


## Event


### Hinton Lecture

 *Back to the Big Bang – the Large Hadron Collider*

Speaker: Dr Lyn Evans CBE FRS, Project Leader, Large Hadron Collider

## Lecture

### Prime Innovator lecture series – lecture II

 *Commercialising meaning based computing*

Speaker: Dr Mike Lynch OBE FREng, Founder and Chief Executive Officer of Autonomy

## Event

### Science question time

Speakers: David Willetts MP, Professor Colin Blakemore, Dame Professor Janet Finch, Philip Greenish CBE

## Debate

### Battle of Ideas Festival

Academy sponsored debate: *Engineering the future: cautionary tale or utopia?*

Chair: Claire Fox, Institute of Ideas

## November

## Event

### 2010 New Fellows' Briefing and Dinner

In the presence of the Senior Fellow HRH The Duke of Edinburgh

## Debate

### Competing in the Global Economy – Debate II

Motion: *This House believes that a manufacturing sector accounting for at least 20% of GDP will provide the only basis for a balanced UK economy*

## Lecture

### Prime Innovator lecture series – lecture III

*Changing the economics of Space*

Speaker: Professor Sir Martin Sweeting OBE FREng FRS Executive Chairman, Surrey Satellite Technology Ltd

## Event

### PolicyNet meeting

*The uses of statistics in policy making*  
Speaker: Jil Matheson, National Statistician

## December

## Event

### PolicyNet meeting

*The new knowledge economy – making the best of the research base*

Chaired by Fiona Fox, Director of the Science Media Centre

## January 2011

## Lecture

### New Year Reception

*Re-engineering aid – a bold agenda for the 21st century*

Speaker: Professor Sir Richard Feachem KBE CBE FREng

## Debate

### Competing in the Global Economy – Debate III

Motion: *This House believes that the best innovation happens without government intervention*

## Lecture

### Prime Innovator lecture series – lecture IV

*Encouraging innovative engineering*

Speaker: Tristram Carfrae RDI, Chair Global Building Practice, Arup

## Event

### The Future of Energy Storage Technology and Policy Workshop

The Royal Academy of Engineering/ Chinese Academy of Sciences

## Event

### Visiting Professors workshop

Effective teaching practice


## Lecture

### 2011 International Lecture

*Building confidence for a sustainable and secure low-carbon energy future in the United Kingdom*

Speaker: Anne Lauvergeon, Chief Executive Officer, AREVA

*Transcripts and publications from most of the lectures and seminars mentioned are available at [www.raeng.org.uk](http://www.raeng.org.uk)*

 Video available at [www.raeng.tv](http://www.raeng.tv)

## February

## Lecture

### Prime Innovator lecture series – lecture V

*Semiconductor technology with molecules*

Speaker: Professor Sir Richard Friend FREng FRS, Cavendish Professor of Physics, University of Cambridge

## Lecture


### Pre-history of the Fellowship of Engineering

Speaker: Dr Peter Collins, Director of the Royal Society Centre for History of Science

## March

## Guest Lecture

### Power to the people

 Speaker: Steve Holliday FREng, Chief Executive, National Grid

## Lecture

### Joint Academy/RSE Annual Lecture

*The Twin Towers: 10 years – 10 Lessons on Sustainable Infrastructure*

Speaker: Professor Jose Torero-Cullen FRSE, BRE/RAE Chair in Fire Safety Engineering, Director of the BRE Centre for Fire Safety Engineering

## Lecture


### 11th Annual Regional Public Lecture

*Friction and Where Our Energy Ends Up*


Speaker: Professor Rob Dwyer-Joyce, Head of Dept of Mechanical Engineering, Sheffield


## Lecture

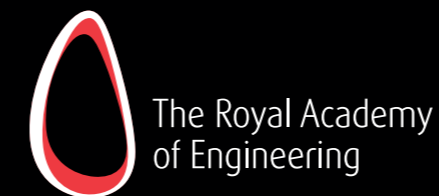
### Sports Engineering Conference

 *UK Focus for Biomedical Engineering*

Professor Lionel Tarassenko FREng, Director, Institute for Biomedical Engineering, University of Oxford

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The Royal Academy of Engineering

# Strategic Priorities

As Britain's national academy for engineering, we bring together the country's most eminent engineers from all disciplines to promote excellence in the science, art and practice of engineering. Our strategic priorities are to enhance the UK's engineering capabilities, to celebrate excellence and inspire the next generation, and to lead debate by guiding informed thinking and influencing public policy.

The Academy's work programmes are driven by three strategic priorities, each of which provides a key contribution to a strong and vibrant engineering sector and to the health and wealth of society.

## Enhancing national capabilities

As a priority, we encourage, support and facilitate links between academia and industry. Through targeted national and international programmes, we enhance – and reflect abroad – the UK's performance in the application of science, technology transfer, and the promotion and exploitation of innovation. We support high quality engineering research, encourage an interdisciplinary ethos, facilitate international exchange and provide a means of determining and disseminating best practice. In particular, our activities focus on complex and multidisciplinary areas of rapid development.

## Recognising excellence and inspiring the next generation

Excellence breeds excellence. We celebrate engineering excellence and use it to inspire, support and challenge tomorrow's engineering leaders. We focus our initiatives to develop excellence and, through creative and collaborative activity, we demonstrate to the young, and those who influence them, the relevance of engineering to society.

## Leading debate

Using the leadership and expertise of our Fellowship, we guide informed thinking, influence public policy making, provide a forum for the mutual exchange of ideas, and pursue effective engagement with society on matters within our competence. The Academy advocates progressive, forward-looking solutions based on impartial advice and quality foundations, and works to enhance appreciation of the positive role of engineering and its contribution to the economic strength of the nation.

# Annual Review 2010/2011

The Royal Academy of Engineering  
Incorporated by Royal Charter  
HRH The Prince Philip Duke of Edinburgh KG KT OM GBE Senior Fellow  
HRH The Princess Royal KG KT GCVO QSO Royal Fellow  
HRH The Duke of Kent KG GCMG GCVO Royal Fellow  
Lord Browne of Madingley FREng FRS President



The Royal Academy of Engineering promotes excellence in the science, art and practice of engineering.

Registered charity number 293074

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This Annual Review provides a summary of the Academy's activities throughout the year. The more detailed Annual Report along with the full Financial Report and Accounts is at [www.raeng.org.uk/about/annrev](http://www.raeng.org.uk/about/annrev)  
Hard copies are available from the Academy.

# President's review



In June 2011, we celebrate 35 years of the Fellowship. That anniversary and the approach of the end of my term as President provide a point to reflect on the Academy's progress.

Our founders' vision was for the Academy to strengthen and promote engineering for the national benefit, for progress in wider society and for the future of humankind.

To achieve this, the Academy is active on many fronts. We are helping to build an education system that inspires and encourages young people to choose a career in engineering. We promote engineering excellence and are supporting research that business and industry can use to grow. We are working to foster a policy framework that enables engineers to address the grand challenges that society faces. And, to underpin all that, we are articulating more broadly the role of engineers and the value they bring to society.

Working in this way, we have made real progress towards the vision of our

founders but, of course, there remains a lot to do. I believe we are better placed than ever to make that contribution.

## Growth

Over 35 years, the Academy has steadily grown in size, partnerships, influence and ambition. From our founding Fellowship of only 130 engineers, led by HRH The Prince Philip, Duke of Edinburgh, the Fellowship now comprises nearly 1,500 eminent engineers. We actively seek diversity in our nominations process to ensure that our Fellowship is representative of the society we serve – an initiative that is beginning to bear fruit.

In 2007, we moved to our headquarters on Carlton House Terrace, making us neighbours of our sister national academies. Our development campaign has raised over £9 million to fund our educational activities and the transformation of our building into the UK Forum for Engineering. We are immensely grateful to our Fellows and all our other supporters for their continuing generosity.

## Education

A significant growth area for the Academy is our work to build an engineering workforce that can meet the needs of business and industry. We take a leadership role on education across the profession, giving high-quality advice to government and the education sector on the education and training of engineers.

In primary and secondary education, our work to inspire the next generation of engineers has created an excellent, collaborative programme both inside and outside the classroom.

In further education, we have made significant progress in campaigning for more skilled engineering technicians.

We host the new Technician Council which works for the recognition of technicians and we undertook the first ever mapping of all STEM provision in further education in England. We continue to work with business and industry on great initiatives such as the University Technical Colleges and the development of apprenticeships.

In universities, our Visiting Professors and Visiting Teaching Fellows bring real-world engineering experience into teaching and help strengthen links between higher education and industry.

## Innovation

Engineering innovation inspires, excites and creates wealth and jobs. Here in the UK, we punch well above our weight in terms of world class research – a critical advantage in generating ideas and the people capable of exploiting them. But the evidence suggests that we fail to translate academic excellence into commercial success. At the Academy, we think that UK research should be concentrated on activities that can make a foreseeable contribution to the economy.

The Academy supports world class engineering research and researchers. Our Research Chairs and Senior Research Fellows undertake work of strategic importance to both the private and the public sectors. For every £1 we invest, this is matched by £12 from elsewhere. This programme now supports over £20 million of research in 20 universities, a valuable resource for UK innovation and an important link between UK research and business.

For examples of great engineering innovation and how they benefit society, we need look no further than the Academy's awards. We have developed a range of awards, medals and prizes that encourage and recognise engineering excellence

and leadership at every stage of an engineering career. The 2010 winner of the prestigious MacRobert Award was Inmarsat's portable communications network which, among its many applications, provided a communications system for the relief operation after the Haiti earthquake.

## Policy

Over time, the Academy's contribution of engineering expertise to policy decisions has grown significantly.

During the year, our Fellows produced influential reports on some of the key national and international policy challenges of the day – including options for energy systems, the electrification of transport and the security of our global satellite navigation system. With our partners in the engineering profession, we have produced studies with and for government on water security, nuclear power plant construction and the resilience of infrastructure in the face of climate change. We have fielded engineering expertise in Parliament and on government committees and panels.

Our debates and meetings over the year provided platforms for some of the world's most influential and inspiring engineers and researchers. The Academy has tackled some of the pressing engineering issues and questions of the day and provided a showcase for great engineering.

Engineering knows no borders and we have been more active than ever on the international scene through exchanges, visits, delegations and the international engineering networks. This year, the six national science and engineering academies from China, the USA and the UK came together for the first of three major symposia on an important new technology, synthetic biology.

## Promotion

Somehow, in this country, the unique contribution of engineering had been less well understood than elsewhere, to the detriment of society and engineering alike. We have been working hard to build awareness among the media and the public of the value that engineers contribute. Our Fellows have been in great demand from all forms of print, broadcast and electronic media, helping to get engineering into the national debate.

Talking to the public about the implications of engineering has never been more important and the Academy has had a leadership role on public engagement in the engineering profession. During the year, a pioneering project to gauge young people's attitudes to electronic patient records featured a tour of a specially commissioned piece of theatre and a series of workshops with young people.

## The future

Engineering underpins the progress of society, the generation of wealth and the prosperity of humanity. The Academy will continue its work to strengthen, facilitate and promote the contribution of engineering.

Over my five years as President I have enjoyed first rate support from the Immediate Past President, Lord Broers and the Senior Vice Presidents, Professor Dame Wendy Hall and Professor Robert Mair. I am indebted to the Academy's Council and Committees for their leadership and unfailing energy. I should like to thank them and the Academy's Chief Executive Officer, along with his dedicated team of staff, for all that they have done and continue to do.

**Lord Browne of Madingley FEng FRS**  
President

# Chief Executive's foreword

The last year has been challenging for the Academy, but has also presented a great opportunity for engineering.



Following the global financial crisis, engineering and manufacturing are firmly back on the national agenda but there is much to do if business and industry are to deliver the performance the UK requires. It is crucially important that the Academy supports this agenda effectively – through its leadership and by means of programmes to help provide the conditions for growth that an innovation-led economy requires. I will highlight some of the key challenges and changes of the year in this foreword.

## The Fellowship

First and foremost, our work requires the leadership and involvement of a broadly based and talented Fellowship. In 2010, the Academy welcomed the maximum number of new Fellows permitted by Charter and Statute. Our 60 new Fellows, of whom six were women, included one Honorary Fellow and six International Fellows. They join a Fellowship which provides leadership, encouragement and unstinting support to the staff both informally and through membership of committees and panels.

## Resources

The government's 2010 Comprehensive Spending Review was undertaken against a background of stringent reductions in public expenditure. A better than expected settlement for science and research reflected the government's recognition that the UK's research base has a key role in supporting economic recovery through innovation. The Academy receives over £12 million of grant funding from the science and research budget, a critically important resource to us even if it is a small component of the whole. The outcome – a 3% cash reduction over 4 years – was the same for most of the research councils and academies.

As with other publicly funded organisations, the Academy has been required to reduce its administrative expenditure by 15 per cent across its government funded programmes. To achieve this, a reorganisation of the staff team was undertaken in early 2011 and the Academy has started to share some back office functions with its sister national academies.

It is fundamental to our purpose that we use funds provided from public sources to bring in further support from the private sector, charitable trusts and individual donors. We are immensely grateful to all our supporters and partners, whether in education and engagement activities or the redevelopment of our building into a great new public space.

## Leadership

The Academy made proposals to government to prioritise its activities and so create headroom for important new work in professional leadership, diversity in engineering and encouraging entrepreneurialism among researchers.

The newly funded leadership role will build on two alliances the Academy has established that bring together the engineering profession. Although both are new, they are already enhancing our ability to influence national policy and the reputation of the profession. The first is Education for Engineering (E4E), an alliance of engineering institutions hosted by the Academy, which seeks to influence education policy relevant to the formation of engineers and technicians. Its current focus is on further education (FE) strategy and funding following detailed work carried out by the Academy that has revealed worrying inadequacies in FE provision. E4E develops policy positions and calls for action on key priorities in STEM education, careers advice, specialist teaching and diversity in the profession.

The second leadership initiative is the Engineering the Future alliance which works with government on areas of policy with an engineering dimension to delivery. Over the year, we have carried out three major studies and delivered a conference on manufacturing, all of which had the involvement of senior government figures.

The purpose of these alliances is to ensure that engineering issues are taken into account at the right time in policy formation and to give Ministers and officials access to the right experts. We are careful neither to lobby nor to act as spokespeople for any sector of engineering or of business and industry; our different point of access to government, as independent advisors and delivery partners, has been welcomed in the policy process.

## Diversity

Creating a more diverse profession will be crucial to the future of engineering and its contribution to the UK's performance. Under the leadership

of Professor Dame Wendy Hall, our campaign for diversity in the profession has completed its first stage, in which we scrutinised and ensured that our own programmes and internal ways of working are based on best practice. Now the campaign will broaden its focus towards engaging the engineering profession and industry to take forward this important work. This will be enabled by some limited funding from government.

## Enterprise

A new scheme, the Engineering Enterprise Fellowships, will be initiated in 2011 with funding secured in the Spending Review. The objective is to stimulate the translation of research into thriving businesses by providing entrepreneurial young researchers with the training and support they need to develop a business over the course of a year.

## Looking ahead

In 2010, the Academy's five-year strategy was completed – and this review reports our progress against objectives. Our new strategy ([www.raeng.org.uk/strategy](http://www.raeng.org.uk/strategy)), approved by Council in January 2011, covers the period of the spending review – from 2011 to 2015 – and is much shorter and more focused than its predecessor. Although brief, it is ambitious. The Council has set the Academy five high level strategic challenges: to drive faster and more balanced economic growth; to foster better education and skills; to lead the profession; to promote engineering at the heart of society and to build organisational capacity.

Our relationships with business and industry continue to develop through new and strengthened partnerships. Our successful joint programmes fund world class engineering research; identify and support young engineers

on their path to leadership; and encourage excellence throughout an engineering career. The many engagement activities we undertake in partnership with industry serve to enthuse a huge number of young people, stimulate debate and get engineering read about, talked about and appreciated. We are now exploring how we can use our new forum for engineering to grow closer links to the business and industrial agenda.

All of this adds up to a unique combination of roles for the Academy – professional leader, catalyst, networker, advisor, mentor and focus for the best engineering talent. These are serious roles which we undertake with an immense sense of responsibility, enthusiasm, excitement and no little pride.

I conclude by thanking the President, Lord Browne, for his outstanding leadership of the Academy over five years. On the foundations laid by his great predecessors, he has brought the Academy to a level of prominence and effectiveness that we are committed to build on in years to come.

**Philip Greenish CBE**  
Chief Executive

# Recognising excellence and inspiring the next generation

The skills needed if the economy is to remain internationally competitive will increasingly be based on the STEM subjects: science, technology, engineering and mathematics. The Academy is taking a leading role in making STEM education in the UK world-class.

The Academy continues to play a significant role in STEM education and in engineering education in particular. This means working to enthuse the very young about science and engineering, developing the expertise of STEM teachers in schools and colleges, improving the education system in the key 14-19 age range and supporting engineering in both the Further and Higher education sectors.

## STEM education in schools

The award winning London Engineering Project is now in its fifth year and has worked with 50 London schools and more than 20,000 young Londoners. Its sister project in Cumbria, the Barrow Engineering project, is in its third year, working with all the schools and colleges in the Furness area and more than 3,000 pupils, 70 teachers, 12 employers and 40 trained STEM Ambassadors.

The Tomorrow's Engineers partnership with EngineeringUK and the Lloyd's Register Educational Trust which engages school pupils with hands-

on engineering is funding more than 30,000 young people to engage with activities provided by Young Engineers, the Smallpeice Trust, The Engineering Development Trust (incorporating the Industrial Trust) and Primary Engineer. Tomorrow's Engineers provides year-round support for the sorts of STEM activities celebrated at the Big Bang Fair. The 2010 Fair, run by EngineeringUK and supported at the Academy, at the Excel Centre in London was the biggest yet, with 28,000 visitors.

## Supporting excellent teaching

Through funding provided by BAE Systems, the Academy is also working with teachers in more than 80 schools and the National Network of Science Learning Centres to emphasise the technology in STEM. This augments the Academy's STEPS at Work Programme which has provided one-day industrial placements for up to 1,300 teachers a year since 2005.

In addition, the teaching of engineering qualifications in the

Further Education sector is being enhanced by professional development for engineering lecturers funded by the Learning and Skills Improvement Service, the Gatsby Charitable Foundation and BP. The Academy trained 685 FE lecturers during the year on a range of topics including instrumentation and control; engineering maintenance; engineering mathematics; sustainability; getting women into STEM and diversity.

The Engineering Further Education project, which is funded by BP and supports teaching and learning in further education colleges, was launched in September 2010. A new e-mentoring programme has been developed which sees engineering students backed by practising engineers from industry. Support for the contextualising of mathematics for engineering students is a key component of a programme of teachers' continuing professional development. The project is currently working with 11 FE colleges nationally.

## 14-19 technical education

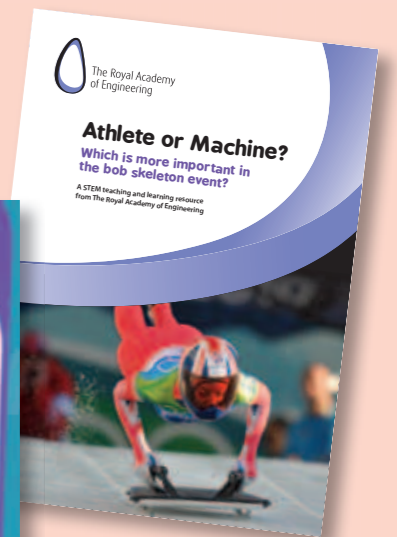
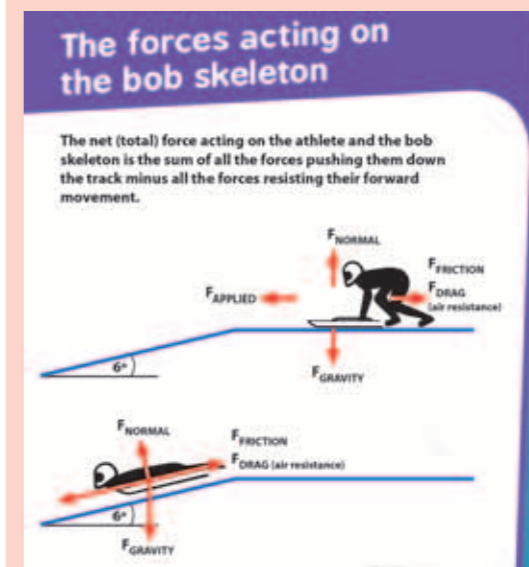
The new Coalition government, the Wolf Review of vocational education, the Academy's hosting of the Technician Council and renewed national interest in apprenticeships have highlighted the role of practical and technical education and training in the UK. The Academy is achieving influence through its leadership of the FE STEM Data project which is mapping out the national provision of technical and practical STEM in close detail and provides policy makers with real evidence on which to base important decisions when resources are scarce. The Academy is also playing a significant role in supporting the emergent University Technical Colleges. These schools are linked to universities and to FE Colleges, and will provide a technical education for 14-19 year olds. At least 24 will receive significant government support and the Academy is working with the Baker-Dearing Educational Trust in developing the curriculum taught in these schools.

## Athlete or Machine?

The Royal Academy of Engineering has been working in partnership with BAE Systems to produce a suite of engineering resources for schools which help teachers illustrate the role of engineering in society and how engineers shape and improve our lives. One of these is a 30 page resource that brings together science, technology, engineering and mathematics to help pupils tackle the question: *Athlete or Machine – which is more important in the sport of Bob Skeleton?*

Below: In the Academy resource *Athlete or Machine?* students use different engineering skills to make a working model of a bob skeleton.

Bob skeleton is an extreme winter sport in which athletes slide head-first down an ice covered track on a sled that holds them just centimetres above the surface. In order to answer the question *Athlete or Machine?* students identify the factors that influence the performance of the bob skeleton and then investigate each one through practical, mathematical and scientific activities.



Below left: Students at BAE Systems in Barrow discovering how 'smart' metals can be. The students tested the reaction rates of a nickel-titanium alloy spring, that is able to 'remember' shapes and has potential robotic applications. Below right: A North London STEM Club participant extracting plastic from milk. Students heated up whole milk before adding vinegar, causing the protein Casein to precipitate out of the milk as a white solid.



# Engineering excellence

Some of the many ways in which the Academy recognises excellence is through the election of Fellows, presentation of awards and medals. The Academy's wide range of awards covers every aspect of engineering.

## MacRobert Award

The Academy's MacRobert Award is the UK's premier prize for innovation in engineering. It is awarded annually to an individual or small team for an outstanding innovation of benefit to society which has also achieved commercial success. It seeks to demonstrate the importance of engineering and the role of engineers and scientists in contributing to national prosperity and international prestige.

In 2010, the winner was Inmarsat for its groundbreaking Broadband Global Area Network. The service, which provides internet data connectivity anywhere on earth, is widely used for remote connectivity for business, government, broadcasters, aid and relief agencies and emergency services. The service brings TV reports into homes from even the most remote parts of the world and is used by many major broadcasters.

Satellite communication services have to be planned over a decade ahead of launch. Inmarsat's geostationary satellites are designed to have a life in orbit of some 15 years, during which time they cannot be maintained, repaired or physically modified. Each Inmarsat-4 satellite has 193 focused beams (which provide the cells), plus 19 regional and one global beam for detection and switching. Their broadband network can be accessed via battery-powered, briefcase-sized terminals virtually anywhere in the world and the system can carry voice and data messages. The Inmarsat development team received a £50,000 prize in recognition of its pioneering work.

## Sir Frank Whittle Medal

Named after Academy Fellow and exceptional aeronautical engineer Sir Frank Whittle OM KBE CB FREng FRS, the award was given in 2010 to Professor Sir Richard Feachem KBE CBE FREng.

A highly influential public health policy advisor, he is also one of the most distinguished engineers working in the field of health. His work has spanned the control of AIDS, tuberculosis, malaria and waterborne diseases. The medal was awarded for his novel, engineering-based approach to managing aid and tackling some of the most virulent diseases.

## New Fellows

The Academy's Fellowship consists of Britain's most eminent engineers, elected by their peers in recognition of the excellence of their own achievements in engineering. Last year, 60 people joined the Fellowship including leading industrialists, pioneering inventors and senior academics. A majority of the new Fellows attended a ceremony held at the Drapers' Hall in the presence of the Senior Fellow, HRH The Prince Philip, Duke of Edinburgh.



**Above:** Carol Burke, Managing Director of Unipart Manufacturing, gave a speech on behalf of the New Fellows elected to The Royal Academy of Engineering at the New Fellows Dinner in November 2010.

**Right:** The marinised version of Inmarsat's global broadband network, FleetBroadband, was used in the round-the-world Volvo Ocean Race to provide live onboard video, email and internet access, as well as essential safety communications © Volvo Ocean Race.

**Opposite page:** Work on the Millennium Bridge helped win Roger Ridsdill Smith an Academy Silver Medal. He has helped Arup become a world-leading authority on synchronous lateral excitation of bridges following their work on the pedestrian bridge.



## Silver Medals

The Academy's Silver Medals are awarded to outstanding individuals in recognition of their personal contributions to UK engineering. Their success in creating and bringing to market a particular idea or innovation is celebrated each year at the Academy Awards Dinner. There were four recipients in 2010.

**Dr Andrew Harter**, CEO of RealVNC Ltd, a company he founded in 2002 to promote the software system Virtual Network Computing (VNC). VNC provides remote graphical access to a computer screen. It has many applications, including systems maintenance, remote help and support, distance learning, collaboration and mobile working. His company now employs 50 people in Cambridge, with 70,000 customers in over 150 countries.

**Dr Nicholas Longfield**, a lead engineer at Corus Strip Products UK, has been working on the development of coil joining processes in the company's continuous production lines by optimising weld strength and formability to minimise the number of weld breaks. He also started working on the development of laser cladding in order to increase the lifetime of critical components within Corus Strip Products UK. The results of his work have led directly to the decision to build Europe's largest laser cladding facility at Port Talbot.

**Roger Ridsdill Smith**, a director at Arup, was instrumental in the design and delivery of London's Millennium Bridge. He was involved in the project from the footbridge's inception, through the design and running of the

construction contract to completion. He was a central member of the team that resolved the bridge's initial vibration issues, and the research he and his colleagues undertook has made Arup a world-leading authority on synchronous lateral excitation triggered by pedestrian overcrowding.

**Colin Tregenza Dancer** is a director of Architecture at Metaswitch Networks. His technology company makes communication equipment, particularly for voice-over-internet and mobile telephony and is now the market leader in this sector in the USA. As well as developing high density, environmentally friendly telephone switches, he is helping to change conventional images of engineering by working with artist Paul Fryer to create stunning engineering artworks.

# Leading debate

The Academy engages in a wide range of activities promoting links between engineering, government and wider society. The Academy seeks to build relations with policy makers nationally and globally to ensure that engineering is at the heart of policy making in crucial areas such as energy, transport, health and security. It also encourages debate and dialogue between engineers and the wider public to ensure that engineering is visible to society and sensitive to its opinions and concerns.

## Engineering the Future

The engineering community has strengthened its relationships with government this year, through the *Engineering the Future* group, an alliance of UK professional engineering organisations. Two major reports were commissioned by government departments and the profession produced joint responses giving a united voice to a number of inquiries and consultations.

The Department for Environment, Food and Rural Affairs commissioned *Engineering the Future* to produce a report on the contribution that engineering can make to adaptation to climate change. *Infrastructure, Engineering and Climate Change Adaptation* focused on the need to create resilient infrastructure, in sectors such as communications or transport, but across the entire infrastructure system. The report underlined how engineers, regulators and the public and private sectors need to work together to allow planning at a systems level, to ensure resilience.

The Office of Nuclear Development asked *Engineering the Future* to carry out a study on *Nuclear Lessons Learned*. The report investigated the lessons from recent and current nuclear build projects, including Olkiluoto in Finland and Flamanville in France, which are relevant to the proposed new nuclear power plant programme in the UK. The report identified the design and licensing issues that need to be resolved before the start of construction and noted that first-of-a kind plants are more expensive and take longer to build.

## Policy work

Last year's Academy report, *Generating the Future*, identified the need to radically reduce the carbon emissions from transport by cutting its reliance on fossil fuels. This year, the Academy

produced a report on *Electric Vehicles*, which examined the electrification of road transport. This included issues such as infrastructure changes to enable the mass rollout of electric cars, ensuring that there are sufficient charging stations and simple ways to pay for power.

A set of lectures based on the theme of *Engineering the Olympics*, was staged to look at the contribution of engineers to the 2012 Olympic and Paralympic Games. The talks highlighted how UK engineers are contributing to the success of the games, including constructing world-class venues for the games as well as supporting and enhancing athletes' performance through sports engineering.

The supply chain for the offshore wind industry was the focus of a workshop which considered the 'green' supply chain in the UK. The meeting brought together leaders from across the industry, including developers, suppliers, financiers, policymakers, port owners and education providers. The discussions identified the critical needs that must be met to support this emerging sector, from skills to infrastructure.



Right: Oscar Pistorius, who runs with carbon fibre blades below both knees, was the subject of *Ethical issues around medical technology and the Paralympics* – a talk given at a conference on sports engineering hosted in March 2011 by the Academy's Panel for Biomedical Engineering © Denis Farrell/Associated Press images.

## Global Navigation Space Systems: reliance and vulnerabilities

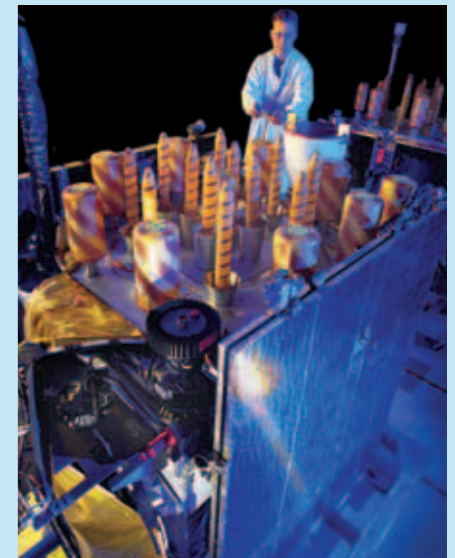
The Academy published a report in March 2011 entitled *Global Navigation Space Systems: reliance and vulnerabilities*. The study, led by Dr Martyn Thomas CBE FEng, warned that society may have become over-reliant on satellite radio navigation systems such as GPS to gain accurate data for positioning, navigation and timing.

GNSS dependency is now widespread across the world. As well as the ubiquitous satnav, the signals are used by data networks, financial systems, shipping and air transport, agriculture, railways and emergency services. The range of applications using the technology is now so broad that, without adequate independent backup,

signal failure or interference could potentially affect safety systems and other critical parts of the economy. The European Commission estimates that an €800 billion portion of the European budget is already dependent on GNSS.

The Academy's report looked at security awareness and recommends that critical services include GNSS vulnerabilities in their risk register and that these are reviewed regularly and mitigated effectively. Research councils were encouraged to support R&D into enhancing the resilience of GNSS-dependent systems.

The Global Navigation Space Systems report is available online at [www.raeng.org.uk/gnss](http://www.raeng.org.uk/gnss)



Above: The front cover image from the *Global Navigation Space Systems*, showing an engineer preparing a GPS IIR spacecraft © Lockheed Martin.

## Public engagement activities

The Academy has continued to support public engagement with engineering through a variety of activities.

The Academy was a major partner in the annual Cheltenham Science Festival where more than 1,500 people attended the Academy's engineering debates, discussions and interactive demonstration sessions.

During the year the Academy published a report on the findings from a two-year public dialogue and theatre engagement programme. The report gathered together the attitudes and views of young people to privacy and security of their personal information. It highlighted the potential uses and possible abuses of electronic patient records in the NHS.

The Academy also became a signatory of the Concordat for Engaging the Public, along with a number of the UK's

major research funding bodies. The concordat was launched by Rt Hon David Willetts MP, Minister for Universities and Science in December 2010.

The Academy made 20 Public Engagement Awards and one Public Engagement Fellowship in the fifth round of the public engagement grants programme, *Ingenious*. *Ingenious* is supported by the Department of Business Innovation and Skills and distributes funding for schemes that bring creative public engagement to engineering projects.

## Biomedical engineering

The Academy hosts the Panel for Biomedical Engineering. This body provides a forum through which the principal organisations concerned with biomedical engineering in the UK can communicate, debate and jointly act upon issues that affect this area. The Panel hosted an all-day conference on sports engineering, where delegates

considered performance; ethics in Paralympic technology, muscle oxygenation studies in athletes and the role of sports science and engineering in preparing British athletes for competition.

The Academy jointly hosted a meeting in Parliament with the Parliamentary and Scientific Committee. During this meeting and accompanying dinner, specialist speakers spoke about the ageing population in the UK, regenerative medicine and mobile health technologies to support patients with long-term illness. A series of briefing papers followed up on these themes and have been published on the Academy website.

## Media activity

The media team continued to achieve regular coverage in print, broadcast, electronic and social media including record coverage for the report *Global Navigation Space Systems: reliance and vulnerabilities*.

# International matters

## Synthetic biology symposia

The Academy has joined forces with the Royal Society and the engineering and science academies of the USA and China for a set of high level international symposia addressing the exciting new field of synthetic biology. The first symposium, jointly hosted by the Academy and the Royal Society, brought together leading international figures from the worlds of research and industry to survey the state of current research, to explore the potential to develop successful tools and technologies, and to examine the technical, social and ethical challenges which might be posed.

## Africa-UK Engineering for Development Partnership

The Academy has taken a leading role in the Africa-UK Engineering for Development Partnership – a partnership of engineering bodies



in the UK and Africa dedicated to building the capacity of engineering institutions in Sub-Saharan Africa, and strengthening networks of engineers within Africa and between Africa and the UK. The partnership was launched at the Academy by the Kenyan Prime Minister – and engineer – Rt Hon Raila Odinga. It runs workshops in African countries bringing together policy makers and engineers to discuss the key issues influencing Africa's social and economic development.

## Frontiers of Engineering

The Academy hosted the first ever EU-USA Frontiers of Engineering symposium, an intensive three day meeting bringing together 60 of the most gifted engineers under the age of 40 from Europe and the USA to discuss cutting edge research at the boundaries of traditional disciplines. The event – which covered themes such as bio-inspired engineering and augmented reality – provided a welcome opportunity for future stars of engineering to meet and collaborate across disciplines. The Academy administers the Frontiers of Engineering programme on behalf of the umbrella group of European engineering academies, Euro-CASE, in partnership with the USA National Academy of Engineering.

## Competing in the Global Economy debates

The Academy held a highly successful series of debates in which senior engineers and other interested people from government, think tanks, business, and academia were invited to discuss important issues affecting UK competitiveness in international markets. Motions debated included the impact of foreign ownership of UK businesses and the role of manufacturing in rebalancing the UK economy. Key messages emerging



from the series have been captured in a report to policy makers and will form the basis of future Academy work in this area.

## ERA International Lecture

Anne Lauvergeon, Chief Executive Officer of the French nuclear and renewable energy conglomerate AREVA, spoke to an audience of senior engineers, policymakers, business people and students at the Academy's ERA International Lecture. She praised the UK's energy market reforms and gave a strong endorsement of nuclear energy as part of the "past, present and future" of the UK's energy mix – as long as the right investments were made in skills and high quality public dialogue.

Left: The Prime Minister of Kenya, Rt Hon Raila Odinga, launches the Africa-UK Engineering for Development Partnership.

Above: Anne Lauvergeon, Chief Executive Officer of AREVA, delivers the ERA International Lecture.

# Lectures and events

## Forum for debate

A key role played by the Academy is to act as a forum for debate and exchange. Throughout the year, a broad range of lectures and events were held by the Academy, transcripts of which can be found at [www.raeng.org.uk/events](http://www.raeng.org.uk/events). Videos and podcasts can be found at [www.raeng.tv](http://www.raeng.tv)

The annual Lloyd's Register Educational Trust lecture was given by Dr Anne-Marie Warris, Environmental Adviser at Lloyd's Register, under the title *A low carbon world – is it realistic?* Dr Warris flagged up the need for the developed world to adapt and accelerate its innovation to maintain its competitiveness. Advances in the low carbon era, she said, will not happen without the involvement and support of engineers.

The Academy's flagship Hinton Lecture was delivered by Dr Lyn Evans CBE FRS, the project leader of the Large Hadron Collider (LHC). He explained how the world's largest and highest-energy particle accelerator has been



Above: In June 2010, the Academy invited two Nobel laureates, Professor Sir Charles Kao CBE FRS (left) and Professor Charles Townes FRS (right), to celebrate the 50th anniversary of the first working laser at a day-long event at 3 Carlton House Terrace.

designed to recreate the conditions that existed one picosecond after the Big Bang. Dr Evans described some of the fundamental questions in science that the LHC will address as well as some of the innovative design features of this colossal scientific instrument.

Steve Holliday FRS, Group Chief Executive of National Grid, delivered the Academy Lecture *Power to the People*. He outlined the crucial decisions that need to be made in the coming years in order to deliver low carbon energy for the UK. He said that the UK faces a pivotal year as decisions need to be made on replacing critical assets, many of which are now 50 years old.

The Academy also hosted a new lecture series during the year under the banner *Prime Innovators*, in which engineers at the top of different professions discussed innovations being undertaken in their areas of expertise. Alex Burns, Chief Executive Officer of Williams F1, responsible for implementing the group's



diversification strategy, gave an insight into the operational management of the Formula 1 team.

Dr Mike Lynch OBE FRS, Chief Executive Officer of Autonomy, is a technology entrepreneur. He talked about the ability of computers to handle and, at some level, understand emails, text, phone calls and video, which is revolutionising practical computing.

In the third lecture of the series, Professor Sir Martin Sweeting OBE FRS, Executive Chairman of Surrey Satellite Technology Ltd, drew attention to the huge scope of modern 'microsatellites' which are able to dramatically reduce the size, cost and manufacturing times of small and highly capable satellites, fundamentally changing the economics of space.

Tristram Carfrae, structural engineer, Principal and Arup Fellow, described some of the projects that he had helped to create, most notably the Beijing National Swimming Centre, also known as the 'Water Cube', the innovation that was recognised by the 2009 MacRobert Award.

Finally, Professor Sir Richard Friend FRS talked about the challenges of introducing radical innovation into the manufacturing environment. He discussed how scientific innovation can be developed to have commercial applications.

As part of the ongoing Vodafone Lectures series, Professor Brian Collins CB FRS, Chief Scientific Adviser to DfT and BIS, talked about *The engineering of intelligent transport systems and services*. Natasa Milic-Frayling, Principal Researcher at Microsoft Research Cambridge, discussed *The Art and Science of Social Computing*, examining the way computer technology has revolutionised the way that people communicate.

# Enhancing national capabilities

The Academy's activities are focused on enhancing the UK's performance and promoting engineering innovation at home and abroad. The Academy builds links between university and industry, helps engineers continue their professional development and encourages excellence in engineering research.

## Establishing international research networks

International collaborations and global research networking are key to remaining internationally competitive. The Academy's Global Research Awards have helped provide opportunities for engineering researchers to spend substantial periods of time at an overseas institute to gain access to knowledge, technologies or skills that are not currently unavailable within the UK. Awardees develop lasting collaborations and, once back in the UK, can pass on their newly acquired knowledge to colleagues and students.

Professor Sheila MacNeil from the University of Sheffield was one such awardee. She travelled to Australia to visit Swinburne University of Technology, Melbourne, and the University of Auckland's Bioengineering Institute. Her primary research interests are in soft tissue engineering – skin, oral mucosa, urethra and cornea, with a strong focus on translating research for clinical benefit. In Australia she explored how different surface coatings could promote increased cell growth and so improve the healing of

wounds. The time spent at the host universities has enabled Professor MacNeil to access world-class facilities, skills and expertise that are not currently available in the UK.

## Engineering young researchers

The Academy's Research Fellowship scheme, run jointly with the Engineering and Physical Sciences Research Council, enables young researchers to continue their academic research following completion of their PhD. These five-year Research Fellowships provide the long-term stability necessary to develop a future career at the highest level of international research. The Academy funds 50 Research Fellows across 22 universities covering all areas of engineering research and the intense competition for these Fellowships ensures that the quality of incumbents is uniformly high.

Dr Ross Hatton is a Research Fellow at the University of Warwick whose research focuses on understanding the science that underpins the operation of organic solar cells. Every hour, enough energy arrives at the surface of the earth



**Right:** University of Warwick PhD student, Helena Stec, holding ultra-thin gold film with Professor Tim Jones and Dr Ross Hatton, Royal Academy of Engineering/EPSC Research Fellow (right).

**Opposite page top:** Professor Rod Smith FREng Chair of the Future Railway Research Centre researching the use of Shinkansen high speed trains in Japan.

**Opposite page:** Dr David Swaffield, a winner of the IEEE Eric Foster Young Scientist Award.

## Enhancing links between industry and academia

The Academy's Research Chairs and Senior Research Fellowships schemes are co-funded by the Academy and industry partners to enable top-level, internationally recognised academics to build on links between industry and UK universities by establishing and developing a research centre of excellence as a focal point for collaborative research.

Professor Rod Smith FREng is Chair of the Future Railway Research Centre, Imperial College, and holds the RAEng/Network Rail Research Chair. The support has enabled the Centre to work on energy consumption for high-speed trains and the reduction of maintenance costs by improving the understanding

of deterioration mechanisms, particularly on switches and crossings, and also the study of alternative 'green' methods of traction for rail.

Building a high speed rail network for the UK is a long-term project which should eventually link all the major cities with 800 miles of new high speed track. The maintenance costs of the network will be a substantial part of the overall operating cost, and Professor Smith's research is seeking to minimise this.

There are likely to be new types of track implemented as well as the production of lighter trains. There will also be increased strain placed on the UK's electricity generation and distribution capacity will need to be compensated for. These and other such considerations

require thorough examination to ensure the effective implementation and maintenance of the high-speed network, and the Research Chair scheme provides the required stability, time, industry input and academic freedom to best enable this.



from the sun to meet humanity's energy requirements for a year. The challenge is to harvest even a small proportion of this energy in an economically viable and sustainable way.

The aim is to improve the output and versatility of the solar cells while reducing production costs. Dr Hatton, who has since become a lecturer, and his group have achieved cost savings by reducing the quantity of gold necessary in their manufacture and by moving away from the traditional ridged design to flexible solar cells which can be used more widely. The first generation of these organic solar cells are set to be commercially available within a year, with operational lifetimes and efficiencies matched to portable consumer electronics.

## Transferring industrial practice to academia

The Industrial Secondment Scheme facilitates knowledge transfer between



industry and academia by enabling academics to spend up to six months in industry where they can apply their skills and expertise to real-world industrial projects. The benefits include increasing the productivity and competitiveness of the industry and developing industrially-relevant engineering curricula, thereby enhancing university engineering courses.

Dr David Swaffield of the University of Southampton spent six months at

Converteam UK Ltd in Rugby. As a young academic with minimal experience in industry he was keen to gain exposure to the commercial world to better understand the environment and pressures faced by engineers in industry.

Dr Swaffield's secondment involved the testing and fault rectification of a rotating transformer for the 'Hydrogenie' generator and the development of Non Destructive Testing methods. This resulted in a case study for his postgraduate-level High Voltage Insulation Systems module, and provided valuable experience for improving the lectures on the design of electrical insulation for large motors and generators.

Dr Swaffield also took part in the testing of a wind turbine generator which, when combined with the other activities, formed a strong collaborative base between Southampton University and Converteam staff to be built upon in the future.

## Ongoing successes

### Professional formation of engineers

The Academy's work in higher education is concerned with enhancing the skills available to industry and research to promote innovation and growth. Our flagship programme, the Visiting Professors scheme, brings leading practitioners into the undergraduate experience which is enriched by exposure to the latest industrial practices and technologies. This scheme is very much focused on problem-based and project-based learning.

The newest addition to this long-established programme is the Visiting Professor in Innovation scheme, which supports the government's drive to develop an innovation-based economy.

In recent years, support for the Visiting Professors scheme from business and third parties has been significant. In

2010, the Academy joined with the National Nuclear Laboratory to launch a Visiting Professors scheme in nuclear engineering. Four Visiting Professors have been appointed in the first year, with posts at the universities of Birmingham, Leeds, Liverpool and Manchester. This scheme enriches the teaching curriculum in all aspects of technology associated with the nuclear industry and encourages students to take up careers in the industry after graduation. It is hoped to expand the numbers and scope of the scheme in the future through the participation of other companies operating in the nuclear industry.

Other Visiting Professor schemes develop the learning of engineering design, sustainable development, systems engineering and building engineering physics. Each of the 200 Visiting Professors currently in post reach between 100 to 150 students a year.

### Engineering Professional Development Awards

For any company competing in the global marketplace of the 21st century, its employees' skills must reflect the latest cutting-edge technology and business practice. The Engineering

Professional Development Awards ensure that UK engineers possess the most up-to-date skills by awarding funds to support training programmes that focus on developing a company's engineering staff.

David McGlasson is responsible for managing design projects for the petrochemical and nuclear industries. Employed by Bendalls Engineering, a UK manufacturer of pressure vessels and high integrity steel fabrications for the nuclear, oil, gas, petrochemical and renewable energy industries, he wanted to enhance his professional development in structural steelwork design, analysis and manufacture. Expertise in this area would help the

Left: David McGlasson examining the installation of internal pipework in an Evaporator Vessel at Bendalls.



business enter the nuclear new build and decommissioning markets where the need for a fully integrated design and manufacture service is growing.

To this end, David McGlasson joined a part-time, distance-learning HND/BEng in Mechanical Engineering that comprised a set number of modules as well as one week of intensive study at Blackburn College. He has since put his new-found skills into practice in the engineering and management of an evaporator vessel at Sellafield, the UK's largest nuclear investment project. Thanks to him, Bendalls Engineering demonstrated outstanding quality during the project and reduced delivery times. The business has also been able to pre-qualify for the supply of equipment towards the new generation of nuclear power stations, soon to be built in the UK.

### Continuing Professional Development

The objective of the Panasonic Trust Awards is to encourage and support the professional development and retraining of engineers in the UK. It achieves this by providing funding for individuals to study courses designed to develop or update their knowledge and skills. These can be in new or emerging technologies and the various fields of engineering, manufacturing, materials science, environmental technology and IT.

Mitesh Chandegra worked full time at URS/Scott Wilson while studying for his MSc in Geotechnical Engineering on a part time basis at the University of Birmingham. He achieved a distinction in Geotechnical Engineering in 2010 and received the 'Midland Geotechnical Society' prize for 'Best Overall Student' and 'Best Project'.

By undertaking this course on a part time basis for four years and working full time Mitesh Chandegra was able to apply the knowledge gained on the course to appropriate projects he worked on. The flexible training allowed him to expand his theoretical understanding and design skills in a broad range of subjects within geotechnical engineering including: physical and mechanical properties of soils, earthworks, foundation design, earth retaining structures, environmental ground engineering and geomechanics.

Mitesh says: "The MSc has given me a greater depth of understanding and confidence in geotechnical engineering and has allowed me to continue working on a number of high profile projects at URS/Scott Wilson including; Blackfriars Station, East London Line and Crossrail Paddington Station Design.



Above: Mitesh Chandegra on the day he was presented with his MSc at the University of Birmingham.

A number of hi tech industries require specialist skills that are only available through the study of a Masters degree. The Academy has made a major investment in funding the study of specialist second degree courses in the fields of energy supply and environmental technology. The Panasonic Trust Fellowships and Petrofac Fellowships for the Enhanced Graduate Engineer support some of the most competent and highly driven graduate engineers. Competition is intense with more than 200 applicants chasing the 12 awards supported by these schemes each year.

### Developing leading engineering professionals

The Academy is also concerned with promoting full career development and the continued employability of engineers once they have

entered industry through a number of programmes funded by the private sector and the Engineering Professional Development Awards.

The results obtained from such schemes are very positive, both in terms of student outcomes and the third party support they attract. The recipients of Panasonic Trust Awards for the study of part-time modular MSc courses graduate with a 'distinction' in 40% of cases, compared with the national average of 5%.

The Engineering Professional Development Awards regularly lever between 10 and 20 times their value enabling substantial numbers of industrial engineers to access professional and personal development opportunities.

### Engineers in the boardroom

In addition to supporting the UK's technical skills base, the Academy is involved in developing the industrial leaders who will drive these industries forward to achieve their full wealth creating potential. The Sainsbury Management Fellowship scheme plays a significant role in helping to develop the next generation of industrial leaders. The scheme's alumni, the Sainsbury Management Fellows, include chief executives, company directors and company owners. These individuals also support the Academy by helping select and mentor undergraduate students in the Engineering Leadership Advanced Awards scheme.

# Development report

The Academy's *making things better* Campaign aims to raise £16.5 million to expand education and engagement activities and create a Forum for Engineering. Achieving this goal will help create the next generation of engineers and support the Academy's work to move engineering to the centre of society.

The Academy's £16.5 million *making things better* Campaign made great headway during the year. Commitments towards education and engagement work and creating a Forum for Engineering reached £9.05 million. By financial year end nearly 90% of funding for the Forum had been raised. Repeating the welcome trend of previous years, the Academy successfully expanded its range of funders, affirming its position as a trusted and effective partner.

The fundraising year was marked by an exceptional gift of £2.5 million towards the Forum for Engineering building fund from a private philanthropist. Major gifts in support of this project were also received from The Michael Bishop Foundation and Dr Wilem Frischmann FREng.

Academy Fellows continued their strong support of the Campaign, both financially and in providing introductions to potential new funding sources. An appeal to all Fellows, launched in early 2011 to help complete funding of the Forum project, is being generously supported and the Forum project is on track for an August 2011 start.

The Forum will strengthen the Academy's ability to engage and inspire a range of audiences with engineering. The new

facilities, including including multi-use rooms for exhibitions and conferences and a 170-seat lecture theatre, will allow the Academy to do more with and for its many partners and beneficiaries.

Major education programmes have been supported by generous gifts from BAE Systems, BP, Shell International, The Ove Arup Foundation and Petrofac Services. These programmes have taken many forms, from the development of learning resources, support of after-school clubs, industry-relevant engineering skills for undergraduates and increasing the Academy's ability to effect change in further education.

The Gatsby Charitable Foundation's contribution to the Academy's long-term growth and development – and to engineering in general – has been immense. The Foundation's support continues with funding for the Sainsbury Management Fellowships. And for our work supporting the professional development of engineering teachers and lecturers through the Technology Enhancement Programme.

The Academy's international activities attracted funding from new supporters, such as ARM and Autonomy Corporation, helping build valuable links with our sister academies across the world.

It is a tribute to the standing of the Academy and the quality of its work that donors and sponsors, have continued their strong commitment in an economic downturn. This is particularly valued at this pivotal stage in the Academy's development.

**Left:** Sam Keil discussing her bronze eagle sculpture donation with Sir John Parker FREng, *making things better* campaign chair and Academy President, Lord Browne.  
**Above left:** Steve Holliday FREng, Chief Executive of National Grid, delivering his *Power to the People* lecture in March 2011.



# Academy funding

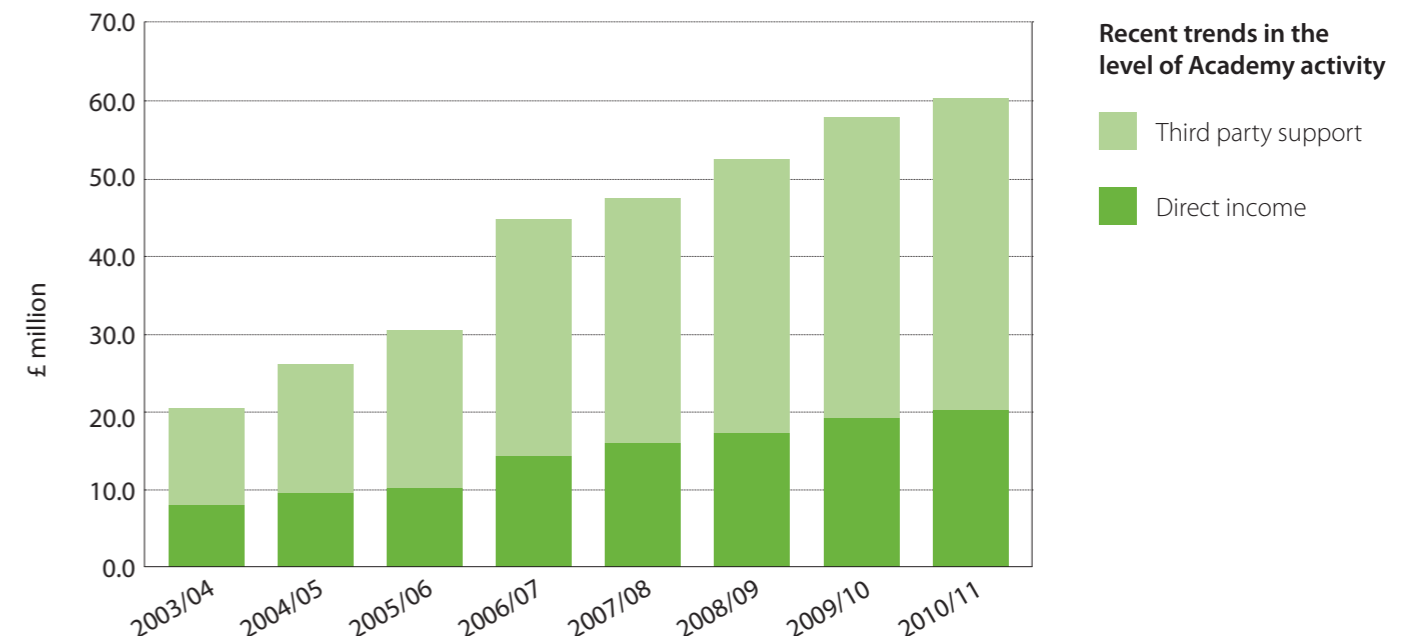
## Sources of income and destination of expenditure

For the financial year ended 31 March	2011 £ million	2010 £ million
<b>Sources of income</b>		
Grants	12.6	12.1
Contracts	4.3	4.0
Gifts and donations	2.3	1.7
Investment income	0.9	0.7
Other income	0.7	0.6
	<b>20.8</b>	<b>19.1</b>
<b>Destination of expenditure</b>		
Charitable activities:		
– engaging effectively with the public	3.0	2.8
– attracting more people into engineering	3.2	3.1
– enhancing the contribution of engineering	10.8	10.4
– developing the Academy	0.9	0.9
Costs of generating funds and governance costs	0.4	0.4
	<b>18.3</b>	<b>17.5</b>
<b>Third party support attracted to Academy programmes *</b>	<b>39.7</b>	<b>38.5</b>

Numbers are rounded to £0.1 million

\* Note: Third party income arises from donors who agree to support Academy projects but make contributions directly to those projects without passing through the Academy's books. Although these funds are not under the direct control of the Academy they would not have become available without the involvement of The Academy.

## Academy income



# Academy highlights 2010/2011

## April 2010


### Event


#### PolicyNet General Election Sessions

Speakers: Adam Afriyie MP, Shadow Minister for Science and Innovation. And Speaker: Dr Evan Harris MP, Shadow Science Minister

### Lecture

#### 2010 Lloyd's Register Educational Trust Lecture and Dinner

 *A low carbon world – is it realistic?*

 Speaker: Dr Anne-Marie Warris, Environmental Adviser, Lloyd's Register

## May

### Briefing

#### The interface between law and engineering

Chair: Sir Vivian Ramsey, Judge in charge of Technology and Construction Court


### Event

#### The Africa-UK Engineering for Development Partnership UK Launch

Workshop on the theme of Building Engineering Physics

### Event


#### Visiting Professors workshop

 Keynote Speaker: Rt Hon Raila Odinga, Prime Minister of the Republic of Kenya

## June

### Lecture

#### Vodafone Lecture Series in Mobile Telecommunications and Networks

 *The engineering of intelligent transport systems and services*

Speaker: Professor Brian Collins FREng, Chief Scientific Adviser to DfT & BIS

### Event

#### The Engineering Academy of Japan/Royal Academy of Engineering Symposium on Green manufacturing and Eco-innovation


### Event

#### The 2010 Academy Awards Dinner

in association with BAE Systems


### Event

#### Cheltenham Science Festival

 The Academy co-produced and sponsored three events: *Engineering the Paralympics*; *Global water security*; *Electric dreams: the future of cars*


### Event

#### Celebrating the 50th Anniversary of the first working laser

 With the attendance of two Nobel laureates Professor Charles Kao CBE FREng FRS and Professor Charles Townes FRS

### Briefing

#### The 2012 Olympic and Paralympic Games: how engineers will make it happen

 Chaired by John Armit, Chair, Olympic Delivery Authority

## July

### Event

#### Academy's Annual General Meeting

## September

### Event

#### The Governance of Autonomous Systems

A meeting held in collaboration with the UCL Centre for Ethics and Law

### Event

#### GO-Science

A reception for participants on the Academy/GO-Science engagement programme

### Event

#### Engineering Leadership Advanced Awards

Annual training 3-day event

### Event

#### Engineering Research Forum

Showcasing Academy-sponsored research

### Event


#### London Design Festival Programme 2010

Four day Academy-led programme on the theme *Designing a low carbon infrastructure for London*

### Lecture

#### Prime Innovator lecture series – lecture I

*An obsession with speed*

 Speaker: Alex Burns, Chief Executive Officer, Williams F1

## October

### Lecture

#### Vodafone Lecture Series in Mobile Telecommunications and Networks

*The Art and Science of Social Computing*

Speaker: Natasa Milic-Frayling, Principal Researcher, Director, Research Partnership Programme, Microsoft Research, UK

### Debate

#### Competing in the Global Economy Debate I

Motion: *This House believes that the advantages of foreign ownership of the UK corporate sector outweigh the disadvantages*

### Event

#### The future of privacy, electronic personal information and health records

*Exploring the evidence on public opinion*

Chair: Harry Cayton OBE, Chief Executive of the Council for Healthcare Regulatory Excellence

### Event


#### Engineering the Future Reception

*Autumn reception for the Presidents and Chief Executives of the Engineering the Future alliance and the wider community of engineering bodies*

Keynote speech: Lord Browne of Madingley FREng

### Event


#### Hinton Lecture

 *Back to the Big Bang – the Large Hadron Collider*

Speaker: Dr Lyn Evans CBE FRS, Project Leader, Large Hadron Collider

### Lecture

#### Prime Innovator lecture series – lecture II

 *Commercialising meaning based computing*

Speaker: Dr Mike Lynch OBE FREng, Founder and Chief Executive Officer of Autonomy

### Event

#### Science question time

Speakers: David Willetts MP, Professor Colin Blakemore, Dame Professor Janet Finch, Philip Greenish CBE

### Debate

#### Battle of Ideas Festival

Academy sponsored debate: *Engineering the future: cautionary tale or utopia?*

Chair: Claire Fox, Institute of Ideas

## November

### Event

#### 2010 New Fellows' Briefing and Dinner

In the presence of the Senior Fellow HRH The Duke of Edinburgh

### Debate

#### Competing in the Global Economy – Debate II

Motion: *This House believes that a manufacturing sector accounting for at least 20% of GDP will provide the only basis for a balanced UK economy*

### Lecture

#### Prime Innovator lecture series – lecture III

*Changing the economics of Space*

Speaker: Professor Sir Martin Sweeting OBE FREng FRS Executive Chairman, Surrey Satellite Technology Ltd

### Event

#### PolicyNet meeting

*The uses of statistics in policy making*  
Speaker: Jil Matheson, National Statistician

## December

### Event

#### Polycynet meeting

*The new knowledge economy – making the best of the research base*

Chaired by Fiona Fox, Director of the Science Media Centre

## January 2011

### Lecture

#### New Year Reception

*Re-engineering aid – a bold agenda for the 21st century*

Speaker: Professor Sir Richard Feachem KBE CBE FREng

### Debate

#### Competing in the Global Economy – Debate III

Motion: *This House believes that the best innovation happens without government intervention*

### Lecture

#### Prime Innovator lecture series – lecture IV

*Encouraging innovative engineering*

Speaker: Tristram Carfrae RDI, Chair Global Building Practice, Arup

### Event

#### The Future of Energy Storage Technology and Policy Workshop


The Royal Academy of Engineering/ Chinese Academy of Sciences

### Event

#### Visiting Professors workshop Effective teaching practice

### Lecture

#### 2011 International Lecture

 *Building confidence for a sustainable and secure low-carbon energy future in the United Kingdom*

Speaker: Anne Lauvergeon, Chief Executive Officer, AREVA

*Transcripts and publications from most of the lectures and seminars mentioned are available at [www.raeng.org.uk](http://www.raeng.org.uk)*

 Video available at [www.raeng.tv](http://www.raeng.tv)

## February

### Lecture

#### Prime Innovator lecture series – lecture V

*Semiconductor technology with molecules*

Speaker: Professor Sir Richard Friend FREng FRS, Cavendish Professor of Physics, University of Cambridge

### Lecture


#### Pre-history of the Fellowship of Engineering

Speaker: Dr Peter Collins, Director of the Royal Society Centre for History of Science

## March

### Guest Lecture

#### Power to the people

 Speaker: Steve Holliday FREng, Chief Executive, National Grid

### Lecture

#### Joint Academy/RSE Annual Lecture

*The Twin Towers: 10 years – 10 Lessons on Sustainable Infrastructure*

Speaker: Professor Jose Torero-Cullen FRSE, BRE/RAE Chair in Fire Safety Engineering, Director of the BRE Centre for Fire Safety Engineering

### Lecture


#### 11th Annual Regional Public Lecture

*Friction and Where Our Energy Ends Up*

Speaker: Professor Rob Dwyer-Joyce, Head of Dept of Mechanical Engineering, Sheffield

### Lecture

#### Sports Engineering Conference

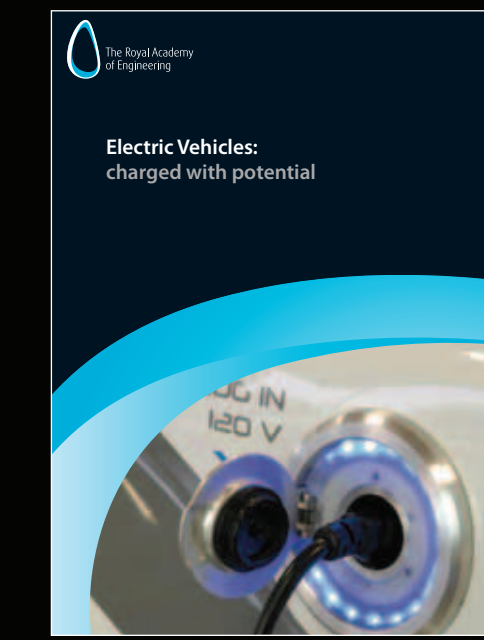
 *UK Focus for Biomedical Engineering*

Professor Lionel Tarassenko FREng, Director, Institute for Biomedical Engineering, University of Oxford

 Transcript PDF available online at [www.raeng.org.uk](http://www.raeng.org.uk)

 Printed reports. Digital versions are also available online at [www.raeng.org.uk](http://www.raeng.org.uk)

As Britain's national academy for engineering, we work to further the profession's contribution to society and the economy. Along with our partners in the engineering profession, we work with business and industry, schools and universities, the public and policymakers to enhance, support and promote engineering today and for the future.



A selection of Academy and *Engineering the Future* publications 2010/2011

