by undertaking a year of research at Nottingham University in the UK. Hosted by the university's Interdisciplinary Centre for Photonics and Electronics – and able, at the same time, to work closely with the Novel Photonic Glasses Research Group, located at the same university – Professor Romanova started to research the processing of optical materials, under the project title: "Femtosecond modification in glasses with application to novel laser designs".

To complete the "bridge with real life", Professor Romanova still needed to gain input from the field of high powered lasers. For this reason, her year at Nottingham University was followed by a 6-month period hosted by the Nonlinear Dynamics and Optics Division of the Institute of Applied Physics at the Russian Academy of Sciences in Nizhny Novgorod – an acknowledged world leader in high powered lasers.

Now back at her home university, Saratov State University, Professor Romanova is in no doubt about the lasting benefits of her Marie Curie Fellowship – during which she participated in 10 international conferences and had 8 papers published. "I have gained understanding of how to apply my theoretical models in photonics to create optical devices by using novel optical glasses and new fabrication methods", she explains.

Another important outcome of the Fellowship, Professor Romanova says, was the establishment of links not only between the three institutes with which she herself was directly associated – Saratov State University, the University of Nottingham, and the Russian Academy of Sciences, but between these and a further seven research institutes in Europe and Russia. These links, she says, create a high-level interdisciplinary network of scientists with the potential to apply for European Union 7th Framework Programme (FP7) contracts.

Already, the group has received a grant from the Royal Society for a project to develop mid-infrared transmitting devices for medicine, and it has submitted further applications to both the Royal Society and the Russian Foundation for Basic Research. There are also plans to submit a project to the NATO "Science of Peace and Security" programme, and the goup is involved in a project to provide ecological monitoring and control on motorway bridges across the Volga River in Russia.

Not least, says Professor Romanova, the Marie Curie Fellowship has played a key role in transforming her own approach to research - from a curiosity-driven one to a socially driven one.

"Our main goal now is to create a network of sensors or portable sensors for the control of the environment by spectroscopy of gases in the atmosphere", she says. "Such devices are in great demand everywhere – in industry, in cities and in the natural environment".

MyEuropia

The visionary tools helping myopia researchers see further

Participants

Germany *(Coordinator), Spain, United Kingdom, France*

http://cordis.europa.eu/projects/ (search for REF=82408)							
FP6	Proj. N°	34021	**EU contribution:**	€ 3 174 000	Duration:	from:	Oct. 2006
						to:	Sept. 2010

Professor Frank Schaeffel has spent a quarter of a century studying myopia, the phenomenon of how the eye often grows too long and becomes short-sighted. Schaeffel, who is the Head of the Section of Neurobiology of the Eye at the Institute for Ophthalmic Research in Tübingen, Germany, has scored some crucial breakthroughs, yet for much of his career he has felt like a lone explorer in myopia research.

"While the other parts of the world have forged ahead in studying myopia, Europe has been vacant", he says. "Research on myopia exploded in the 1980s, with many new labs starting in the United States, Australia and Asia", he says. "However, we had just only one lab in Germany and one in the UK working on this topic".

In 2005, he decided to turn the situation around by putting together a European consortium to bundle myopia research. With the help of like-minded academics, he applied for a grant from the Marie Curie Research Training Network (RTN) and created MyEuropia. The project was granted €3.17 million from the European Commission, Marie Curie Actions provided a platform for students studying physics, genetics, computer science, engineering and other fields to receive training in biological techniques and other topics related to ophthalmology.

The network included Germany's University of Tübingen, the Rodenstock GmbH in Munich, Germany, King's College London, Cardiff University in Wales, University of Leipzig in Germany, Spain's University of Murcia, and the French biomedical and public health research institution INSERM. Their research addressed three areas in myopia:

- Optics: designing and testing new spectacle types to reduce myopia progression, together with new optical techniques to obtain continuous scans of the refraction across the visual field;
- Genetics: large-scale human screening studies to map the genome-carrying genes linked to myopia;
- Biochemical signals: the growth signals released from the retina and how they reach the back of the eye.

Schaeffel says the research and the training of the students has been remarkably successful. It is not merely that seven doctoral students were trained and finished their degree, but that some 44 peer-reviewed original research articles were published in high-ranking journals, with more to come.

There were many scientific breakthroughs including the selectively breeding of chickens to become either very myopic or almost not myopic in just two generations, showing how short-sightedness is determined by many genes. MyEuropia's industrial partner, Munich-based

Rodenstock, was able to develop new spectacle designs to cope with the optical problems of myopia, and to inhibit further myopia development. And the 13th International Myopia Conference was held in Tübingen in July 2010, an event that Schaeffel says meant that virtually every myopia researcher around the world now knows about the MyEuropia network.

Schaeffel says the project helped put the future of myopia research in the hands of young scientists at the start of their career. Around the world, the MyEuropia network was repeatedly quoted in myopia literature. Most of the students found post-doctorate positions, although the post-doctorate working at Rodenstock was hired by the European Patent office in Munich. One of the scientists received the respected Attempto Award, worth €7,500, based on his work in MyEuropia. "We have generated some long-ranging and also long-lasting scientific networks of the fellows, now working in different labs and different places but still friends", he says. "And we have developed new technologies that may in part become commercially available in the future".

NUSISCO

How researchers are unlocking the science behind hunger

Participants

***France** (Coordinator), United Kingdom, Germany, The Netherlands*

http://cordis.europa.eu/projects/ (search for REF=81912)							
FP6	*Proj. N°*	*20494*	***EU contribution:***	*€ 1 647 000*	*Duration:*	*from:*	*Jun. 2006*
						to:	*May 2010*

Over the past two decades, obesity levels in Europe have been steadily increasing, tripling between 1990 and 2006, according to World Health Organization (WHO) statistics. But measuring the phenomenon is the easy bit. Understanding it is much harder, and researchers have struggled to explain the physiological effects of appetite on obesity.

However, thanks to a European Union-funded research project, new insights are emerging into the complex relationship between hunger and feeding. The research is expected to help businesses develop foods and diets that are better adapted to body weight control.

The "Nutrient Sensing In Satiety Control and Obesity" (NUSISCO) project offered nine PhD students the chance to research the latest experimental, theoretical and applied science of feeding and appetite with London's Imperial College, Munich's Technical University (TUM), the French food and science institute AgroParisTech and multinational Unilever.

Launched in June 2006, the four-year long NUSISCO received a € 1.65 million grant thanks to the Marie Curie Actions EU's supporting the mobility of researchers. "The project began with the aim to research feeding behaviour", says, Daniel Tomé from AgroParisTech, who was the project coordinator. "There was a need for expert scientists in this area for both industry and academic research. We felt that a synergy between the different partners in a Marie Curie doctoral programme would meet this objective".

Tomé says the research was able to benefit from the complementary expertise that the four partners offered in key research areas like molecules and cells, integrative physiology, human clinical science and food development.

The nine PhDs were all able to use their experience gained during their Marie Curie fellowship as a springboard to their next positions. Six of them are in post-doctoral positions: Wageningen University in the Netherlands, Imperial College London, University of Surrey in the UK, Marseille University, University of Paris, and University of Dublin. Another was appointed assistant professor at the American University in Beirut, while two others were recruited by food giants Nestlé and Danone.

The research itself revealed the importance of the interactions between the different appetite regulation signals in the brain. This is crucial for understanding food and diets, and is an area that is set for further research in the coming years, Tomé says. "The main objective was to get more knowledge on the peripheral signals sent to the brain during meal ingestion and how these signals are treated by the brain to control the food intake", Tomé says.

Among their findings were that neither stress nor artificial sweeteners have an effect on appetite regulation, and that fasting biases brain reward systems towards high-calorie foods.

But the main discovery, Tomé says, came from understanding the different way that the brain processes the eating of different foods. "Despite the complexity of the peripheral signals produced by food intake, specific messages are recorded at the brain level related to digestion and the composition of the meal", he says.

As for the students, Tomé says NUSISCO gave them invaluable insights into the latest research on food, appetite and hunger. The network of collaboration between the different European partners continued after the project formally ended, and was often crucial for the researchers as they moved on to careers in academia and industry. "The training and research helped develop innovative activities between academic research and food industry", he says. "It also created a unique European network of expertise on feeding behaviour and satiety".

PHeLINet

Research project opens new career opportunities for a French physicist

Participants

Germany *(Coordinator), Poland, United Kingdom, Spain, Denmark, The Netherlands, Slovenia, Italy*

http://www.phelinet.eu/index2.php?option=com_content&do_pdf=1&id=119							
FP6	Proj. N°	36002	**EU contribution:**	€ 3 702 750	Duration:	from:	Mar. 2007
						to:	Feb. 2011

The revolutionary medical research project PHeLINet has not only created openings for doctors to better diagnose cancer, asthma, cystic fibrosis and other lung diseases, but it has expanded the professional horizons for budding scientists like Guilhem Collier.

Along a journey that has taken him from his homeland of France to Poland and then on to the UK, Collier says the support he received from the European Union's Marie Curie Actions programme of support for the mobility of researchers, has presented him with opportunities that otherwise may have passed him by.

"This has been one of the best opportunities I could have had – for many reasons", Collier said. "The good thing is that you have a lot of contacts and more ways to collaborate. We learned a lot from many different partners throughout Europe, spending one month a year at different institutions. I was really happy with the programme – everyone was".

Collier was working in the biochip field at the French Alternative Energies and Atomic Energy Commission in Grenoble when he heard about the Marie Curie programme – by accident, he says. "I didn't really know much about it. It turned out to be one of the best fellowships that you can get".

Aided by the fellowship, Collier entered a physics PhD programme at Jagiellonian University in Krakow in 2007. While there for three years, he played a key role in PHeLINet – the Polarised Helium Lung Imaging Network. The project's team worked to design and develop new magnetic resonance imaging (MRI) techniques for diagnosing lung ailments.

Conventional MRI, which uses magnetic fields to produce three-dimensional images of organs, bones and tissues, have long been an effective, non-invasive diagnostic tool for medical professionals. The presence of water in the body, however, is needed in order for an MRI to work. The problem is that lungs do not contain very much water. "That was the challenge – using MRI to examine lungs", Collier says.

The PHeLINet team worked to improve a technique in which the patient breathes in polarised helium, which the MRI scanner can then detect. By improving MRI scans of lungs, diseases could be better understood, detected and treated early – thus saving lives.

Collier's task, supported by the Marie Curie programme, was to speed the production of helium gas and with higher levels of polarisation. He completed his PhD at Jagiellonian University in 2011, and the university continues to use the equipment he used for the PHeLINet project. Collier has since moved on to the UK's University of Sheffield, where he obtained a post-doctorate position to continue his research on the helium MRI technique. Though his background is in physics, Collier's work on PHeLINet has steered him toward the medical field. "I would like to stay in this area", he said.

Collier was one of 18 young researchers – 11 PhD students and seven post-docs – who worked on PHeLINet from 2007 to 2011. The project recorded a variety of significant breakthroughs related to human applications, animal investigations, MRI instrumentation and methodologies, and helium polarisation techniques, said PHeLINet coordinator Yannick Crémillieux, who was at the University of Lyon at the time.

Crémillieux said the project shaped the students into professionals. "In the end, they were trained scientists – independent and autonomous. They held a scientific workshop to present their research. They had to organise the event, find the funding – everything".

PHeLINet's results and findings have been written up in dozens of journal articles, book chapters and conference proceedings – well over 150 in total. The project also contributed to a spin-off company and a pending patent, as well as training sessions and international workshops.

Premaid

The research network devising ways to diagnose powertrains

Participants

France (Coordinator), Italy, Poland, Portugal, Spain

http://cordis.europa.eu/projects/ (search for REF=84898)							
FP6	Proj. N°	29986	**EU contribution:**	€ 773 150	Duration:	from:	Feb. 2006
						to:	Jan. 2009

As the group of components that generates power for a locomotive, the powertrain – which includes the transmission, drive shafts, and differentials – is the motor of the railways. It needs to be watched and maintained carefully to ensure every aspect is safe and in proper working order. But this is a tough task: there are few diagnostic tools available to check the reliability of powertrains, so maintenance is either done after a component fails (with all the associated risks to the service), or through a systematic yet indiscriminate replacement of key parts.

With Europe's rail sector forecast to surge over the coming decade, alternative maintenance methods are needed, says Laurent Nicod, the Traction Marketing and Innovation Manager at Alstom Transport, the world's top supplier of rail products. With this in mind, Nicod sought a grant six years ago from Marie Curie Actions, the European Commission's programme of support for the mobility of researchers.

The aim was to set up a network researching a more predictive system that cuts maintenance costs without jeopardizing safety and service. "We worked to align the ideas of researchers with the ideas of engineers to tackle these problems", he says "In the end, both parties were able to bring new solutions to improve railway competitiveness".

The result was Premaid, a three-year Marie Curie project, which helped 15 experienced researchers come together from different parts of Europe to examine the issue with Alstom Transport. Backed by a €773,144 grant from the European Commission, Premaid gathered academics from Spain's University of Oviedo, Portugal's University of Coimbra, Italy's University of Bologna and Poland's Gdansk University of Technology.

Premaid sought breakthrough innovations in diagnostic tools and maintenance methodologies, looking in particular at materials, fault diagnosis and data transfer systems. Most of the researchers were seconded to Alstom Transport's research centre in Tarbes in the French Pyrenees for periods of between two months and two years.

At the same time, Alstom Transport's own researchers carried out complementary work with the academics. "Using the best European labs helped us work with the most advanced researchers on a very specific technical environment on traction equipments and systems for electric trains", Nicod says.

The results, Nicod says, were impressive and included detailed studies and new insights into transformers, inverters, traction motors and gearboxes.

One key result of the project was the capability to detect transmission problems with numerical analysis through a dedicated software code, a method that means inspectors no longer have to dismount to visually inspect the traction bogie. "This new approach led to early detection of failures, cut costs of maintenance for operators and indirectly reduced the impact on environment as parts are replaced only when they are very close to a failure", Nicod says.

Nicod says Premaid was an exciting adventure, giving Alstom Transport new perspectives on scientific and theoretical approaches to the aging of parts and sub-systems. "A better understanding of the aging of components in their working conditions is the first step towards predictive maintenance", he says.

And for the researchers collaborating on the project, it was an opportunity to discover real industrial problems and challenges. They were able to use the experience as a springboard for their academic and industry careers, with one Portuguese student now a researcher at the Instituto de Telecomunicações in Coimbra, and another, from Gdansk University, hired by Alstom in Tarbes.

"Thanks to this collaboration, we were able to align needs and potential solutions to railway traction systems", he says. "But without the Marie Curie programme, it would not have been possible".

SAFEAST

Network of researchers helps making drivers more aware of road safety

Participants

Turkey *(Coordinator), Sweden, United Kingdom, Finland, Greece*

http://psy.metu.edu.tr/SRU/Safeast.html

FP6	Proj. N° 509813	**EU contribution:** € 685 350	Duration:	from: Oct. 2004 to: Sept. 2008

In Europe over 41,000 people die and 1.6 million are injured in traffic accidents every year. However, there are striking regional differences. In Southern Europe the number of traffic deaths is as much as two to three times higher for the same number of vehicles. The project SAFEAST, Towards Safer Road Traffic in the Eastern Mediterranean Region, was set up to examine the reasons behind these differences in October 2004. Universities from Sweden, the United Kingdom, Finland, and Greece participated in the four-year project.

SAFEAST was a "Transfer of Knowledge Project", which was part of the Marie Curie Actions with funding from the European Commission of approximately €680,000, whose aim was to improve the knowledge and research skills and mobility of Eastern Mediterranean traffic researchers. Experienced researchers were trained in Turkey and Greece and selected researchers from the two countries were sent to leading road safety institutes in the European Union, exposing them to different systems and new ideas. Traffic experts from abroad also came to Turkey and Greece to share their knowledge. The research focused on how Turkish and Greek people behave in traffic, what factors influence their behaviour, and how it could be changed for the better.

As the coordinator of the project, Timo Juhani Lajunen, a psychologist at the Orta Dogu Technical University in Ankara explains, "If you look at Finland, traffic drivers are aware, they are educated in road safety". But in Turkey one is confronted with an additional problem: "We have to make people aware of how they can drive more safely, for example by wearing seatbelts or by having children sit on the back seat".

An important result of the programme supported by Marie Curie Actions was that it created a new research area, traffic psychology, in Turkey and a Masters program at Lajunen's university. "We now have a laboratory, we are working with research groups, and we've acquired expertise", says Lajunen. "Students here are extremely motivated, something I haven't seen in the rest of Europe" continues Lajunen, adding that some Turkish students completed PhDs, something they wouldn't have done otherwise. "They really find this fascinating and see the possibilities for changing things. In northern countries concerns about traffic safety are less urgent and the students don't get very motivated", says Lajunen.

A second aim of the project was to increase awareness of road safety among the general public and road engineers. By organising community projects, involving experts from different fields, including the traffic police, and actually going out onto the streets, researchers were able to raise public awareness and really change behaviour. "For example, with the help of the municipality, we went to different schools in Ankara and did traffic safety interventions, which means we went there with video recorders and monitored the speed of cars and the behaviour of children outside the schools", explains Lajunen. "And afterwards we went back and checked and, indeed, speed had decreased and the way of crossing the road had changed, making these places much safer".

Traffic police and municipalities in Turkey responded positively to the findings of this international research programme, and the field of traffic and transportation psychology received a boost. "We published many papers in the area, and people who took part in our project continued to work in traffic safety when returning to their universities", says Lajunen. Awareness of road safety is what changes drivers' behaviour and SAFEAST has made the first steps, concludes Lajune.

SEMEAI

New career horizons opened up by research on sustainable businesses

Participants

France *(Coordinator)*

http://www.feast.org/projects/247							
FP6	Proj. N°	509911	**EU contribution:**	€ 287 500	Duration:	from:	Jul. 2004
						to:	Jun. 2007

Research fellow Dr Renato J. Orsato published a book entitled "Sustainability Strategies: when does it pay to be green?" as part of a European Union-funded Marie Curie Actions, specifically a research fellowship called Strategic Environmental Management at European and Australian Industries (SEMEAI). His fellowship was part of the Marie Curie programme designed to support mobility and attract talented young researchers to the EU.

The book looks at how companies can incorporate eco-investments into their business strategies and benefit from that, be that in terms of, for example, profits or brand value. Eco-investments are important for society because they are about saving the planet's resources so that future generations can benefit from them. The book raises awareness of the importance of environmentally-friendly business and may even prompt people to buy green products even if they are more expensive than other products.

An example of this is a Brazilian company that uses oil from the nuts of a wide range of endogenous plants to make cosmetics products. It sources the nuts from thousands of small suppliers of forestry products. Because of the social and environmental appeal of the components from the Amazon forest, the company managed to obtain a price premium for its eco-branded products.

The book has been used in many places, including programmes Dr Orsato teaches at Fundação Getúlio Vargas (FGV), Brazil's leading business school, and masters programmes at the International Institute for Industrial Environmental Economics in Sweden. In addition, it was selected as the 2008 most promising (in print) management book by the European Academy of Management (EURAM).

"My book was fundamental to bring balance to the 'pays to be green' debate. By analysing both success and failure cases of sustainability investments from the theories of competitive advantage, the book made a mark in the field. In 2011, it was translated into Chinese, Arabic and Portuguese", says Dr Orsato.

Between 2004 and 2007, Dr Renato J. Orsato completed a Marie Curie research fellowship at the School of Management at the University of Technology Sydney (UTS) and the Centre for the Management of Environmental Resources (CMER) at the INSEAD business school in Fontainebleau, France, ranked as one of the top business schools in the world.

Initially the study was meant to cover only Europe and Australia but the fellowship gave him the chance to gather valuable data from companies in New Zealand and Brazil too. In the end, Dr Orsato collected more than 30 case studies from Australia, New Zealand, Brazil, and Europe as he looked into the following research question: "Why have environmental initiatives developed by European and Australian firms resulted in economic and/or market success or failure?"

"The Marie Curie project gave me the freedom to explore avenues that wouldn't have been possible if I had had the constraints of teaching at the time", says Dr Orsato.

"I've continued to do what I did for the Marie Curie Fellowship. I'm interested in sustainability and questions such as what kinds of business models bypass some of the trade-offs between environmental protection and profits", he adds.

Dr Orsato was hired by INSEAD after the Marie Curie project was concluded and worked there as a senior research fellow in the business school's Social Innovation Centre for three more years.

After that, he took on a professorship at Fundação Getúlio Vargas (FGV), the leading Brazilian business school, where he continues to develop research on the subject of sustainability. How to create wealth, alleviate poverty and reduce the environmental impact of a business activity in the emerging economies is one of his research areas now. This is about bringing people out of poverty by using innovative business models.

SPINSWITCH

15 leading European research groups explore the spin transfer effect

Participants

Germany *(Coordinator), France, United Kingdom, Belgium, Spain, Portugal, Poland, Romania*

http://www-user.rhrk.uni-kl.de/~webhill/spinswitch/index.html							
FP6	Proj. N°	35327	**EU contribution:**	€ 2 831 280	Duration:	from:	Oct. 2006
						to:	Sept. 2010

The phenomenon of the spin transfer effect has received much attention due to its promise for the electronics industry. In the phenomenon, a current can give a jolt to thin magnetic layers sandwiched between non-magnetic materials. This jolt can be used to excite oscillations or even flip the orientation of the magnet.

Devices utilising spin transfer torque are faster, smaller, and require less power to switch. The electronics industry is thus looking for ways to utilise it as they believe it has great potential to enhance their product offering.

Mindful of the technology's potential, the almost €3 million Marie Curie Actions SPINSWITCH Network brought together 15 leading European research groups to explore the scientific foundation and potential of the spin transfer effect on high frequency and ultrafast switching applications. It also trained Early Stage Researchers (ESR) and Experienced Researchers (ER), preparing them for future entry into the scientific work force. The Network was launched on 1 October 2006 and was operational for a period of 48 months.

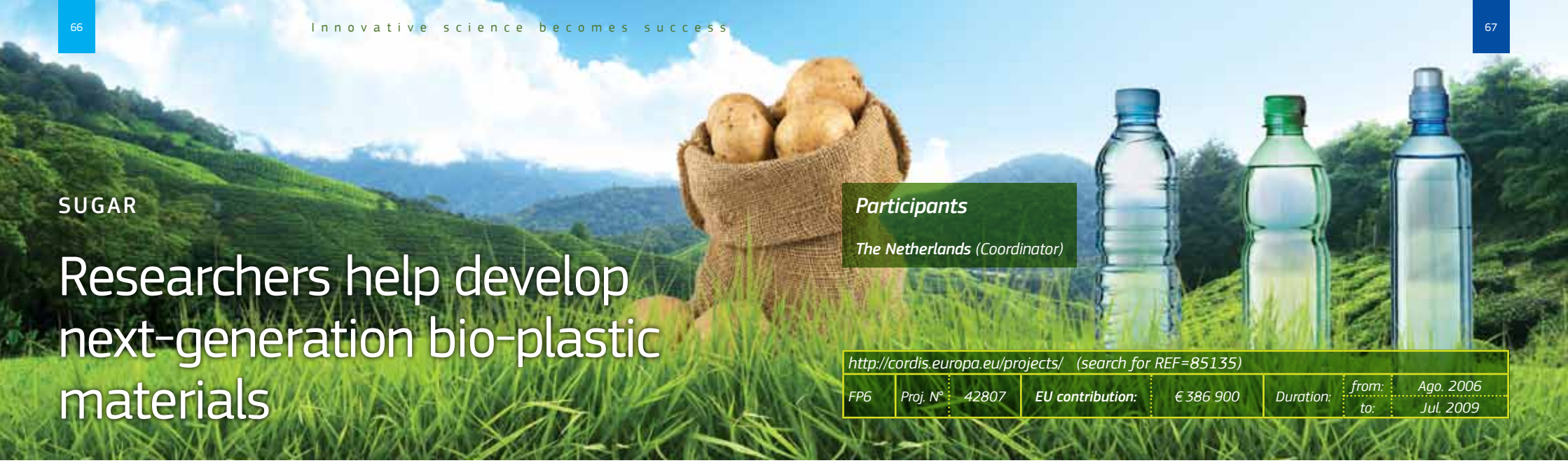
SPINSWITCH provided comprehensive, state-of-the-art scientific and complementary training for 18 young researchers from Germany, France, Italy, Poland, Greece, Portugal, Romania, Belarus, Algeria, China and Mexico. "As well as providing money and support for each researcher, we actively encouraged them to identify their specific training needs which we took on board and implemented", said SPINSWITCH Project Coordinator, Prof. Dr. Burkard Hillebrands.

SPINSWITCH focused on a number of well-defined, specific, scientific tasks concerning advanced technical applications. A strong teamwork approach linked fundamental studies, modelling theory, advanced characterisation and work on model structures for applications. The Network also worked closely with the industrial research laboratories of both Siemens and Thales as well as independent research centres. This cooperation accelerated results and provided industrial guidance.

Research results from the SPINSWITCH Network have appeared in 86 leading scientific publications. The results were also presented at 168 conferences at both national and international level. In addition, two single partner patents were published and another is pending. Finally, Albert Fert, who was awarded the Nobel Prize in Physics in 2007, was actively involved in the network.

Mobility was a big part of SPINSWITCH. The researchers have undertaken 24 secondments and 31 visits to other network partners where they gained valuable experience by learning new techniques. Numerous workshops and a summer school were also organised to develop not only scientific competences but also communication skills, networking and team work. To integrate effectively with their hosts, many researchers even took language courses.

SPINSWITCH finished in September 2010 but its legacy lives on. The vast majority of fellows are now highly trained and have started their careers, with many working in corporations as well as in university and independent research centres. One fellow has even established a start-up company with a SPINSWITCH partner.



SUGAR

Researchers help develop next-generation bio-plastic materials

Participants

The Netherlands *(Coordinator)*

http://cordis.europa.eu/projects/ (search for REF=85135)							
FP6	*Proj. N°*	*42807*	***EU contribution:***	*€ 386 900*	*Duration:*	*from:*	*Ago. 2006*
						to:	*Jul. 2009*

The Dutch company Avantium is leading the way in replacing plastic PET bottles and other oil-based products, with "green" versions made from sugar derivatives – starch, protein and cellulose. Success in making the technology break-through has been partly achieved by the technological expertise brought to the company through the European Commission's Marie Curie Actions mobility support scheme.

Avantium is a spin-off from the petrochemicals giant Royal Dutch Shell and, up until 2005, its main business was focused on contract research for the chemical and pharmaceutical industry. The company decided to broaden its base and move into product and process development to exploit its in-house expertise in the field of advanced catalytic research. The company initiated its own R&D programme focused on biomass conversion. In particular, using sugar and starch based products to replace the petrochemical feedstock generated from oil.

To support its move into this new sector the company was able to bring in three specialist researchers under the Marie Curie scheme to fill the gaps in its knowledge. The company's Chief Technology Officer is Gert-Jan Gruter, former Professor for Polymer Catalysis at Eindhoven University of Technology, who explains: "At that time Avantium lacked the in-depth knowledge of carbohydrate chemistry and bio-based polymers to help it produce bio substitutes for oil-based products in bulk production chains".

"The objective of this Transfer of Knowledge project was to expand the company's knowledge in these areas by recruiting, training and hosting experienced researchers in these fields for a two year period". Laszlo Sipos, a post doctorate researcher, joined the Avantium team as a Marie-Curie fellow in 2006 and succeeded in developing the key elements in the final stage of the process (catalytic polymerisation of FDCA to PEF). This work also resulted in the filing of two patents.

In 2008 Sipos was offered a permanent contract with Avantium as a Scientist (now Senior Scientist) after ending his Marie Curie project. He now leads the technical aspect of the process development efforts for the PEF bottles. A critical aspect of Avantium's R&D was the development of bio-based replacement of the building block of the PET bottle. The introduction of Cesar Munoz de Diego, a post-doctorate researcher, was very successful in developing the required catalytic oxidation process. His pioneering work resulted in two patent applications being filed. Cesar Munoz de Diego subsequently moved back to his native country in 2010 and now continues to work in research and development in Madrid.

A third recruit under the Marie Curie scheme was a software development specialist, Nathan Brown. After supporting the development of informatics at Avantium he moved to Novartis in Switzerland to expand the company's expertise, and now works with the Institute of Cancer Research in London.

The legacy of the three Marie Curie researchers will be the sugar-based fully recyclable PEF bottles that will steadily replace the familiar PET bottles. The beauty of the PEF bottle is not only its bio-based origin but also its superior thermal and mechanical properties.

The patented technology developed by Avantium is known as YXY (pronounced as icksy) – and represents a family of green building blocks for making materials and fuels that can compete on both price and performance with oil based alternatives, but which have a superior environmental footprint

A pilot plant for developing and demonstrating PEF technology with a capacity of 40 tons per year was opened in December 2011. Avantium has entered multi-year collaboration programmes with major brands such as Coca-Cola and Danone to introduce PEF to replace petrochemical based alternatives.

The collaboration programmes which continue the development of PEF and make it ready for mass production and recycling are key to securing a smooth transition into the mass production phase of PEF bottles. Commercial production of PEF is anticipated in about three to four years.

Gert-Jan Gruter commented: "The contribution of Marie Curie supported researchers has been essential in enabling us to undertake the very important initial development of these next generation 'green' bio-plastic materials. We believe that the PEF will become the new world standard for polyester bottles".

VOCAT

Pioneering research shows how living organisms are affecting weather and climate

Participants

Sweden *(Coordinator)*

http://cordis.europa.eu/projects/ (search for REF=79160)							
FP6	Proj. N°	25026	**EU contribution:**	€ 495 850	Duration:	from:	Jan. 2006
						to:	Dez. 2008

A university Chair funded under the European Commission's Marie Curie Actions has pioneered ground-breaking research into the chemical transformation of organic compounds which take place high in the sky - an area where the biological dimension is traditionally ignored.

The research work undertaken at Stockholm University's Department of Meteorology between 2006 and 2008 under the VOCAT project (Versatile Organic Compounds in ATmospheric processes) has demonstrated that organic matter generated at ground level can become airborne and provoke transformations in the atmosphere with a potentially important impact on the weather and also on our climate.

Marie Curie Actions are the European response to the American Fulbright Program, allowing competitively selected scientists to conduct research and teach abroad. While this mobility programme is primarily addressed well-established scientists, Dr Barbara Nozière was among the few to receive the award at the beginning of her career.

She had long suspected that the unique biological footprint made by the organic compounds emitted from the Earth's surface into the atmosphere had much more impact on atmospheric processes and climate than expected and she received support to investigate this under the VOCAT project.

In addition to the Marie Curie Chair, the VOCAT project also received enthusiastic support and nearly € 1 million of funding from national programs in Sweden which, as Dr Nozière says, made a big difference in getting the projects off the ground.

"Through VOCAT we have been able to explore some scientific directions that were unusual and risky at the time, and otherwise difficult to get funded", Dr Nozière explains.

The research revealed new ways in which organic matter can affect climate, such as evidence for the interaction between microbial life and cloud formation. It also led to the discovery of an unexpected new class of reactions in atmospheric aerosols, giving a new picture on how aerosol particles might form and absorb sunlight.

The research also introduced new concepts, such as using the separation of bioorganic molecules (known as chiral separation) which for the first time enables biological molecules to be distinguished from non-biological molecules in atmospheric aerosols. It has also involved the prototyping of the first instrument to observe certain organic radicals, which are essential for the production of ozone and also important in other fields of chemistry, but have never been observed individually before.

Barbara Nozière was an Assistant Professor at the University of Miami and had been working in the United States for eight years when she received the award. "I was planning to continue my career in the US and there is no doubt that my return to Europe is entirely due to VOCAT", she says. The success of VOCAT has now secured for her a fully tenured senior position at CNRS (French National Research Administration). The high visibility of the work undertaken in the project has led to many offers for collaboration and exchanges from leading research groups in the world, in particular the US. "In addition, VOCAT has given me the opportunity to patent some of my findings and consider launching a start-up company".

The new directions opened up by VOCAT in atmospheric chemistry and green science are now being studied by other research groups throughout the world. The findings of the VOCAT project have attracted widespread interest among the scientific community, including biologists, who are now planning multidisciplinary programs on these topics. The project also received a lot of interest from the public, with an article in New Scientist, interviews for scientific radio programs, and many references to it and discussions on the internet.

European Commission

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KI-30-12-608-EN-C

This book profiles some of the Marie Skłodowska-Curie projects financed under the Sixth Framework Programme for Research and Technological Development and Demonstration (FP6). During the training period (2003-2012), funding was provided for almost 14,500 fellows coming from 121 Countries. The 30 projects showcased in this publication demonstrate, what the whole MSCA world - research fellows, project coordinators and participants, organisations, mentors - was able to achieve at the beginning of this century by investing in research and innovation.

The European Union's next framework programme for research and innovation, Horizon 2020, will build on the experience gathered so far, helping Europe's brightest and most creative minds extend the frontiers of knowledge by strengthening activities.

Marie Skłodowska-Curie researchers all have extraordinary stories to tell. We hope the successes illustrated here will inspire others to follow in their footsteps.

http://ec.europa.eu/research/mariecurieactions/

"Stars of European Research" free tablet application available on:

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Project information

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