

The Journal of the
Parliamentary and
Scientific Committee

SCIENCE IN PARLIAMENT

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WINTER 2017



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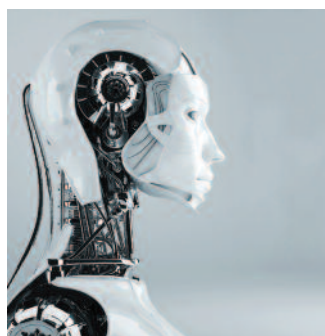
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events.ergonomics.org.uk



Stephen Metcalfe MP,
Chairman, Parliamentary and
Scientific Committee

Welcome to the winter edition of Science in Parliament. It has been a busy couple of sessions over Autumn/Winter 2017 for Parliament and for the Parliamentary and Scientific Committee. Much of the focus within Parliament has been on the Brexit negotiations with several lengthy sessions debating proposed amendments to the Brexit Bill. P&SC is helping to inform Brexit discussions by

continuing to promote dialogue between the scientific and research community and parliamentarians. We recently held a discussion meeting on Science, Innovation and Brexit where progress with the priorities for science and innovation in Brexit discussions was deliberated. A report of discussions can be found in this edition.

Also in this edition, you will find reports from recent P&SC discussion meetings on Human Fungal Diseases and Space Weather. Alongside this are fascinating insights into the role of universities in providing evidence to policymakers and the latest on the future of hydrogen as fuel to help implement the Clean Growth Strategy.

We were pleased to welcome over 100 guests to the Parliamentary and Scientific

Committee Annual Lunch. This event gave our parliamentary members the opportunity to meet and network with guests from our scientific and technical, university and commercial membership. We had two excellent speakers, Lisa Anson President of Astra Zeneca UK and Sinead Lynch, Chair of Shell UK who gave guests their unique perspective of the current situation in the pharmaceutical and energy sectors.

Finally, I would like to draw your attention to our flagship event, the finals of STEM for BRITAIN, our annual poster competition for early career scientists. The finals will be taking place on Monday 12th March in the Atlee Suite in Portcullis House. We welcome attendance from all parliamentarians and I hope to see you there. Further details can be found at www.stemforbritain.org.uk



The Journal of the Parliamentary and Scientific Committee.
The Parliamentary and Scientific Committee is an All-Party Parliamentary Group of members of both Houses of Parliament and British members of the European Parliament, representatives of scientific and technical institutions, industrial organisations and universities.



Science in Parliament has two main objectives:

1. to inform the scientific and industrial communities of activities within Parliament of a scientific nature and of the progress of relevant legislation;
2. to keep Members of Parliament abreast of scientific affairs.

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EYES IN SPACE ADVANCING WEATHER FORECASTING AND CLIMATE SCIENCE



Dr Roger Saunders
Head Satellite Applications
Met Office, Exeter

Measurements of the atmosphere have come a long way since the introduction of the mercury barometer in the 17th century. Satellites now monitor the weather on our planet over all locations and as often as every 15 minutes using a combination of geostationary and polar orbits. These developments have transformed our understanding of the atmosphere and our ability to predict changes in the weather and their impacts. This transformation has allowed weather forecasts to become better trusted and embedded in decision-making for all sorts of sectors from aviation and energy to civil contingencies and defence.

OBSERVING THE WEATHER FROM THE GROUND AND FROM SPACE

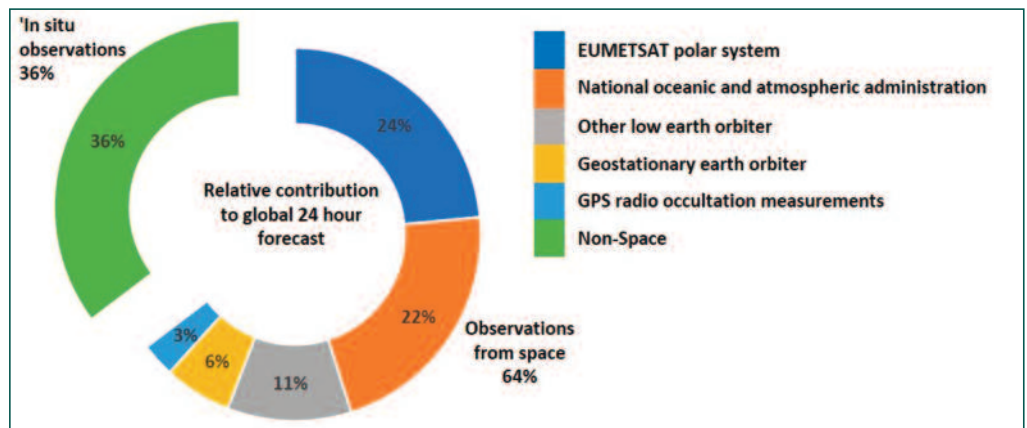
Conventional ground-based and balloon meteorological observations are concentrated over Northern Hemisphere land with few observations over the oceans. As a result, they can't provide a full picture of the global atmosphere. In contrast satellites can measure the atmospheric temperature and water vapour profiles across remote and distant areas using a variety of techniques. Additionally, three dimensional winds by tracking clouds, surface

winds over the ocean and cloud properties can all be retrieved from the satellite observations. There are many more variables which can be inferred from the data for climate monitoring such as greenhouse gas concentrations, sea-ice coverage and sea level.

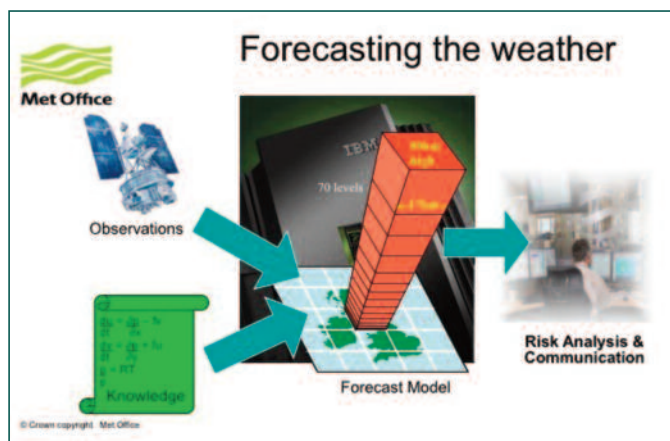
Regular assessments are undertaken into the contribution that observations make to the skill of the weather forecast. These show that satellite measurements now dominate and are a major factor in the improvements gained in accuracy since 2000. At the same time, conventional

observations from sources such as balloons and aircraft still have a significant impact and are crucial to 'anchor' the satellite observations to a known reference.

The satellite data received at the Met Office in near real time for assimilation into our forecast models is provided by several space and meteorological agencies around the world. Due to the scale of investment involved in satellite observations, these long-standing international partnerships are vital to the success of weather and climate science, allowing countries to work together to achieve



Plot showing the relative contribution of different observation types to our 24 hour global weather forecast.



The steps involved in producing a weather forecast

common goals. The Met Office represents the UK in many of these partnerships, working across the science landscape with organisations such as the UK Space Agency to ensure that the UK is able to make the most of our international partnerships.

- The **European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT)** based in Darmstadt, Germany provides the European contribution to the global observing system with the Meteosat geostationary satellite providing imagery since 1979 and the Metop satellites in polar orbit since 2006.
- The **National Oceanic and Atmospheric Administration (NOAA)** in the USA have provided satellite data for meteorology at no cost for many years and have a continuing commitment with their new generation Joint Polar Satellite System (JPSS) polar orbiting satellites.
- More recently Japan, China and India have all started providing useful datasets from their new satellites which are being used operationally at the Met Office.
- Finally, the EU are starting to become players in the satellite Earth observing system with their Sentinel series, part of the

Copernicus programme, which are providing valuable data for marine and land surface applications and in the future for air quality.

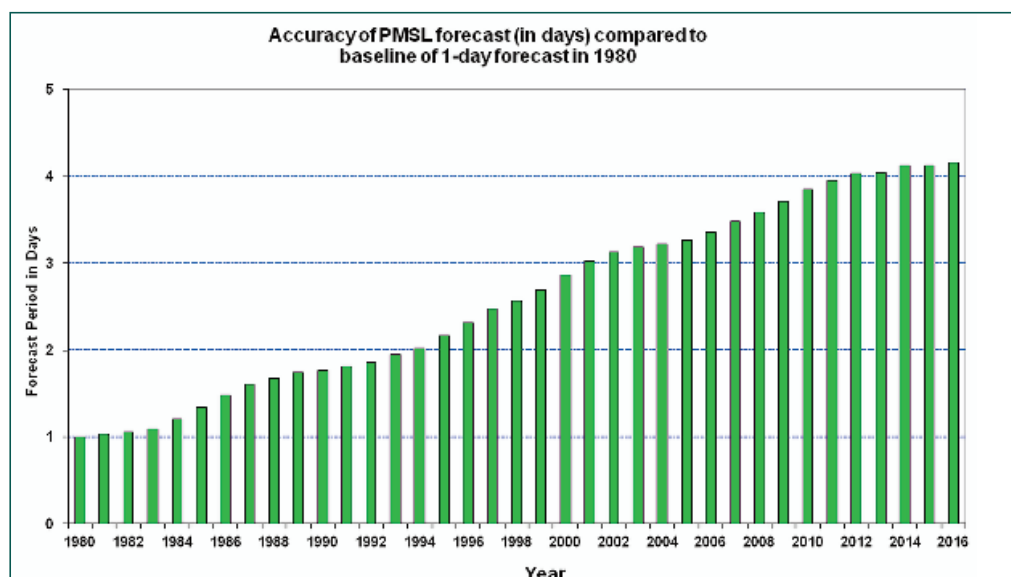
FROM OBSERVATIONS TO PREDICTIONS

Satellite data are assimilated alongside a range of ground-based observations into the Met Office forecast model (the Unified Model) to create an analysis from which our forecasts are run. Millions of observations are collected from around the world every day, as having an accurate picture of the current conditions is vital to predicting how the atmosphere is likely to evolve. This assimilation cycle uses the latest observations and is run every 6 hours for our global model, and every hour for our UK model. The Unified Model predicts the weather by dividing the atmosphere into boxes, and computing the equations of motion and thermodynamics within each box, stepping forward in time little by little throughout the forecast period. The size of these boxes and time steps are different for our global and UK models –

balancing the need for detailed forecasts with the computational cost of running these.

| Model | Global | UK |
|-----------------|--------------------|--------------------|
| Grid width | 10km | 1.5km |
| Vertical levels | 70 (up to 80km) | 70 (up to 40km) |
| Time step | 4 mins | 1 min |
| Forecast length | 6 days | 5 days |

Since 1990 our research and development has allowed us to reduce the horizontal scale of our global model from 90km down to 10km. This has only been possible with the increasing power of computers and the Met Office is now home to the world's largest supercomputer for weather and climate – a key piece of UK science infrastructure located in the South West. The new supercomputer is allowing us to pull through new science developments into our forecast model and produce more detailed and accurate predictions, and will help us to maintain the UK's world-leading position in weather and climate prediction.



For many years we have verified our forecasts by comparing forecasts of mean sea-level pressure with subsequent model analyses of mean sea-level pressure. These comparisons are made over an area covering the North Atlantic; most of western Europe, and north-eastern parts of North America. From this long-term comparison an average forecast error can be calculated. This graph shows how many days into a forecast period this average error is reached compared to a baseline in 1980. This graph shows that a four-day forecast today is more accurate than a one-day forecast in 1980.

The global forecasts from the Met Office are the most skilful of any national weather service and our four day forecast is now as accurate as our one day forecast was 30 years ago. The high level of trust in our forecast accuracy is underlined by the fact that our model is used under licence by six other forecast centres and over 50 research centres around the world.

APPLICATIONS BEYOND THE FORECAST MODEL

Apart from improving numerical model forecast accuracy there are many other applications of satellite data: real time imagery of the Earth at several wavelengths (in the

visible, infrared and microwave) is used by forecasters to assess the present state of the atmosphere over regions of interest and to produce short range 'nowcasts' of the weather using a sophisticated extrapolation technique. Simulated satellite imagery computed from the forecast model fields is now used to compare with the real imagery to assess how well the model is representing the atmosphere at any given time allowing forecasters to decide how much to trust the model.

There is also a wide range of products derived from satellite imagery for various customers which are provided in real time to them. For example, the accurate depiction of the areas affected by ash from a volcanic eruption is a product now used to advise the aviation industry of safe areas to fly within the vicinity of an active eruption. These products provide customers with valuable up to date information about the environment in which they operate, to inform their decision-making.

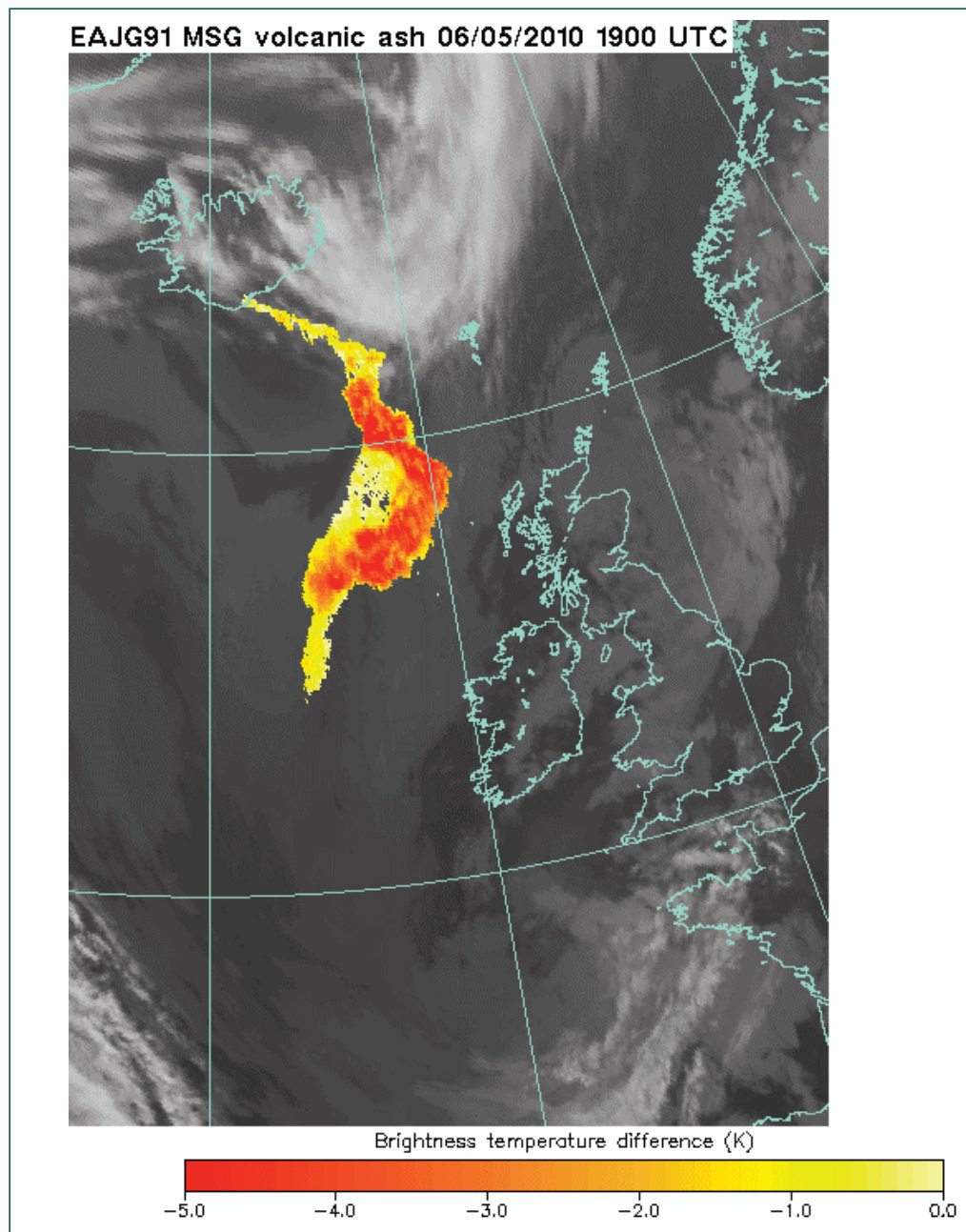
As the length of satellite data records start to exceed several decades, they are increasingly being used for climate research. These observations allow us to monitor the state of the Earth's climate across a range of variables such as sea level, carbon dioxide concentration, arctic sea ice cover, retreating glaciers and atmospheric temperature. Another application is to confront the climate model predictions with the observations to assess the accuracy of the former. These data allow us to better understand the state of the climate, and help underpin decisions regarding climate change mitigation and adaptation.

NEW DEVELOPMENTS

For the future there are several developments in new technology which will influence new satellites. Firstly, a Doppler wind lidar (Aeolus) is about to be launched by the European Space Agency (ESA) to measure 3 dimensional winds using a lidar which builds on 20 years of development. The winds measured by Aeolus could

In recent years so-called nano-satellites or CubeSats have started to be launched. CubeSats attempt to make the same measurements of the atmosphere and surface that larger operational satellites currently make, but are much smaller (weighing less than 5kg, compared to conventional satellites which can weigh 4000kg) and thus operate at a fraction of the cost. Innovative

which has the potential to measure sea state over the oceans. It is early days to assess if this new generation of small satellites can replace the older technology for at least some measurements; but the Met Office are liaising with CubeSat developers to understand the potential benefits these new developments could bring to us and our customers. This development is also allowing



Satellite image showing volcanic ash from the Eyjafjallajökull eruption in 2010

provide further improvements in our weather forecasts and hence the services we provide.

new measurements are being trialled using CubeSats such as measuring surface reflected signals from the GPS satellites

commercial organisations to start offering satellite data to the meteorological community potentially changing how the

data is provided to users worldwide.

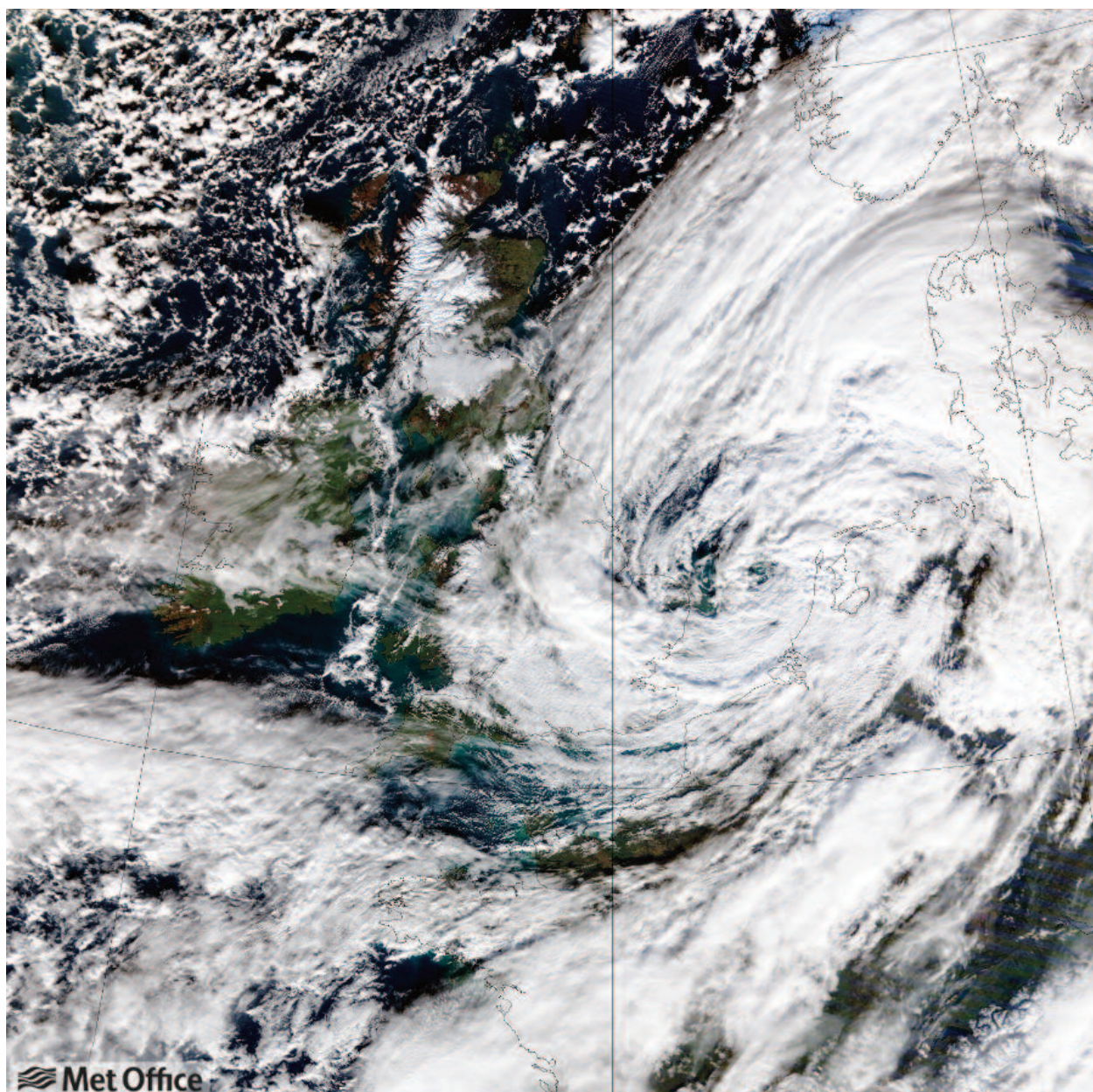
There has been a huge increase in the amount of satellite data provided to the meteorological community since the first operational satellites were launched back in the late 1970s and there is clear evidence these data have helped to improve the accuracy of weather forecasts over this period. October 2017 marks the

30th anniversary of the 1987 Great Storm which ravaged the South of the country. In 1987 very few observations were received from satellites. Now of the 215 billion observations received every day, the majority come from satellites and contribute significantly to the performance of our Global Numerical Weather Prediction model. This increase in accuracy supports our users to make

better informed decisions and avoid the costs associated with disruptive weather: from airports preparing for severe weather to shops ensuring they have the right products on their shelves.

The research at the Met Office continues in order to better exploit the existing satellite datasets where there remain gaps in their utilisation, ensuring that we maximise the value of these observation platforms.

Plans are well advanced in Europe to launch the next generation of weather satellites to further increase the impact these data have, and the Met Office is working with our international partners to ensure that the UK benefits from its investment in these programmes.



The first named storm of the season, Storm Angus, brought heavy rain and severe gales to the UK from 19 -20 November 2016. This image from NASA's TERRA satellite is from the morning of 20 November and shows Storm Angus over the North Sea and Eastern parts of the UK. Much of Scotland and parts of Northern England are clear and snow can be clearly seen on higher ground in these regions. TERRA orbits the earth every 99 minutes at an altitude of around 710 km. Data from the Moderate-resolution Imaging Spectroradiometer (MODIS) on board the satellite is received directly from the satellite, in near-real time, by our satellite receiving ground station at the Met Office. Three channels from the red, green and blue parts of the visible spectrum are combined to make this true colour image at 500 metre resolution.

<http://www.metoffice.gov.uk/barometer/features/monthly-satellite-images-2016>

SCIENCE PHOTOGRAPHY COMPETITION SHOWS RESEARCH IN ACTION

Previous winners have included a robot doing a stand-up routine, nanotube forests and a ball of swirling graphene ink.

And for the fifth year scientists and engineers from across the UK are taking part in a photography competition designed to showcase some the country's most exciting research.

The Engineering and Physical Sciences Research Council (EPSRC), the UK's principal funding agency for engineering and physical sciences research, is holding its fifth Science Photography Competition.

The overall prize in the 2016 Science Photography Competition was awarded to James Macleod, from the University of Cambridge, for his image Graphene – IPA Ink.

It shows powdered graphite in alcohol which produces a conductive ink. The ink is then forced at high pressure through micrometre-scale capillaries made of diamond, which rips the layers apart, resulting in a smooth, conductive material in solution.

The photograph was featured on BBC Breakfast, and in The Daily Telegraph, Daily Mail and The Times.

Further explaining how the photograph came about, Mr Macleod said: "We are working to create conductive inks for printing flexible electronics and



EPSRC Science Photo Competition - 2016 winner James Macleod

are currently focused on optimising our recipe for use in different printing methods and for printing onto different surfaces. This was the first time we had used alcohol to create our ink and I was struck by how mesmerising it looked while mixing."

Mr Macleod's image came first in two categories, Innovation, and Equipment and Facilities, while other winning images included the University of Cambridge's Michael Coto testing and purifying polluted water in Tanzania (People and Skills); Dr Marta Alvares Paino from the University of Nottingham's photo of tiny

polymer particles resembling golf balls (Weird and Wonderful); and Khaled Elgeneidy from Loughborough University's image of a 3D printed robotic soft gripper (Eureka and Discovery).

The judges for the 2017 competition were Martin Keene, Group Picture Editor at the Press Association; Dr Helen Czerski, Lecturer at UCL's Department of Mechanical Engineering who has also presented a wide range of science programmes for television and radio; and EPSRC's Deputy Chief Executive, Professor Tom Rodden.

Dr Czerski said: "Scientists and engineers are often so busy focusing on the technical details of their research that they can be blind to what everyone else sees first: the aesthetics of their work.

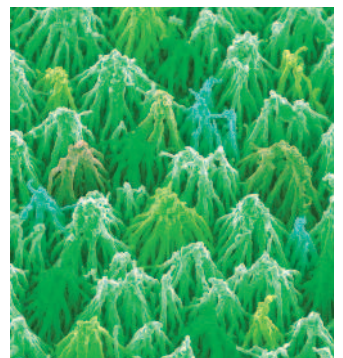
"Science is a part of our culture, and it can contribute in many different ways. This competition is a wonderful reminder of the emotional and artistic aspects of science, and it's great that EPSRC researchers

have found this richness in their own work."

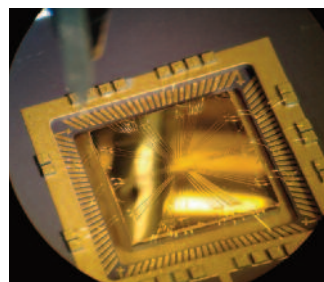
Professor Rodden added: "The quality of entries into our competition demonstrates that EPSRC-funded researchers are keen to show the world how beautiful and interesting science and engineering can be. I'd like to thank everyone who entered; judging was really difficult.

"These stunning images are a great way to engage the public with the research they fund, and inspire everyone to take an interest in science and engineering."

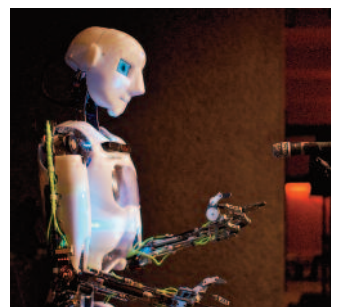
The winners of EPSRC's fifth Science Photography Competition will be announced in the new year.



EPSRC Science Photo Competition - 2014 winner Paul May



EPSRC Science Photo Competition - 2015 winner Diana Prado Lopes Auda Craik



EPSRC Science Photo Competition - 2013 winner Toby Harris

PARLIAMENTARY AND SCIENTIFIC COMMITTEE ANNUAL LUNCH 2017

Isabel Spence, Executive Secretary, Parliamentary and Scientific Committee

Lord Oxburgh, President of the Parliamentary and Scientific Committee, welcomed 100 guests to the Committee's Annual Lunch at the House of Lords on Tuesday 21 November 2017.

Parliamentarians from both ends of the House came together with members of the science and research community across all disciplines from academia and industry.

There were two excellent guest speakers from different but equally important industrial sectors for the UK economy. Lisa Anson, President of Astra Zeneca UK and President of the Association of the British Pharmaceutical Industry (ABPI), presented the urgent priorities for the pharmaceutical sector and Sinead Lynch, Chair of Shell UK gave an excellent overview of how Shell are responding to challenges within energy transition.

Ms Anson opened her speech describing the pivotal role that the UK has historically played in the pharmaceutical sector – even though medicines development is a global enterprise. Companies choose to research and develop new medicines in the UK because of our strong science base, world-class universities and the potential of the NHS. Together these components create a



Lord Oxburgh welcomed the guests to the event and introduced the guest speakers

unique life sciences ecosystem – a virtuous circle that has brought massive scientific progression, patient benefit and investment.

Ms Anson went on to discuss how we stand at a critical juncture for the £30.4bn life sciences sector in the UK and there are three clear areas we must get right – addressing the challenges and seizing the opportunities. Given life sciences thrives in an ecosystem, all three are interconnected.

Firstly, Ms Anson described how we must ensure we have a skilled scientific workforce that keeps the UK competitive. The successful development of new medicines and vaccines relies on having the right people, with the right skills. However, the UK faces skills gaps in mathematical and computational areas and has long standing issues in recruiting experts in translational medicine, clinical pharmacology

and in rapidly developing disciplines such as systems biology and health informatics. The ABPI estimates 400-600 people will be needed in these areas in the next two years alone.

Secondly, the UK must protect patients and the pharmaceutical industry during Brexit. In addition to securing ease of movement for global talent, Ms Anson believes we must secure a collaborative approach to medicines regulation, preserve integrated UK and EU trading relationships and secure the funding to deliver a successful future for UK science.

Finally, Ms Anson said we must transform the NHS into a world-leading health system that gives UK patients the same access to medicines and health outcomes as similar European countries. The UK has some of the lowest medicine prices in the EU and one of the strictest cost-effectiveness assessments. Yet there is growing evidence,



First guest speaker - Lisa Anson, President Astra Zeneca UK and President of the Association of the British Pharmaceutical Industry



Second guest speaker - Sinead Lynch, Chair Shell UK

including Government data, that shows the UK lags behind similar nations in terms of patient outcomes and access to medicines. Our health system must be enabled to appropriately recognise the value of the innovation we develop to genuinely be regarded as a credible world leader in life sciences. To ensure patients can benefit from these innovations, Ms Anson said investment is required.

Ms Lynch, Chair of Shell UK then proceeded to address the attendees on one of the greatest challenges facing the

world – Energy Transition. How does our planet meet growing demand for energy at the same time as significantly reducing greenhouse gas emissions? She described how this is an area where the energy sector has to respond in many dimensions – from dynamic commodity prices to a changing energy system.

Ms Lynch chose to focus her remarks on transport, an area that accounts for around 40% of the UK's energy demand and a quarter of the UK's carbon dioxide emissions. Any low-carbon energy system requires a low-carbon transport system.

This will require collaboration and investment from industry, business, government and society. She described three of the areas which Shell is working on to contribute to developing this system - powering electric vehicles, hydrogen and gas.

She reported that Shell supports the government's plans for a ban on new petrol and diesel cars and vans by 2040. It has recently introduced on-forecourt rapid charging for electric vehicles in London, 10 this year and with ambitious growth plans for 2018. It has also developed a smart charging system to help the electricity

grid cope with all this new demand. She said however that batteries are not the answer for every car journey, let alone a simple solution for the entire transport sector. There needs to be a range of options to meet different needs.

Ms Lynch went on to describe another fuel source, hydrogen. It has a similar performance to conventional engines, better range than batteries and refuelling in a few minutes. All that with exhaust pipe emissions of water. It is usable in cars, vans, trucks, buses and even trains. In Germany, some strong collaboration and government



Stephen Metcalfe MP thanks the speakers



Lunch guests including Norman Lamb MP, Chair of the House of Commons Science and Technology Select Committee, Lord Patel, Chair of the House of Lords Science and Technology Select Committee, Stephen Metcalfe MP, Chair of P&SC, Lord Selbourne, Professor Alan Malcolm, Sinead Lynch, Lisa Anson, Lord Oxburgh

backing has enabled a joint venture involving six companies, including Shell, to begin developing a nationwide network of up to 400 stations by 2023. Shell is now selling hydrogen fuel at one service station in the UK with two more stations opening soon.

Finally, Ms Lynch went on to describe a third type of fuel which could aid Energy Transition, natural gas. Gas as a transport fuel has the benefit of releasing a fraction of the particulates and lower nitrogen oxide emissions than conventional fuels. In both Birmingham and London, black

own. We are beginning to see ships and trucks being powered by liquified natural gas.

She concluded by stating that the entire energy landscape is shifting. That means there has never been a more exciting time to be in the energy industry. And there has never been a greater need for that industry to build a pipeline of diverse talent. If science is to unlock the solutions that society needs, companies like Shell have to engage in a spirit of collaboration with both the science community and with policy makers.



Stephen Metcalfe MP presents Professor Alan Malcolm with a gift of thanks following his retirement from P&SC

cabs could soon be running on cleaner liquid petroleum gas. She did however highlight that it is probably in heavy transport – freight and shipping especially – that gas really comes into its

Following these speeches, Stephen Metcalfe MP gave a vote of thanks to the speakers and gave an overview of what the P&SC had achieved over the previous year. With regard to the



Chi Onwurah MP, Deputy Chairman of P&SC with guest speakers Lisa Anson and Sinead Lynch

Brexit negotiations, he highlighted that he and the P&SC are striving to ensure parliamentary colleagues understand what needs to be done to maintain and grow UK research and innovation. This will continue throughout 2018.

To conclude proceedings, Stephen Metcalfe presented a gift of thanks to Professor Alan Malcolm who stood down as Executive Secretary to the Parliamentary and Scientific Committee after 5 years of service. Alan was thanked for all of the support he had given the Committee and for all of his hard work. Lord Oxburgh added his gratitude to Alan and thanked everyone for attending and for their ongoing support to the Parliamentary and Scientific Committee.



P&SC Individual Members Professor Alan Malcolm and Dr Michael Elves



Dr Lucy Harper, SfAM and Camilla Morrison-Bell, British Ecological Society



P&SC President Lord Ron Oxburgh with Lisa Anson and Aileen Thompson, ABPI



Lord Selbourne, Dr Stephen Benn, Dr Gail Cardew and Professor Alan Malcolm

EVIDENCE INFORMED POLICY MAKING AND THE ROLE OF UNIVERSITIES



Gavin Costigan,
Director of Public Policy,
University of Southampton

Over at least the last 20 years, and probably for much longer, different incarnations of the Science and Technology Committees from both the Commons and Lords have made recommendations about improving the Government use of science and research evidence in policymaking. Similar calls have been made over that period by others, such as the Royal Society and the Campaign for Science and Engineering.

The result has been change – change which often appears painfully slow at the time, but which taken over the period has led to real progress. That change has included the development of a network of Chief Scientific Advisors in Government departments, reinvigoration of the science and engineering profession within Whitehall (with similar networks for social scientists and economists), improvements to science advisory committees, and more exchange in and out of the civil service. In 2017, we have seen another welcome development, with Departments publishing Areas of Research Interest, questions in which they would welcome research evidence.

The job is far from done, of course, and more is needed. Pressure is – and should be – maintained on Government to keep the momentum for change going. But it is interesting to note that over the last two decades, most of the attention has been on the demand side of the equation – what is Government doing to

seek and use evidence? Less focus appears to have been given to the supply side. Where is that evidence going to come from? And is it being prepared and supplied in a way that make it easy for policymakers to use?

In the UK, the majority of non-commercial research is carried out in the University sector. This means that, in this country at least, universities have a key role in providing evidence and expertise to Government. How do they do this? Do they have the skills, the resources and the motivation?

Parliament has a direct interest in this as well, of course. Select Committees, the Libraries of the Houses of Commons and Lords, the Parliamentary Office of Science and Technology – all draw on research evidence and expertise from UK universities. Are our universities geared up to deliver what Parliamentarians and their officials need? The recent report from colleagues in the Parliamentary Office of Science and Technology, *The Role of Research in the UK Parliament*¹, suggests they are not, with academic evidence

being late and poorly presented, with a limited understanding among academics of how Parliament operates.

Those who know both worlds – that of the policymaker and the academic – know that they have very different drivers. The key currency in UK universities is academic time, and researchers never have enough of it. They are constantly making choices about how to prioritise, but in contrast to many other types of organisations, there is a high degree of freedom in those choices. The creative drive which makes universities so successful hinges on this independence within the academic community and amongst individual researchers. All of which means, if universities want to increase the active participation of their researchers in working with policymakers, it's not a question of telling them that they should. It's about putting the right incentives in place.

So what are these incentives? One, of course, is money. Increasingly, funding is available for policy related activities, through impact-specific funding

schemes (such as the Higher Education Innovation Fund, and the Impact Acceleration Accounts from different Research Councils) and from money for policy impact costed directly into research grants. The Research Excellence Framework (REF) provides the promise of future financial reward for universities with successful policy impacts, via Impact Case Studies. The 2014 REF was the first to include Impact Case Studies, and their contribution to the 2021 REF assessment has been raised from 15% to 20% - a firm signal that both money and prestige will come to universities succeeding in impact – including providing evidence and expertise for policymakers.

So money is available now, and increasingly in the future. Universities have most definitely noticed, and such financial incentives are definitely necessary – but there are not sufficient.

The second incentive is recognition. Academics careers are built on personal recognition. Whether seeking promotion internally or moving elsewhere for their next role (in what is a highly mobile industry), there are some key, measurable success factors. Winning research grants, publishing in the right journals, speaking at conferences, teaching metrics, leadership roles – these are all part of that mix. Delivery of policy impact is now beginning, very slowly, to count for something, and universities can do more to incorporate impact into career progression, promotion and recruitment criteria.

To do so does however require clearer and more public recognition by policymakers of

the individual contribution which academics have made. This is somewhat countercultural in the context of the civil service. In my 17 years in Whitehall, I wrote major elements of Government policy documents, provided the expert advice on policy areas I had the lead on, drafted articles for publication, and contributed to taking and implementing the decisions of Government. But rarely if ever was my name publicly displayed, and it didn't need to be for me to build a successful career as a civil servant.

Policy decisions never hinge around a single piece of evidence and expertise, of course, and it is totally unrealistic to expect departments and ministers to credit individuals publicly with having “changed policy”. But there are ways in which departments can reflect the contributions which individuals have made, such as referencing individuals and/or publications from which they have drawn evidence, and we see this happening increasingly. Discussions on how best to do this should continue, involving universities, policymakers within departments and those within the wider public sector charged with monitoring policy impacts of academics in the REF and elsewhere. It could even form a part of the recently announced Knowledge Exchange Framework.

Finally in terms of incentives, universities can provide specialist support to academic staff to support their work with policymakers. In this regard, it is worth comparing policy work with that of interactions with business. Universities have developed increasingly sophisticated support structures

over the last 30 years, both for interacting with established companies, and in supporting spin-outs and start-ups. People with expertise from the world of business were brought in, and have helped transform the enterprise agenda of many universities.

A similar trend is now beginning to emerge in support of public policy activities. Small units are appearing in a number of universities, including the one I lead at the University of Southampton. These teams vary in size and function, and it's clear that – as in the early days of Technology Transfer Offices – there is no established model. Many are time-limited, with universities experimenting and waiting to see the results. Several have drawn in expertise from the policy-making community – making good use of a contracting civil service since the financial crisis.

As universities begin to explore more central and coordinated support for increasing links between academics and policymakers, a number of general themes are emerging where they are focussing their effort. They include:

1. Training and awareness raising within their own institutions
2. Developing links directly with policymakers (local and national), and then introducing them to academics within the institution
3. Distributing small packets of university funding to support policy related projects
4. Identifying small external funding opportunities for policy work

5. Supporting academics to bid for – and subsequently deliver – policy activities as part of regular research grants
6. Supporting (early) preparations for REF 2021 Impact Case Studies

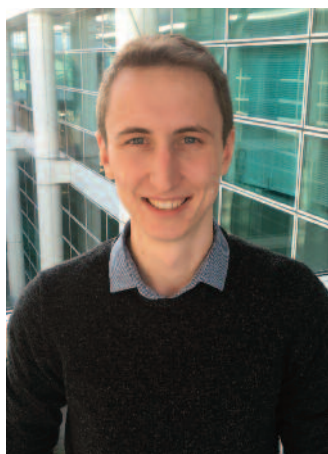
It's not yet clear how these policy units will develop. They could be a flash in the pan initiative, or a start of a new established area of university business. Either way, their development demonstrates two things. Firstly, that Universities are taking more seriously the need to up their game in terms of supporting policymakers (if only because there's future money and prestige in it). And secondly, that it's difficult, and needs a different set of skills.

I started by saying that there had not been enough focus on the supply side of the evidence to policy equation. But of course, supply and demand are linked. The more policymakers ask for evidence, the more universities will improve how they deliver it. And the easier it is supplied for policymakers to use, the more they will seek it out. So, my hope is that the next review to look at Government's use of evidence in policy making (and I have no doubt that there **will** be another one) will also question and challenge what universities are doing to supply that evidence.

Reference:

1 Kenny, C., Rose, D.C., Hobbs, A., Tyler, C. & Blackstock, J. (2017) *The Role of Research in the UK Parliament Volume One*. London, UK, Houses of Parliament

INNOVATION IN THE CLEAN GROWTH STRATEGY: THE FUTURE OF HYDROGEN IN THE UK



Matt Whitney, NPL

The Clean Growth Strategy provides an ambitious route to achieving the UK's climate targets, and innovation in new technologies underpins many of the proposed policies. Matt Whitney, in the Energy and Environment Strategy team at the National Physical Laboratory (NPL), explores how hydrogen technology could help to tackle the decarbonisation challenge.

The UK Government recently unveiled its Clean Growth Strategy, setting out how the UK will stimulate economic growth while reducing carbon emissions over the next few decades.

Since the Climate Change Act of 2008, the UK has seen significant progress in reducing greenhouse gas emissions and is on track to beat its 2022 decarbonisation targets. However, the Clean Growth Strategy highlights that more needs to be done to ensure the UK can meet its 2050 target to reduce emissions by at least 80% on 1990 levels.

Transport and heat are two sectors that are particularly difficult to decarbonise. The UK heating network has a structural dependence on fossil fuels with 84% of homes currently being supplied from non-renewable natural gas. In transport, electric vehicles still only represent around 2% of new car registrations, despite improvements in the recharging infrastructure and range of the vehicles.

As a result, these sectors together contribute over half of total UK greenhouse gas emissions. It is clear that innovative new technologies and strong policy will be key in quickly reducing emissions in line with legally binding targets.

Hydrogen gas has the potential to decarbonise both heat and transport. Hydrogen can be

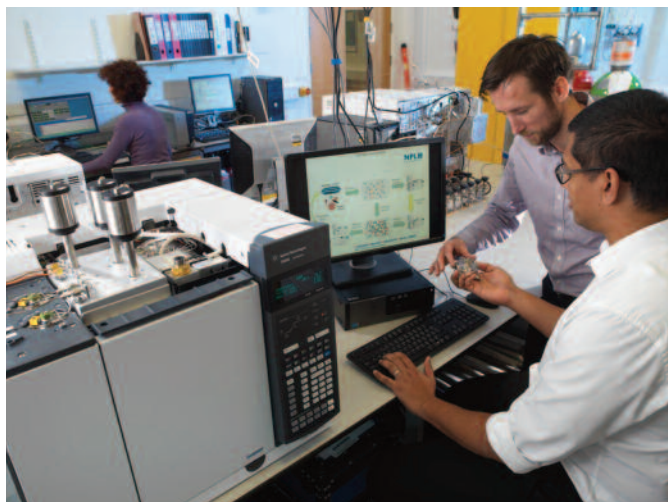
produced from renewable sources via electrolysis of water or by splitting natural gas into carbon and hydrogen, although this method will require the use of carbon capture and storage to be carbon neutral. Once produced, hydrogen can be stored for long periods of time and transported around the country, potentially in the existing natural gas network. Hydrogen can be burnt in homes for heating, or used in transport through fuel cell electric vehicles.

The Clean Growth Strategy recognises the role that new technologies such as hydrogen have to play. In total, the strategy brings together £2.5 billion for innovation funding to transition the UK to a low carbon society. This includes £25 million to inform the feasibility of using hydrogen as an alternative to natural gas for

heating, building on existing government investment of £4.8 million to create a network of 12 new hydrogen refuelling stations and £23 million to boost the roll-out of hydrogen vehicles.

As with any innovation, taking new hydrogen technologies from feasibility trials to wide-scale uptake is a significant challenge. The National Physical Laboratory (NPL), the UK's National Measurement Institute, sits at the interface between academia and industry and has a long history in supporting the transition of innovations from the lab in to the real world.

Robust measurement science is necessary for the success of new technologies. It gives users and investors confidence that a technology can operate reliably and safely, as well as giving regulators the information needed to establish appropriate benchmarks. In recognition of



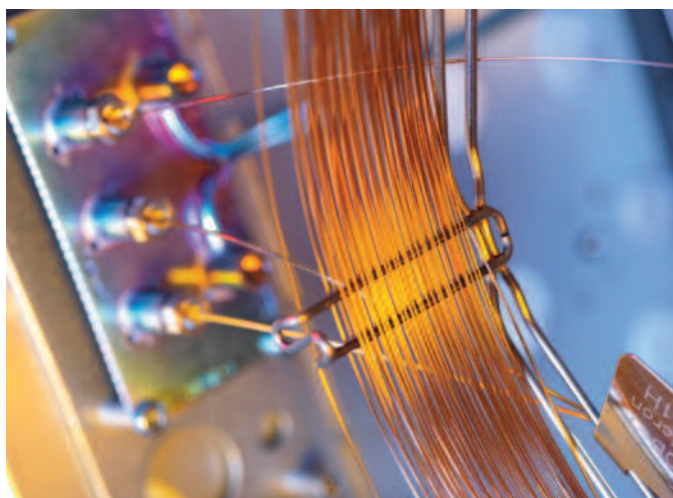
The NPL hydrogen purity laboratory where the team are developing a new gas analysis method

the decarbonisation potential of hydrogen, NPL recently published a report that identifies the measurement challenges that face the commercialisation of hydrogen.

For transport, most hydrogen refuelling stations in the UK produce hydrogen by splitting water into hydrogen and oxygen using grid electricity via electrolysis. The gas is then stored in high-pressure tanks on-site and dispensed to the

before the fuel can be used in a fuel cell electric vehicle. Due to the complexity of the measurements required, NPL is currently the only laboratory worldwide accredited to provide calibration gas standards and validated methods to comply with the purity specifications.

To overcome this potential barrier, a hydrogen impurity enrichment device has been developed at NPL. This device will enable other laboratories to



Gas chromatography column used for the measurement of hydrogen purity

vehicle in a similar method and in a similar refuelling time to conventional petrol and diesel cars. While driving, hydrogen passes through a fuel cell stack and reacts with oxygen to produce electricity which powers the vehicle. The only emission from the vehicle is water.

Fuel cells are however extremely sensitive to impurities in the hydrogen being delivered, as even trace amounts can quickly degrade the fuel cell. This is a serious concern for fuel cell manufacturers and the automotive industry, as impure hydrogen would impact the reliability, lifespan and ultimately the mainstream commercialisation of fuel cell technologies. In recognition of this challenge, an international standard has been developed which requires measurements of 13 impurities to be taken

provide the necessary impurity quality-assurance measurements, calibrated against national standards, and facilitate the scalability of hydrogen fuel applications internationally. As the industry continues to grow, more cost-effective and simpler methods for detecting impurities will need to be developed.

Hydrogen can also be used to generate heat by direct combustion in boilers. National rollout of hydrogen boilers would require large-scale transportation of hydrogen around the country. The existing gas network could be used for carrying hydrogen gas, although there are various technical challenges facing such a shift. For example, hydrogen gas is odourless and invisible, and therefore a suitable odorant would need to be added that



NPL hydrogen refuelling station

doesn't impact the performance of appliances. In addition, accurate hydrogen flow meters would need to be implemented to ensure accurate billing of the customer.

An ever-growing evidence base demonstrates the potential for hydrogen to provide a cost-effective and scalable way of decarbonising the UK's transport and heating sectors. However, there is no silver bullet, and it is clear that innovative science and engineering, as well as robust

measurement science, has to be cultivated across decarbonisation technologies.

With the significant investment across low carbon technologies pledged by the Clean Growth Strategy, it is likely that the UK can lead the way in finding new innovations to meet its ambitious emissions targets.

NPL's report exploring the challenges facing widespread rollout of hydrogen is available for download at www.npl.co.uk/hydrogenreport

ABOUT NPL

NPL is the UK's National Measurement Institute, providing the measurement capability that underpins the UK's prosperity and quality of life.

From new antibiotics to tackle resistance and more effective cancer treatments, to unhackable quantum communications and superfast 5G, technological advances must be built on a foundation of reliable measurement to succeed. Building on over a century's worth of expertise, our science, engineering and technology provides this foundation and helps to make the impossible possible. We save lives, protect the environment and enable citizens to feel safe and secure, as well as support international trade and commercial innovation. As a national laboratory, our advice is always impartial and independent, meaning consumers, investors, policymakers and entrepreneurs can always rely on the work we do.

Based in Teddington, south-west London, NPL employs over 500 scientists and is home to 388 of the world's most extensive and sophisticated laboratories. NPL also has regional bases across the UK, including at the University of Surrey, the University of Strathclyde, the University of Cambridge and the University of Huddersfield's 3M Buckley Innovation Centre.

To find out more please visit npl.co.uk

BIG BANG @ PARLIAMENT

Gemma Wood, Head of Public Affairs, Engineering UK

To celebrate Tomorrow's Engineers Week 2017 EngineeringUK and the Parliamentary and Scientific Committee once again hosted a Big Bang @ Parliament. Finalists in The Big Bang Competition from schools from around the country came to Parliament to showcase their entries to MPs, Peers and people from across the engineering community.

Tomorrow's Engineers Week is a national campaign led by EngineeringUK and backed by industry, the engineering profession, government and education providers to promote the important message that engineering offers rewarding, creative and well-paid job opportunities for young men and women.

The UK needs more engineers and, to achieve this vital aim, we must excite young people about the incredible range of great careers that science, technology, engineering and maths subjects can lead to.

Three students from Liverpool Life Sciences University Technical College attended with their project on designing a cloud chamber. Also from the



Andrew Gwynne MP with Turing House School and their Tomorrow's Engineers EEP Robotics challenge



Anne Milton MP, Minister of State for Skills and Apprenticeships and Minister for Women addresses the room

North West, Alderley Edge School for Girls exhibited their playground traffic light system, which they created in conjunction with Siemens for a local specialist school to meet

the needs of the children there.

The Grammar School at Leeds demonstrated their project to create a centrifugal pump, which uses sustainable energy and nano-filtration. A student from University Academy of Engineering South Bank came with his affordable smart phone project, explaining how he planned to achieve social good by making the now essential technology more accessible.

Guildford County School, who looked at generating vitamins and minerals from recycled foods, were delighted to meet their local MP and Minister for Skills and Apprenticeships, Anne Milton, who gave a speech at the event.



Stephen Metcalfe MP, Chair of the Parliamentary and Scientific Committee, Government Envoy for the Year of Engineering and Apprenticeships Ambassador welcomes guests to the event

Pupils from Kent College showcased their low cost robotic arm designs and Rainford High Technology College explained

their Unilever STEM challenge project to design a game to help kids with hand washing. The two youngest competitors were from Outwood Academy, Shafton, with two finalists with individual projects, one researching kindness and the other nuclear energy.

Last year's UK winners attended the event and demonstrated their winning projects.

The UK Young Engineers of the Year 2017, Sankha Kahagala-Gamage and David Bernstein were inspired to act after Sankha witnessed a passer-by having an epileptic fit. He then teamed up with fellow Loughborough Grammar School student, David,

to create a wearable vest that monitors heart rate variability and body temperature to efficiently predict an epileptic fit up to eight minutes in advance.

Once a fit is detected, the vest sends a message to both the wearer's phone as well as possibly a carer to warn them that they need to seek help.

The GSK UK Young Scientists of the Year 2017 are George Rabin and Ed Thurlow from Churchill Academy and Sixth Form, Somerset. They were awarded the GSK Young Scientists of the Year title for their project investigating birds' responses to colour in the hope of using the knowledge to help airplane engineers reduce the number of bird strikes.

Robotics Challenge. Turing House School attended the Big Bang @ Parliament with their Lego robot to demonstrate their progress to guests.

Companies who sponsor The Big Bang Fair, to be held in Birmingham 14th-17th March 2018 also attended the event with tasters of a few interactive STEM activities including virtual reality headsets. They included Air Products, BAE Systems, Rolls Royce and Siemens.

Parliamentarians including Deputy Chief Whip, Esther McVey, Chair of the Treasury Select Committee, Nicky Morgan and Shadow Communities and Local Government Secretary/ Labour Co-National Campaign Coordinator, Andrew Gwynne, came to join in the celebrations.

Engineers of the Year to victory, gave inspiration to the young people in the room competing in 2018.

Stephen Metcalfe MP, Chair of the Parliamentary & Scientific Committee, Government Envoy for the Year of Engineering and Apprenticeships Ambassador gave a speech welcoming guests, congratulating the finalists and outlining his support for The Big Bang Fair and Tomorrow's Engineers.

Mark Titterton, CEO of Engineering UK, said a few words on the Tomorrow's Engineers theme, engineers on a mission, explaining that Tomorrow's Engineers Week 2017 was about showcasing the contribution that engineering makes to society, in order to

encourage more young people to see it as a potential career.

A huge thank you to everyone who has taken part in Tomorrow's Engineers Week this year. All around the UK people have been joining in with engineering activities and events and sharing inspiring details on social media.

According to research conducted for Tomorrow's Engineer's Week, young people demand jobs that tackle social issues, with 67% saying they would consider a career in engineering if it allowed them to help the world, the environment or save peoples' lives.

Find out more at www.tomorrowsengineers.org.uk



Esther McVey MP and Alderley Edge School for Girls with their Playground Clock project

In their project, the students painted a series of four feeders in different colours and filled them with food. They then introduced birds to the feeders and counted the number of bird visits to the feeders and how much food the birds ate. Their investigation found that birds were more likely to feed from a feeder painted in blue.

In addition to The Big Bang Competition, The Big Bang UK Fair hosts the finals of the Tomorrow's Engineers EEP

All of the MPs and Peers and other stakeholders who attended were hugely impressed with the quality of the young scientists' and young engineers' work, their dedication and their passion.

Anne Milton MP, the Minister of State for Skills and Apprenticeships and the Minister for Women gave an energising speech and Daljit Kaur, who leads STEM innovation at a group of Loughborough schools and led last year's UK Young



John Penrose MP with 2017 GSK Young Scientists of the Year from Churchill Academy



Nicky Morgan MP with 2017 Big Bang Young Engineers of the Year from Loughborough Grammar School

ANTIFUNGAL STEWARDSHIP

Rosemary Barnes

Emeritus Professor of Medical Microbiology and Infectious Diseases, Cardiff University School of Medicine

Many of us are familiar with the term antimicrobial stewardship in the context of the use of antibacterial agents. The use of a coordinated approach to measure and monitor the appropriate use of antibiotics aims to improve patient outcomes by optimizing treatment through the selection of the right drug, right dose and the right duration whilst also reducing adverse events and the emergence of resistant organisms, has become a fundamental part of patient care¹.

However, whilst there is a clear relationship between bacterial resistance and antimicrobial usage and also between clinical failure and resistance (indeed antibiotic usage can be used as a surrogate for resistance), few data can be applied to fungal infection. Fungal infections are increasingly commonplace. In humans, they occur when the body's immune system is unable to deal with an invading fungus which has taken over an area of the body. Fungal infections can be difficult to kill as they can survive in the environment and often re-infect.

Systemic infections particularly invasive *Candida* and *Aspergillus* infections generally affect patients with severe underlying disease particularly immunocompromise. The factors determining response to treatment are more complex with the host response playing a major role in these opportunistic infections.

Little formal surveillance of invasive fungal disease takes

place in the UK and so the true burden of disease is unknown. Whilst there is voluntary reporting of *Candida* bloodstream infections², the incidence of deep-seated infection and infections caused by other fungi is largely unknown. The true benefits of antifungal stewardship programmes will be difficult to demonstrate in this context.

Diagnosis of fungal infection in these patients is more difficult and conventional techniques such as microbiology and culture are suboptimal such that many infections go undiagnosed. This results in many clinicians treating patients considered at risk of infection with antifungal drugs empirically when they have non-specific sign and symptoms. This strategy is largely driven by fear given the high morbidity and mortality associated with invasive fungal diseases, but the evidence base to support the practice is poor. Much of this treatment is inappropriate as most of the patients do not have fungal infection and many of the drugs are expensive and carry risks of side effects and drug interactions. Antifungal expenditure continues to rise in the UK and is out of proportion with the scale of the problem given that invasive fungal infections are actually quite rare. Nonetheless, the incremental costs of managing established fungal infection are substantial, at more than an additional £50,000 per patient³.

Encouragingly, newer diagnostic tests that do not rely

on conventional culture techniques such as molecular and antigen biomarker tests have the potential to improve management. A variety of biomarker tests have been developed and many have been standardized and are commercially available. Despite this, use in the UK is not widespread. This is partially due to a lack of understanding of their clinical utility and the fact that a negative result can be more useful than a positive one by enabling the diagnosis to be excluded so antifungal drugs do not need to be used empirically. Furthermore, the use of a combination of biomarkers can diagnose infection more accurately and at an earlier stage allowing treatment to be optimized for individual patients. Integrating diagnostics into treatment care pathways not only reduces empirical therapy but detects infection before established disease has developed, decreasing inappropriate antifungal usage and costs and improving patient outcomes⁴.

Antibiotic stewardship focuses heavily on the prevention of the emergence of drug resistance. Resistance to antifungal agents, particularly azole drugs, is of increasing concern and is rising globally. However, clinical resistance in patients, linked to over usage is relatively rare and seen mainly in a very few patients with chronic infection who have received prolonged courses of antifungal agents. Of more concern is the use of antimicrobials drugs in agriculture, horticulture and

animal husbandry. Drugs of the azole class, similar to those used as a mainstay to treat serious human infection, are used widely and the volume used in agriculture completely dwarves all medical use. Approximately half of the total acreage of European cereal and grapevine production is treated at least once a year with azole drugs and soft fruits are routinely sprayed with these agents to prolong shelf life. Ornamental bulbs and shrubs are also treated prior to sale to prevent spoilage⁵. Millions of kilograms of triazole drugs are used in the spraying of crops and food commodities in UK each year and the emergence of multiazole resistance in environmental isolates of aspergillosis has been linked to usage⁶. These resistant isolates are now found in clinical environments and have the potential to impact on patient care.

It can be argued that without routine use of antifungal drugs by the industry, food production could be cut by up to 30% and spoilage would increase. The economic effect would be large and restriction on drug usage could contribute to global poverty.

To conclude, antifungal stewardship requires a team approach to integrate patient risk factors, diagnostics and optimal therapeutic choices⁷. Education, research and investment are required to improve understanding and interpretation of these various factors. Formal surveillance of invasive fungal

disease needs to be put in place to monitor the impacts of stewardship.

It is unlikely that stewardship can contribute greatly to the prevention of antifungal resistance in the hospital setting. This will require an international, government and multiagency approach to assess the real needs and benefits of use of antifungal agents in agriculture and other areas outside of medicine.

References

- 1 Dellit TH, Owens RC, McGowan JE Jr, Gerding DN, Weinstein RA, Burke JP, Huskins WC, Paterson DL, Fishman NO, Carpenter CF, Brennan PJ, Billeter M, Hooton TM. "Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America Guidelines for Developing an Institutional Program to Enhance Antimicrobial Stewardship". *Clin Infect Dis* (2007) 44 (2): 159-77. DOI: <https://doi.org/10.1086/510393>
- 2 PHE. Public Health England, Health Protection Report Vol. 10 No. 32 September 2016; <https://www.gov.uk/government/publications/candidaemia-annual-data-from-voluntary-surveillance>
- 3 Ceesay MM, Sadique Z, Harris R, Ehrlich A, Adams EJ, Pagliuca A. "Prospective evaluation of the cost of diagnosis and treatment of invasive fungal disease in a cohort of adult haematology patients in the UK". *J Antimicrob Chemother* 2015;70(4): 1175-1181 DOI: 10.1093/jac/dku506
- 4 Barnes RA, "Directed therapy for fungal infections: focus on aspergillosis". *J Antimicrob Chemother* 2013; 68(11):2431-4. DOI: 10.1093/jac/dkt227
- 5 O'Neill report: "Antimicrobials in Agriculture and the environment" 2015; [https://amr-review.org/sites/default/files/Antimicrobials in agriculture and the environment –Reducing unnecessary use and waste.pdf](https://amr-review.org/sites/default/files/Antimicrobials%20in%20agriculture%20and%20the%20environment%20Reducing%20unnecessary%20use%20and%20waste.pdf)
- 6 ECDC. European Centre for Disease Prevention and Control, "Risk assessment on the impact of environmental usage of triazoles on the development and spread of resistance to medical triazoles in *Aspergillus* species". ECDC Stockholm; 2013.
- 7 Agrawal S, Barnes R, Bruggemann RJ, Rautemaa-Richardson R, Warris A. "The role of the multidisciplinary team in antifungal stewardship". *Journal of Antimicrobial Chemotherapy*. 2016;71:37-42.

SCIENCE, INNOVATION AND BREXIT

Elizabeth Dellar

Policy Intern, Campaign for Science and Engineering

Six months after the publication of the report "Science priorities for Brexit" in March 2017, the Parliamentary and Scientific Committee held a discussion meeting in the Boothroyd Room of Portcullis House on Tuesday 10 October to further examine how research and innovation issues are being considered in Brexit negotiations.

The event was opened with a warm welcome from the Chairman, Stephen Metcalfe MP, who introduced the four speakers; Sir Venki Ramakrishnan, President of the Royal Society, Tom Thackray, Director for Innovation at the

Confederation of British Industry, Dr Sarah Main, Executive Director of the Campaign for Science and Engineering, and Professor Julia Buckingham, Treasurer at Universities UK. He reflected that after several Parliamentary and Scientific



A distinguished panel of guest joined P&SC Chairman Stephen Metcalfe to debate the issues surrounding Science, Innovation and Brexit. L-R Sir Venki Ramakrishnan, President of the Royal Society, Tom Thackray, Director for Innovation at the Confederation of British Industry, Stephen Metcalfe MP, Chairman P&SC, Professor Julia Buckingham, Treasurer at Universities UK and Dr Sarah Main, Executive Director of the Campaign for Science and Engineering

Committee meetings over the past year, we are now in a critical decision-making period, and that this discussion is an opportunity for us to say what we think the government is doing right and wrong, and where it needs a nudge.

“Brexit is the most significant political event in this country in the last half century, but its ramifications may not be known for decades” Stephen Metcalfe MP

Sir Venki Ramakrishnan was next to speak and commented that whilst there has been good progress on engagement with the scientific community, the Government’s Brexit paper is a statement of intent only, so we still need to ensure recognition of five key points:

- Research and innovation is not done in the UK, or by UK citizens, alone. Sir Venki stressed the role that mobility and collaboration have in improving the quality of science, noting that in 2015 over half of the UK’s research output was the result of an international collaboration and these collaborations are increasing – both in absolute terms and as a proportion of the UK’s research output.
- People are attracted to work in the UK by the excellence of our research base, the open culture, and the quality of life for themselves and their families. We need the whole ecosystem of researchers, early career researchers and technicians as well as science leaders.
- We are right to build international partnerships, as well as strengthening European partnerships.
- Ongoing uncertainty over our future engagement with Horizon 2020 is unhelpful, particularly alongside discussion of an ‘implementation period’ that

will take us to the end of this funding programme. The government could address this now by making a financial commitment to Horizon 2020 until its end and committing to being part of the next EU research programme.

- The world is listening and hears us; we need a consistent and positive message welcoming people to live and work in the UK.

Tom Thackray provided a perspective from the business sector, and was clear that continued engagement with the EU is vital to innovation and business, and that innovation is the answer to a prosperous society. Strong links with the EU are needed for better outcomes, not just for access to money, but also for access to facilities and expertise. Alluding to the UK’s prowess in innovation, he also viewed the UK as having a good case for a bespoke arrangement to continue our involvement in EU research.

Tom also highlighted the need for better and stronger export relationships, as the EU acts as a gateway to the rest of the world, particularly for SMEs. He was clear on the need for the avoidance of a legislative limbo and the need to influence regulation from the start.

Professor Julia Buckingham followed, placing an emphasis on a need for the positive rhetoric from the Prime Minister to become solid commitments to allay fears. She had two clear priorities, firstly, access to EU framework programmes are key to underpinning our reputation

“Collaboration results in better innovation outcomes: a problem shared is a problem halved” Tom Thackray, Director for Innovation, Confederation of British Industry

for world-leading excellence, as collaboration is incentivised by our success within the system. Whilst commitments to underwrite Horizon 2020 grants were welcomed, Professor Buckingham drew attention to the fact that applications can take up to 18 months, so those starting now may not be complete by March 2019. People are the second priority. Professor Buckingham viewed the UK to be at serious risk of losing talent that is essential for our ability to deliver impact in innovation and economic growth, with confirmation of residency and work rights needed to secure this talent. An additional point was the impact of migration on our ability to train our own workforce, as

“We are not faced with a binary choice between the EU and the rest of the world” Sir Venki Ramakrishnan, President of the Royal Society

many specialist masters programmes are only viable due to international students.

Dr Sarah Main then looked back, commenting that one year on, the consensus on major themes is still present, but the key difference today is that things are considerably more time critical. Dr Main’s focus was on domestic investment, as we have a high degree of scientific and cross-party political consensus on a commitment to increasing public and private investment in R&D, but that there is a need for ambition and practicality. Her recommendation was for the creation of a roadmap to a 3% investment target, with milestones for each sector over a 10 year timeframe.

After these opening addresses the event moved onto a Q&A discussion. Vicky Ford MP, had

words of caution in that our ability to influence Horizon 2020 has been key in ensuring the suitability of funds for British science, and questioned whether the sector is doing enough across the continent to communicate the benefit of UK science to Europe. Both Sir Venki and Professor David Cole-Hamilton, President of the European Association for Chemical and Molecular Sciences, added that European learned societies and professional bodies were clear that they valued UK participation, but suggested they could do more to influence their own governments. Tom Thackray was also clear on the benefits seen by the business sector.

On a question from Lord Kakkar on how the science community would inform Government on maintaining the UK science base in the event of a no-deal, Dr Main answered that there are many aspects under domestic control, such as education, our migration system and investment, so the challenge is to Government to take the decisions to allow science and engineering to thrive. Sir Venki added that a no-deal does not prevent our involvement in Framework Programmes, as an associated country.

Both Professor David Cole-Hamilton and Daniel Zeichner MP brought up issues of the disconnect between the discussion at parliamentary level and the reality for researchers who often feel distinctly unwelcome. Stephen Metcalfe MP responded by highlighting the importance of changing our messaging even if we cannot provide practical reassurances.

Both Professor Buckingham and Professor John Atherton, Pro Vice Chancellor of the University of Nottingham drew attention to the impact of messaging on UK and EU nationals who have right of residency, but are still increasingly considering leaving

"Europe is served better by staying close to the powerhouse that is UK science and innovation"

Tom Thackray, Director for Innovation, Confederation of British Industry

due to the perception of opportunities closing. Dr Main also commented on the difficulty of obtaining black and

white examples, as these effects are highly intangible.

Both Mike Galsworthy of Scientists for EU, and Tom Nichols, commented on the need for connecting with the public about the needs of the

scientific and business community; with Tom Thackray suggesting a need for businesses to have greater

visibility in local communities, and think about the language used.

Other questions were from Andrew Mackenzie, of The Physiological Society, on the specific needs of the scientific community in Northern Ireland, and Jeffrey Llewellyn of the British Measurement and Testing Association on the skills base of scientists in analytical services who will be difficult to replace.

Stephen Metcalfe MP then brought the event to a close with a clear call on the need for a positive approach to make progress, as negativity will drive people away, and a reminder that "We will be leaving, but we need to work hard and bring everyone along with us".

Elizabeth Dellar
Policy Intern, Campaign for Science and Engineering

"How can we quantify the number of times the phone didn't ring, the times a path is not taken"

Dr Sarah Main, Campaign for Science and Engineering

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SCIENCE AND STORMONT 2017

Leigh Jeffes, Public Affairs Advisor, Royal Society of Chemistry

The Royal Society of Chemistry's sixth annual *Science and Stormont* was held at the Parliament Buildings, Stormont, Belfast on Monday 9th October.

Science and Stormont, organised on behalf of, and in cooperation with, the Northern Ireland STEM community is designed to foster close relations between scientists and the policymakers and key stakeholders.

In his Foreword to the event flyer, **Professor Sir John Holman**, President of the Royal Society of Chemistry wrote:

'The theme of this year's gathering is Skills for Science and Innovation, and we welcome a number of excellent



Dr Stephen Farry MLA, Dr Steve Aiken OBE MLA, Dr Caoimhe Archibald MLA, Dr Helen Pain, and Leigh Jeffes ©RSC

speakers on this important topic. As President of a professional body, a passionate advocate of vocational training and a lifelong science teacher, I need no convincing of the importance of developing the

right skills throughout one's education and career'.

The event, chaired by **Dr Helen Pain**, Deputy Chief Executive of the Royal Society of Chemistry, drew a record

attendance which reflected a broad representation of the Northern Ireland STEM community and a capacity exhibition consisting of 25 scientific societies and professional bodies.

Science and Stormont was sponsored by kind permission of **Naomi Long MLA**, Chair of the the Northern Ireland Assembly's All-Party Group on STEM, together with **Dr Steve Aiken OBE MLA**, and **Dr Caoimhe Archibald MLA**, Vice-Chairs of the Group.

In her message to delegates Naomi Long MLA said:

'This year's focus on Skills for Science and Innovation is an

essential policy area that will require cooperation between policymakers and those in the STEM community. Through working together, we can ensure that Northern Ireland is prepared for the challenges currently associated with Brexit'.

The speaker programme, was divided into two panel sessions, and comprised, firstly: **Professor Gerry McKenna**, Professor Emeritus & Hon. Secretary, Heads of University Centres of

pharma industry'.

In the second panel session, **Brian Doran**, Chief Executive Officer, Southern Regional College, gave a talk on the *'Evolution of science apprenticeships in Northern Ireland'*, while **Professor Steve Furber CBE**, Chair of the Royal Society's Computing Education Project Advisory Group, and ICL Professor of Computer Engineering, School of Computer Science, University of



The Science and Stormont exhibition

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Biomedical Sciences, and Vice President of the Royal Irish Academy, **Dr Marie Cowan**, Director, Geological Survey Northern Ireland. Professor McKenna and Dr Cowan presented on *the preliminary analysis and conclusions of the findings of the Royal Irish Academy Brexit Taskforce*.

Dr Yvonne Armitage, Bioeconomy Specialist, Knowledge Transfer Network Ltd and Chair of Royal Society of Biology Employer Advisory Board, delivered a talk on *'Understanding DNA: Bioscience is much more than biology in today's laboratory'*.

Professor Tom Moody, Vice President of Technology, Development and Commercialisation, Almac and Arran Chemicals, spoke on *'The future of the fine chemical and*

Manchester, spoke on 'The reboot of computing education'.

The subject of a presentation by **Lorraine Marks**, Manager, Knowledge Transfer Partnerships, Queen's University Belfast, was *'KTP: Bridging the skills and knowledge gap between Queen's University and NI business'*.



Q&A Panel: Dr Caoimhe Archibald MLA, Dr Steve Aiken OBE MLA and Dr Stephen Farry MLA

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The Science and Stormont exhibition

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Gareth Hetherington, Associate Director, Ulster Economic Policy Centre, Ulster University, spoke on *'The Northern Ireland Skills Barometer – identifying the skills for tomorrow's economy'*. And last, but not least, **Professor Robert Bowman**, Head of School of Mathematics and Physics, Queen's University Belfast delivered a talk on *'An evolution of post-doctoral training and experience'*.

Members of the Legislative Assembly: **Dr Steve Aiken OBE MLA** and **Dr Caoimhe Archibald MLA**, Vice Chairs of the All-Party Group on STEM, and **Dr Stephen Farry MLA**, a former Minister for Education and Lifelong Learning, participated in an excellent Q&A.

A central feature of *Science and Stormont* is the exhibition – an excellent opportunity for scientific societies and professional bodies to demonstrate their work. This year the following organisations were present and we were grateful for their support participation:

Association of Science Education, British Academy, British Psychological Society, Centre for Advanced Sustainable Energy, Geological Survey Northern Ireland, Institute of Food and Science Technology, Institution of Mechanical Engineering, Institute of Physics, Microbiology Society, National Museums Northern Ireland, Queen's University Belfast, Royal Academy of Engineering, Royal Astronomical Society, Royal Society of Biology, Southern Regional College, STEM Ambassador Hub, The Academy of Medical Sciences, The Bryden Centre, The Geological Society of London, The Open University, The Physiological Society, The Royal Society, Ulster University, W5, and the Royal Society of Chemistry.

Next year's Science and Stormont is scheduled for Monday 8th October 2018.

SCIENCE AND THE PARLIAMENT 2017

Bristow Muldoon

Head of Policy Advice, The Royal Society of Edinburgh & Public Affairs (Scotland),
Royal Society of Chemistry

This year's Science and the Parliament event was held on 15 November 2017 and focussed on Science, Innovation & the Economy. Science and the Parliament is organised by the Royal Society of Chemistry (RSC). It also involves speakers, delegates and exhibitors from across the whole scientific & engineering community and Parliamentarians.

The 2017 event was chaired by Royal Society of Edinburgh (RSE) General Secretary, Professor Alan Alexander, who set out the theme of the day. The Deputy Presiding Officer of the Scottish Parliament, Linda Fabiani MSP, gave a welcome on behalf of the Parliament and expressed her thanks to the RSC for its continued commitment to holding the event, now in its 17th year. She reflected on how important and useful MSPs found the event.

Professor Dame Carol Robinson, President-Elect of the RSC, gave the first keynote speech. She observed that the RSC had long links with Scotland dating from its first President, Thomas Graham, maintained to the current day through leading figures such as one of her recent predecessors, Professor Lesley Yellowlees, who was the first female President of the RSC. She reflected on some recent research breakthroughs in Scotland including work on crystalline solids at Heriot-Watt.

RSE President Dame Jocelyn Bell Burnell commented on the role of women in science, advising the conference that the RSE was about to undertake further work on this, following

on from the 2012 Inquiry Report. She noted that progress had been made in the academic sector, through most of the universities now having received Athena Swan awards, though much more still needed to be done.

A Ministerial speech was delivered by Jamie Hepburn MSP, Minister for Employability and Training, who recognised the importance of the scientific and engineering sectors to the Scottish economy. He highlighted several of the



Carol Robinson giving her address

initiatives that the Scottish Government had been pursuing to stimulate science, including the Technology Innovation Centres, the recent STEM Education Strategy, as well as the series of measures that the



Linda Fabiani MSP giving the welcome on behalf of the Parliament

Government intend to pursue to support the economy more generally including the Scottish National Investment Bank.

There followed a panel session involving: RSE Vice President Iain Gray; Dr Jo Reynolds of the RSC; Royal Society Vice President Alex Halliday; and Dr Jano van Hemert of Optos. Iain stressed the need to ensure that the strength of the research base in Scotland is translated into economic benefit. He also expressed concern about whether Scotland had sufficiently influenced thinking on the UK Government Industrial Strategy. Jo called for progress towards the target of

raising overall research and development (R&D) investment to 3% of GDP, including utilising the Industrial Strategy Challenge Fund. Alex Halliday, while agreeing on the need to raise R&D investment also stressed the need to tackle skills gaps to create the right conditions for R&D. Jano observed that the low percentage of large companies contributed to the low level of business R&D and that this requires an uplift in risk capital and entrepreneurship to enable more companies to scale up.

A panel session was chaired by Ken MacDonald of the BBC and comprised of MSPs from the parties represented in

Parliament: Clare Adamson (SNP); Dean Lockhart (Labour); Iain Gray (Labour); Willie Rennie (Lib Dem); and Patrick Harvie (Greens). Topics that the MSPs were asked to comment upon by the audience included: The Young Academy of Scotland study on the impact of Brexit; whether the UK should leave the single market and customs union; shortages of STEM teachers; and how scientists communicate with the public.

There followed a session on the perspective from industry, which was chaired by Professor Polly Arnold of the University of Edinburgh and involved Professor Iain Wall, of the Scottish Council for



Jamie Hepburn MSP and Linda Fabiani MSP with two of the pupils from the Scottish Council for Development and Industry Young Engineers & Scientists, Kirkton of Largo Primary School, Fife



Scottish Council for Development and Industry Young Engineers & Scientists Clubs, Kirkton of Largo Primary School, Fife

Development and Industry, and Alastair Cameron of Scotmas and Chemical Sciences Scotland. Alistair expressed a welcome to the UK Government Industrial Strategy and explained how Chemical Sciences Scotland provides a voice to the Scottish Government on behalf of the industry, including in areas such as the need to develop interdisciplinary learning and improve on the commercialisation of the excellent university research in the UK. Iain focussed on the

longstanding shortage of Business Expenditure on R&D, particularly in Scotland.

The event was rounded off by Scottish Government Minister Shirley-Anne Somerville awarding prizes to the highest achieving school students in the SQA Highers and Advanced Highers across all of the main scientific disciplines.



Dr Jo Reynolds (RSC); Jamie Hepburn MSP (Minister for Employability & Fair Work); Professor Dame Carol Robinson



Professor Dame Jocelyn Bell Burnell; Linda Fabiani MSP (Deputy Presiding Officer); Professor Dame Carol Robinson



HOUSE OF COMMONS LIBRARY

The Science and Environment Section (SES) is one of eight teams in the Research Service in the House of Commons Library. The Library provides confidential, impartial and bespoke briefing to Members of the House of Commons and their offices on a daily basis supporting the full range of parliamentary work, from policy development to constituency issues. We also produce a series of briefing papers on topical issues, published on the internet and available in hard copy around the Parliamentary Estate.

In general the Library continues to produce material around the debate on Brexit. For example we have produced briefings on the Withdrawal Bill. We have also published briefings on specific issues such as Brexit and the Environment, Agriculture and Trade and Brexit: What next for UK fisheries?

More widely we have recently published briefings on: Energy Bills, Euratom, Antimicrobial resistance, Tobacco Control and e-cigarettes

and Smart Meters. Over the coming session you can watch out for our briefings on relevant legislation: The Nuclear Safeguards Bill, the Smart Meters Bill (both in progress in the Commons), and future Bills on Agriculture, Fisheries and the Space Industry.

In the coming months we hope to publish material on a range of topical issues such as Brexit and Agriculture, Air Quality, Brexit and medicines, Space policy, the Electricity capacity market, Nuclear power and Tidal lagoons.

We would be pleased to hear from anyone who wants to know more about how the Library works or how we can help with Parliamentary duties. Please contact Ed Pottone (pottone@parliament.uk) in the first instance.

If you want to keep up to date with what we are up to, you can follow us @CommonsSES.



PARLIAMENTARY OFFICE OF SCIENCE AND TECHNOLOGY (POST)



NEWS FROM POST

The POST team has seen a number of changes this autumn: Dr Grant Hill-Cawthorne has accepted the role of Head of POST, and is expected to begin in June 2018. In the interim, Dr Chandrika Nath remains acting Director of POST.

Communications Manager Henry Lau has left for a position in the Office for National Statistics' Data Visualisation

Team, and was replaced by Naomi Stewart who had previously taken the role to cover a staff secondment. Dr Abbi Hobbs is on maternity leave; her replacement Rowena Bermingham started in mid-November.

Following the general election, representatives from the House of Commons are still awaiting appointment to the POST Board. In the interim, we continue to be represented by our former chair Adam Afriyie MP, with the support of the vice-chair Lord Winston and members from the House of Lords, alongside external members. The first POST Board meeting since the general election was held in October, and topics chosen for future publication were:

- The Microbiome and Human Health
- Sleep, Sleep Deprivation, and Health
- Fisheries Management
- Shale Gas
- Housing Quality, Health and Wellbeing

BRIEFINGS

The following briefings have been published since the summer recess:

Regulating Clinical Trials

October 2017

POSTnote 561

Clinical trials are essential to establish the safety and efficacy of medicines and are strictly regulated in the EU. The current EU regulatory framework is due to be replaced by a new EU Clinical Trial Regulation in 2019. This POSTnote examines how this may effect the UK healthcare industry, including issues around clinical trial transparency. It also examines options for UK regulation of clinical trials post-Brexit, including a brief description of the more general issues facing UK patients and clinical researchers post-Brexit.

Risk Assessment of Nanomaterials

October 2017

POSTnote 562

The unique properties of engineered nanomaterials are beneficial to a range of industries. However, uncertainties in assessing their

potential health and environmental risks could hinder their safe use. This POSTnote summarises the current regulation of nanomaterials and highlights potential future directions for regulatory testing approaches.

Mental Health Service Models for Young People

October 2017

POSTnote 563

In 2015, the Government committed 5 years of extra funding for Children and Young People's Mental Health Services (CYPMHS). All areas of England were required to submit plans outlining how they will improve their services by 2020. This POSTnote describes some of the new models of CYPMHS and examines the challenges to their effective implementation.

Communicating Risk

November 2017

POSTnote 564

People's responses to risk are shaped by the way that such risks are communicated. Communicating risks effectively can defuse concerns, mitigate disaster situations and build trust with public institutions and organisations. This POSTnote defines the often misunderstood concepts of risk, uncertainty and hazard and describes the key stakeholders communicating it. It examines the factors that shape how people perceive and respond to such risks and summarises evidence on effective risk communication strategies.

POSTnotes that will be published in November also include Decarbonising the Gas Network, Regulating Advanced Therapies, and Benefits of Earth Observation.

EVENTS

POST has had a busy event schedule this autumn. We have hosted delegations from the London Science Diplomatic Club, the Indonesian Ministry of Science and Technology, the Ugandan Committee on Science and Technology and Ministers of State from the Argentinian government.

We hosted Paul Johnson, Director of the Institute for Fiscal Studies, who presented a pre-Autumn Budget Briefing giving the Institute's latest assessment of the UK's public finances as context for Chancellor Hammond's first Autumn Budget, a meeting for Science and Technology Select Committees from both Houses with AsSIST-UK, and also ran a popular Brexit: Research for Policy event with the Economic and Social Research Council. POST's energy adviser Jack Miller has participated in a series of 'Energy 101's' with the APPG for Renewable and Sustainability Energy, and our social science advisers have been traveling around the UK with Parliamentary Outreach to deliver a series of training sessions for experts on getting their research into Parliament.

Within Westminster, POST staff also participated in the Research and Information promotional activities in Portcullis House Atrium, a Recruitment Fair in Westminster Hall, and the Commonwealth and Parliamentary Association's Westminster Seminar session on evidence bases.

At the end of November, we hosted an exciting launch of 'The Role of Research in the UK Parliament', a two year report undertaken with POST staff alongside University College London and the Economic and Social Research Council; Sir Prof Mark Walport was keynote speaker.

In December, we were delighted to work with staff from the Royal Society to launch this year's MP Pairing Scheme.



HOUSE OF COMMONS SELECT COMMITTEES JANUARY 2018

Following the General Election in June 2017, the House of Commons Select Committees have now reformed and have launched a wide range of inquiries. Details of Committees and inquiries with relevance to Parliamentary and Scientific Committee Members are shown below. Further details of membership of House of Commons Select Committees and their inquiries can be found at <http://www.parliament.uk/business/committees/>

BUSINESS, ENERGY AND INDUSTRIAL STRATEGY COMMITTEE

The Business, Energy and Industrial Strategy Committee is appointed by the House of Commons to examine the administration, expenditure and policy of the Department for Business, Energy and Industrial Strategy (BEIS) and its associated public bodies.

The BEIS Committee is chaired by Rachel Reeves MP.

Contact: Business, Energy and Industrial Strategy Committee, House of Commons, London SW1A 0AA
Telephone: 020 7219 5777 Email: beiscom@parliament.uk

RELEVANT INQUIRIES:

Clean Growth Strategy inquiry – announced 27 November 2017

The Clean Growth Strategy, published in October 2017, outlines how the Government expects the UK to meet its target of cutting emissions by 80% by 2050, while talks at COP23 in Germany were aimed at clarifying issues around the Paris Agreement which commits countries to the goal of limiting the global rise in temperature by 1.5 C. MPs are likely to question the Minister on Government support for renewable energy, as well as how the UK will meet its emission reduction target. The Committee is also expected to ask about progress made in implementing the Paris Agreement and the UK's role in UN climate change negotiations post-Brexit.

Electric vehicles: developing the market and infrastructure – Inquiry announced 21 September 2017

Inquiry into electric vehicles, the challenges they represent for the energy infrastructure and the actions needed to support the development of this market. This inquiry builds on the written evidence received for the former BEIS Committee's inquiry Electric Vehicles: Developing the Market, which was interrupted by the General Election. This new inquiry brings an added focus to the challenges electric vehicles create for the electricity grid and energy infrastructure and builds on the previous Electric Vehicles: Developing the Market inquiry.

Brexit and the implications for UK business – Inquiry announced 19 September 2017

Inquiry into the effects of leaving the EU on British business composed of five sub-inquiries. The Committee aims to establish how the interests of different sectors should best be pursued both in the negotiating process and post-Brexit and attempts to examine a range of issues relating to market access, non-tariff barriers, regulation, skills, R&D, trade opportunities and transitional arrangements. Sub-inquiries are considering the following sectors:

- Civil Nuclear
- Automotive
- Aerospace
- Processed food and drink
- Pharmaceuticals

EDUCATION COMMITTEE

The Education Committee monitors the policy, administration and spending of the Department for Education and its associated arms length bodies, including Ofsted. The Committee is an investigative Committee rather than a legislative Committee: it sets its own programme and chooses subjects for inquiries.

The Committee's Chair is Rt Hon. Robert Halfon MP.

Contact: Education Committee, House of Commons, London SW1A 0AA Telephone: 020 7219 1376
Email: educom@parliament.uk

ENVIRONMENT, FOOD AND RURAL AFFAIRS COMMITTEE

The Environment, Food and Rural Affairs Committee (EFRA) is appointed by the House of Commons to examine the expenditure, administration and policy of the Department for Environment, Food and Rural Affairs (Defra) and its associated public bodies. The Committee chooses its own subjects of inquiry on environmental, agricultural subjects.

Following the 2017 General Election, Neil Parish MP was re-elected as Chair of the EFRA Committee.

Contact: Environment, Food and Rural Affairs Select Committee House of Commons, London, SW1A 0AA
Telephone: 020 7219 7341 Email: efracom@parliament.uk

ENVIRONMENTAL AUDIT COMMITTEE

The remit of the Environmental Audit Committee is to consider the extent to which the policies and programmes of government departments and non-departmental public bodies contribute to environmental protection and sustainable development, and to audit their performance against sustainable development and environmental protection targets. Unlike most select committees, the Committee's remit cuts across government rather than focuses on the work of a particular department.

The Chair of the Environmental Audit Select Committee is Mary Creagh MP.

Contact: Environmental Audit Committee, House of Commons, London SW1A 0AA Telephone: 020 7219 5776
Email: eacom@parliament.uk

RELEVANT INQUIRIES:

Nitrates - Inquiry announced 08 December 2017

Environmental Audit Committee is calling for evidence on the scale of the nitrate pollution in the UK and the solutions the UK government should implement. Deadline for submissions is 18 January 2018.

The Future of Chemicals Regulation after the EU Referendum Inquiry – announced 29 September 2017

Environmental Audit Committee is seeking views on the Government's response to the former Committee's report on The Future of Chemicals Regulation after the EU Referendum and the section on chemicals in the Delegated Powers Memorandum.

UK progress on reducing F-Gas emissions – Inquiry announced 13 October 2017

Environmental Audit Committee inquiry into the UK's progress on reducing fluorinated gas (F-gas) emissions and the impact leaving the EU will have on progress and reporting on reducing these harmful greenhouse gases in the future.

EXITING THE EUROPEAN UNION COMMITTEE

The Exiting the European Union Committee is appointed by the House of Commons to examine the expenditure, administration and policy of the Department for Exiting the European Union and matters falling within the responsibilities of associated public bodies.

Following nominations and elections among MPs, Hilary Benn was re-elected Chair of the committee for the 2017 Parliament.

Contact: Exiting the EU Committee, House of Commons, London, SW1A 0AA Telephone: 020 7219 7568 / 5430
Email: exeucom@parliament.uk

HEALTH COMMITTEE

The Health Committee is appointed by the House of Commons to examine the policy, administration and expenditure of the Department of Health and its associated bodies. The Committee chooses its own subjects of inquiry.

Dr Sarah Wollaston has been re-elected as Chair of the Health

Committee for the 2017 Parliament.

Contact: Health Committee, House of Commons, London SW1A
OAA Telephone: 020 7219 6182 Email: healthcom@parliament.uk

RELEVANT INQUIRY:

Brexit – medicines, medical devices and substances of human origin – Inquiry announced 21 September 2017

Health Committee inquiry into arrangements post-Brexit to guarantee supply of medicines, devices, and products.

SCIENCE AND TECHNOLOGY COMMITTEE

The Science and Technology Committee exists to ensure that Government policy and decision-making are based on good scientific and engineering advice and evidence. The Science and Technology Committee is unusual amongst departmental select committees in that it scrutinises the Government Office for Science (GO-Science), which is a “semiautonomous organisation” based within the Department for Business, Energy and Industrial Strategy. GO-Science “supports the Government Chief Scientific Adviser and works to ensure that Government policy and decision-making is underpinned by robust scientific evidence”. The committee therefore has a similarly broad remit and can examine the activities of departments where they have implications for, or made use of, science, engineering, technology and research.

Norman Lamb MP was elected as Chair of the Science and Technology Committee on 12 July 2017.

Contact: Science and Technology Committee House of Commons, London SW1A OAA Telephone: 020 7219 2793
Fax: 020 7219 0896 Email: scitechcom@parliament.uk

RELEVANT INQUIRIES:

E-cigarettes – Inquiry announced 25 October 2017

The Science and Technology Committee examine the impact of electronic cigarettes on human health (including their effectiveness as a stop-smoking tool), the suitability of regulations guiding their use, and the financial implications of a growing market on both business and the NHS.

Evidence-based early-years intervention – Inquiry announced 26 October 2017

The Science and Technology Committee examine the strength of the evidence linking adverse childhood experiences with long-term negative outcomes, the evidence base for related interventions, whether evidence is being used effectively in policy-making, and the support and oversight for research into this area.

Research integrity – Inquiry announced 13 September 2017

This inquiry looks at trends and developments in fraud, misconduct and mistakes in research and the publication of research results. Research by Parliamentary Office of Science and Technology indicates the trend in misconduct/mistakes in publishing is still upwards. There has also been a so-called ‘crisis in reproducibility’ of research.

The Committee continues the previous Committee’s inquiry, taking forward the evidence it had received before the General Election.

Genomics and genome editing in the NHS – Inquiry announced 14 September 2017

Science and Technology Committee inquiry into the mainstreaming of genomic medicine in the NHS.

This inquiry examines the Chief Medical Officer’s (Dame Sally Davies) call in her latest annual report, ‘Generation Genome’, for mainstreaming genomic medicine in the NHS within 5 years.

The Committee has accepted written evidence on the Chief Medical Officer’s recommendations including observations on how any barriers to greater integration of genomic therapies in the NHS could be overcome and how such barriers may differ across the devolved nations.

In doing so, the Committee will take forward the interim report from the previous Committee on Genomics and gene-editing and the evidence it had received before the General Election.

Government Office for Science Annual Report (and work of the Chief Scientific Adviser network) – Inquiry announced 12 October 2017

Science and Technology Committee inquiry into Government Office for Science Annual Report (and work of the Chief Scientific Adviser network).

Algorithms in decision-making – Inquiry announced 14 September 2017

This inquiry examines the increasing use of algorithms in public and business decision making. It assesses how algorithms are formulated, the scope for error or correction and the impact they may have on individuals—and their ability to understand or challenge that decision.

The Committee continues the previous Committee’s inquiry, taking forward the evidence it received previously.

TRANSPORT COMMITTEE

The Transport Committee is charged by the House of Commons with scrutiny of the Department for Transport. Its formal remit is to examine the expenditure, administration and policy of the Department of Transport and its associated public bodies.

Lilian Greenwood MP was elected as Chair of the Transport Committee on 12 July 2017.

Contact: Transport Committee, House of Commons, London SW1A OAA Telephone: 020 7219 3266 Email: transcom@parliament.uk
Twitter: @CommonsTrans

JOINT INQUIRY

Improving air quality – Inquiry announced 09 October 2017

The Environment Food and Rural Affairs, Environment Audit, Health and Transport Select Committees are running an inquiry into the health and environmental impacts of air pollution.

MPs from these four select committees have combined forces to relaunch an unprecedented joint inquiry on air quality to scrutinise cross-government plans to tackle pollution hotspots.



HOUSE OF LORDS SELECT COMMITTEES JANUARY 2018

This article provides details of House of Lords Select Committees and their inquiries with relevance to the interests of the Parliamentary and Scientific Committee.

ARTIFICIAL INTELLIGENCE COMMITTEE

The Select Committee on Artificial Intelligence was appointed on 29 June 2017 to consider the economic, ethical and social implications of advances in artificial intelligence, and to make recommendations. The Committee was established following the recommendation of the Liaison Committee. It will report by 31 March 2018.

The Committee is Chaired by Lord Clement-Jones.

Contact: Select Committee on Artificial Intelligence, House of Lords, London. SW1A 0PW Telephone: 020 7219 4384 Fax: 020 7219 4931 Email: HLAIAHoc@parliament.uk

EU ENERGY AND ENVIRONMENT SUB-COMMITTEE

The EU Energy and Environment Sub-committee is a sub-committee of the EU Committee. The Sub-Committee focuses on a range of policy areas related to agriculture, fisheries, environment and energy. Attention is given to agricultural issues, particularly legislation relating to the Common Agricultural Policy (CAP) and animal health and welfare issues. The Common Fisheries Policy (CFP) and wider environmental issues are also examined, as are policies relating to energy and climate change.

The Committee is Chaired by Lord Teverson.

INQUIRY: BREXIT: ENERGY SECURITY INQUIRY

The EU Energy and Environment Sub-Committee is conducting a short inquiry to examine the implications of Brexit for energy security in the UK. The inquiry aims to highlight the issues the Government will need to consider when developing a new energy relationship with the EU.

Contact: EU Energy and Environment Sub-Committee, House of Lords, London SW1A 0PW Telephone: 0207 219 3015 Fax: 0207 219 6715

SCIENCE AND TECHNOLOGY COMMITTEE

The Science and Technology Committee has a broad remit "to consider science and technology". It scrutinises Government policy by undertaking cross-departmental inquiries into a range of different activities. These include:

- public policy areas which ought to be informed by scientific research (for example, health effects of air travel),
- technological challenges and opportunities (for example, genomic medicine) and
- public policy towards science itself (for example, setting priorities for publicly funded research).

In addition, the Committee undertakes from time to time shorter inquiries, either taking evidence from Ministers and officials on topical issues, or following up previous work.

The Chair of the Committee is Lord Patel.

INQUIRY: LIFE SCIENCES AND THE INDUSTRIAL STRATEGY

The Government set out in its Industrial Strategy Green Paper its intention to create a new Life Sciences strategy to make the UK the best place in the world to invest in life sciences. To tackle challenges like cancer and dementia it is important that the UK has a strong life sciences sector. But the sector faces a number of challenges and opportunities, including Brexit and making innovative new treatments available on the NHS.

This inquiry is investigating issues such as whether the Government has the necessary structures in place to support the life sciences sector; how the NHS can use procurement to stimulate innovation in the life sciences; and the content of the new Life Sciences industrial strategy.

Contact: Science and Technology Select Committee, Committee Office, House of Lords, London SW1A 0PW Telephone: 020 7219 5750 Fax: 020 7219 4931 Email: hlsce@parliament.uk

Research Councils UK

Contact: Alexandra Saxon
Head of RCUK Strategy Unit
Research Councils UK
Polaris House
North Star Avenue
Swindon SN2 1ET

Tel: 01793 444592
E-mail: communications@rcuk.ac.uk
Website: www.rcuk.ac.uk



Each year the Research Councils invest around £3 billion in research covering the full spectrum of academic disciplines from the medical and biological sciences to astronomy, physics, chemistry and engineering, social sciences, economics, environmental sciences and the arts and humanities.

Research Councils UK is the strategic partnerships of the seven Research Councils. It aims to:

- increase the collective visibility, leadership and influence of the Research Councils for the benefit of the UK;
- lead in shaping the overall portfolio of research funded by the Research Councils to maximise the excellence and impact of UK research, and help to ensure that the UK gets the best value for money from its investment;
- ensure joined-up operations between the Research Councils to achieve its goals and improve services to the communities it sponsors and works with.

Biotechnology and Biological Sciences Research Council (BBSRC)



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Website: www.bbsrc.ac.uk

BBSRC invests in world-class bioscience research, innovation and training on behalf of the UK public. Our aim is to further scientific knowledge to promote economic growth, wealth and job creation and to improve quality of life in the UK and beyond. BBSRC research is helping society to meet major challenges, including food security, green energy and healthier lifespans and underpins important UK economic sectors, such as farming, food, industrial biotechnology and pharmaceuticals.

Economic and Social Research Council



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Strategic Lead: External Affairs, Economic and Social Research Council
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Tel: 01793 413119
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The ESRC is the UK's largest organisation for funding research on economic and social issues and is committed to supporting the very best research with wide-ranging impact. Social science contributes to greater knowledge and understanding of the many challenges our society faces today and by ensuring that ESRC-funded research makes the biggest possible impact, our research shapes public policies and makes business, voluntary bodies and other organisations more effective, as well as shaping wider society. We also develop and train the UK's future social scientists.



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EPSRC is the UK's main agency for funding research and training in engineering and physical sciences, investing around £800m a year in research and postgraduate training, to help the nation handle the next generation of technological change.

The areas covered range from information technology to structural engineering, and mathematics to materials science. This research forms the basis for future economic development in the UK and improvements for everyone's health, lifestyle and culture. EPSRC works alongside other Research Councils with responsibility for other areas of research.

Medical Research Council



Contact: Sophie Broster-James
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Website: www.mrc.ac.uk

Over the past century, the MRC has been at the forefront of scientific discovery to improve human health. Founded in 1913 to tackle tuberculosis, the MRC now invests taxpayers' money in the highest quality medical research across every area of health. Thirty-one MRC-funded researchers have won Nobel prizes in a wide range of disciplines, and MRC scientists have been behind such diverse discoveries as vitamins, the structure of DNA and the link between smoking and cancer, as well as achievements such as pioneering the use of randomised controlled trials, the invention of MRI scanning, and the development of therapeutic antibodies. We also work closely with the UK's Health Departments, the NHS, medical research charities and industry to ensure our research achieves maximum impact as well as being of excellent scientific quality.

Natural Environment Research Council



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NERC is the UK's leading public funder of environmental science. We invest £330 million each year in cutting-edge research, postgraduate training and innovation in universities and research centres.

Our scientists study the physical, chemical and biological processes on which our planet and life itself depends – from pole to pole, from the deep Earth and oceans to the atmosphere and space.

We partner with business, government, the public and the wider research community to shape the environmental research and innovation agenda. Our science provides knowledge, skills and technology that deliver sustainable economic growth and public wellbeing.



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www.stfc.ac.uk

The Science and Technology Facilities Council is one of Europe's largest multidisciplinary research organisations undertaking and supporting a broad range of research across the physical, life and computational sciences. We operate world class, large-scale research facilities in the UK and Europe and provide strategic advice to the UK Government on their development. We partner in two of the UK's Science and Innovation Campuses. We also manage international research projects in support of a broad cross-section of the UK research community, particularly in the fields of astronomy, nuclear physics and particle physics.

Association of the British Pharmaceutical Industry



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Website: www.abpi.org.uk

The Association of the British Pharmaceutical Industry (ABPI) represents innovative research-based biopharmaceutical companies, large, medium and small, leading an exciting new era of biosciences in the UK. Our industry, a major contributor to the economy of the UK, brings life-saving and life-enhancing medicines to patients. Our members are researching and developing over two-thirds of the current medicines pipeline, ensuring that the UK remains at the forefront of helping patients prevent and overcome diseases. Topics we focus on include:

- All aspects of the research and development of medicines including clinical research and licensing
- Stratified medicine
- Vaccines, biosimilars, small and large molecules, cell therapy and regenerative medicine



Contact: Professor Richard Brook OBE FREng
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E-mail: enquiries@airto.co.uk
Twitter: @airtoinnovation
Website: www.airto.co.uk

AIRTO – Association of Innovation, Research & Technology Organisations – is the foremost membership body for the UK's innovation, research and technology sector, representing 80% of organisations in the sector.

AIRTO's members deliver vital innovation and knowledge transfer services which include applied and collaborative R&D, (frequently in conjunction with universities), consultancy, technology validation and testing, incubation of commercialisation opportunities and early stage financing. AIRTO members have a combined turnover of over £5.5bn from clients both at home and outside the UK, and employ over 47,000 scientists, technologists and engineers.

AMPS

The Association of
Management and
Professional Staffs.

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07895 162 896 for all queries whether for
membership or assistance.
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Website: www.amps-tradeunion.com

We are a Trades Union for Management and Professional Staff working in the pharmaceutical, chemical and allied industries.

We have produced a training programme funded by the EU on diversity and helping women managers remain in the workplace after a career break. This training programme is aimed at both men and women and is intended to address the shortfall in qualified personnel in the chemical and allied industries.

We are experts in performance based and field related issues and are affiliated to our counterparts in EU Professional Management Unions.



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AWE plays a crucial role in our nation's defence by providing and maintaining warheads for the UK's nuclear deterrent and delivers advice and guidance on a 24/7 basis to UK government in the area of national security.

We are a centre of scientific, engineering and technological excellence, with some of the most advanced research, design and production facilities in the world. AWE is contracted to the Ministry of Defence (MOD) through a Government-owned-contractor-operated (GOCO) arrangement. While our sites and facilities remain in government ownership, their management, day-to-day operations and maintenance of Britain's nuclear stockpile is contracted to a private company: AWE Management Limited (AWE ML). AWE ML is a consortium comprising three partners: Jacobs Engineering Group, the Lockheed Martin Corporation and Serco Group plc.



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The Biochemical Society works to promote the molecular biosciences; facilitating the sharing of expertise, supporting the advancement of biochemistry and molecular biology and raising awareness of their importance in addressing societal grand challenges. We achieve our mission by:

- bringing together molecular bioscientists;
- supporting the next generation of biochemists;
- promoting and sharing knowledge and
- promoting the importance of our discipline.



**British
Antarctic Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

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British Antarctic Survey (BAS), an institute of NERC, delivers and enables world-leading interdisciplinary research in the Polar Regions. Its skilled science and support staff based in Cambridge, Antarctica and the Arctic, work together to deliver research that uses the Polar Regions to advance our understanding of Earth as a sustainable planet. Through its extensive logistic capability and know-how BAS facilitates access for the British and international science community to the UK polar research operation. Numerous national and international collaborations, combined with an excellent infrastructure help sustain a world leading position for the UK in Antarctic affairs. For more information visit [@basnews](http://www.bas.ac.uk)



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The British Ecological Society is an independent, authoritative learned society, and the voice of the UK's ecological community. Working with our members we gather and communicate the best available ecological evidence to inform decision making. We offer a source of unbiased, objective ecological knowledge, and promote an evidence-informed approach to finding the right solutions to environmental questions.

British In Vitro Diagnostics Association (BIVDA)

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BIVDA is the UK industry association representing companies who manufacture and/or distribute the diagnostics tests and equipment to diagnose, monitor and manage disease largely through the NHS pathology services. Increasingly diagnostics are used outside the laboratory in community settings and also to identify those patients who would benefit from specific drug treatment particularly for cancer.



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The British Nutrition Foundation (BNF), a registered charity, delivers impartial, authoritative and evidence-based information on food and nutrition. Its core purpose is to make nutrition science accessible to all, working with an extensive network of contacts across academia, education and the food chain, and through BNF work programmes focussing on education in schools and nutrition science communication.



**BRITISH
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The British Pharmacological Society is a charity with a mission to promote and advance the whole spectrum of pharmacology. It is the primary UK learned society concerned with drugs and the way they work, and leads the way in the research and application of pharmacology around the world.

Founded in 1931, the Society champions pharmacology in all its forms, across academia, industry, regulatory agencies and the health service. With over 3,500 members from over 60 countries worldwide, the Society is a friendly and collaborative community. Enquiries about the discovery, development and application of drugs are welcome.



**BRITISH
SOCIETY
OF SOIL
SCIENCE**

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The British Society of Soil Science (BSSS) or "BS cubed" as it is fondly known was founded in 1947 by a number of eminent British soil scientists. It was formed with the aims: to advance the study of soil; to be open to membership from all those with an interest in the study and uses of soil; and to issue an annual publication.



**Chartered Institute
of Ergonomics
& Human Factors**

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Ergonomics, also called Human Factors, sometimes abbreviated 'E/HF' is a science-based discipline about 'designing for people'. E/HF takes into account the physical and mental capabilities, aptitudes and abilities of people acting individually (a pilot, a surgeon or nurse, train driver) or collectively, with or without equipment (a theatre team, air traffic control) in the design of workplaces, equipment and ways of working to deliver the least harmful, safest, most efficient, most elegant possible outcomes'. E/HF uses science to improve the places in which we work, live and relax and the ways in which we interact with people, equipment and systems.



**The British Society for
Antimicrobial Chemotherapy**

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lwww.appg-on-antibiotics.com
www.bsacsurv.org

The BSAC is an inter-professional organisation with over forty years of experience and achievement in antibiotic education, research and leadership. The Society has an active international membership and:

- Is dedicated to saving lives through the effective use and development of antibiotics, now and in the future.
- Communicates effectively about antibiotics and antibiotic usage via workshops, professional guidelines and its own high impact international journal, the Journal of Antimicrobial Chemotherapy.
- Is home to the UK-led global initiative Antibiotic Action
- Serves as secretariat to the All Party Parliamentary Group on Antibiotics



**Brunel
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Brunel University London is an international research active university with 3 leading research institutes:

Institute of Energy Futures: Led by Professor Savvas Tassou, the main themes of the Institute are *Advanced Engines and Biofuels, Energy Efficient and Sustainable Technologies, Smart Power Networks, and Resource Efficient Future Cities.*

Institute of Materials and Manufacturing: The main themes of research are *Design for Sustainable Manufacturing, Liquid Metal Engineering, Materials Characterisation and Processing, Micro-Nano Manufacturing, and Structural Integrity.* The Institute is led by Professor Luiz Wrobel.

Institute of Environment, Health and Societies: Professor Susan Jobling leads this pioneering research institute whose themes are *Health and Environment, Healthy Ageing, Health Economics Synthetic Biology, Biomedical Engineering and Healthcare Technologies, and Social Sciences and Health.*

Brunel University London offers a wide range of expertise and knowledge, and prides itself on having academic excellence at the core of its offer, and was ranked in the recent REF as 33rd in the UK for Research Power (average quality rating by number of submissions) and described by The Times Higher Education as one of the real winners of the REF 2014.

**British Society for
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The BSI is one of the oldest, largest and most active immunology societies in the world. We have over 5,000 members who work in all areas of immunology, including research and clinical practice.

The BSI runs major scientific meetings, education programmes and events for all ages. We disseminate top quality scientific research through our journals and meetings and we are committed to bringing the wonders and achievements of immunology to as many audiences as possible.

**Cavendish
Laboratory**



**UNIVERSITY OF
CAMBRIDGE**

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The Cavendish Laboratory houses the Department of Physics of the University of Cambridge.

The research programme covers the breadth of contemporary physics

Extreme Universe: Astrophysics, cosmology and high energy physics

Quantum Universe: Cold atoms, condensed matter theory, scientific computing, quantum matter and semiconductor physics

Materials Universe: Optoelectronics, nanophotonics, detector physics, thin film magnetism, surface physics and the Winton programme for the physics of sustainability

Biological Universe: Physics of medicine, biological systems and soft matter

The Laboratory has world-wide collaborations with other universities and industry

**The Cosmetic Toiletry &
Perfumery Association**



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CTPA is the UK trade association representing manufacturers of cosmetic products and suppliers to the cosmetic products industry. 'Cosmetic products' are legally defined and subject to stringent EU safety laws. CTPA is the authoritative public voice of a vibrant and responsible UK industry trusted to act for the consumer; ensuring the science behind cosmetics is fully understood.

**CLIFTON SCIENTIFIC
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**Science for Citizenship and Employability,
Science for Life, Science for Real**

We build grass-roots partnerships between school and the wider world of professional science and its applications

- for young people of all ages and abilities
 - experiencing science as a creative, questioning, human activity
 - bringing school science added meaning and motivation, from primary to post-16
 - locally, nationally, internationally (currently between Britain and Japan; also the Ukraine)
- Clifton Scientific Trust Ltd is registered charity 1086933



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The Council for the Mathematical Sciences is an authoritative and objective body that works to develop, influence and respond to UK policy issues affecting mathematical sciences in higher education and research, and therefore the UK economy and society by:

- providing expert advice;
- engaging with government, funding agencies and other decision makers;
- raising public awareness; and
- facilitating communication between the mathematical sciences community and other stakeholders



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Founded in 1992 in memory of the UK's first female Professor of Physics, the Trust is the UK's leading charity dedicated to realising the potential of scientists and engineers returning to research after career breaks for family, caring and health reasons. Our Fellowship programme, working in partnership with universities, research councils, charities, learned societies and industry, enables individuals to undertake part-time research in universities and research institutes. Fellowships comprise a research project alongside an individually tailored retraining programme, with additional mentoring and support, enabling recipients to re-establish scientific credentials, update skills and redevelop confidence, in a suitably supportive environment.



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The Energy Institute (EI) is the chartered professional body for the energy sector, supporting over 22,000 individuals and 200 companies worldwide. The EI provides learning and networking opportunities, professional recognition and technical and scientific knowledge resources on energy in all its forms and applications.

The EI's purpose is to develop and disseminate knowledge, skills and good practice towards a safe, secure and sustainable energy system. It addresses the depth and breadth of the energy sector and informs policy by providing a platform for debate and scientifically-sound information.

A registered charity, the EI serves society with independence, professionalism and a wealth of expertise in all energy matters.



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EngineeringUK is an independent organisation that promotes the vital role of engineers, engineering and technology in our society. EngineeringUK partners business and industry, Government and the wider science and technology community: producing evidence on the state of engineering; sharing knowledge within engineering, and inspiring young people to choose a career in engineering, matching employers' demand for skills.



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Fera provides expert analytical and professional services to governments, agricultural companies, food retailers, manufacturers and farmers to facilitate safety, productivity and quality across the agrifood supply chain in a sustainable and environmentally compatible way.

Fera uses its world leading scientific expertise to provide robust evidence, rigorous analysis and professional advice to governments, international bodies and companies worldwide. Our food integrity, plant health, agri-tech and agri-informatics services ensure that our customers have access to leading edge science, technology and expertise.



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FirstGroup are the leading transport operator in the UK and North America and each day, every one of our 110,000 employees works hard to deliver vitally important services for our passengers. During the last year around 2.2 billion passengers relied on us to get to work, to school or college, to visit family and friends, and much more.

**GAMBICA
Association Ltd**



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GAMBICA Association is the UK trade association for instrumentation, control, automation and laboratory technology. The association seeks to promote the successful development of the industry and assist its member companies through a broad range of services, including technical policy and standards, commercial issues, market data and export services.



serving science, profession & society

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The Geological Society is the national learned and professional body for Earth sciences, with 12,000 Fellows (members) worldwide. The Fellowship encompasses those working in industry, academia and government, with a wide range of perspectives and views on policy-relevant science, and the Society is a leading communicator of this science to government bodies and other non-technical audiences.



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Advancing knowledge and setting standards in biomedical science

With over 20,000 members in over 30 countries, the Institute of Biomedical Science is the leading professional body for biomedical scientists, support staff and students.

For over 100 years we have been dedicated to the promotion, development and delivery of excellence in biomedical science within all aspects of healthcare, and providing the highest standards of service to patients and the public. By supporting our members in their practice of biomedical science we set quality standards for the profession through: training, education, assessments, examinations and continuous professional development.



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IFST is the independent qualifying body for food professionals in Europe. Membership is drawn from all over the world from backgrounds including industry, universities, government, research and development and food law enforcement.

IFST's activities focus on disseminating knowledge relating to food science and technology and promoting its application. Another important element of our work is to promote and uphold standards amongst food professionals.



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IKE is the UK's professional body for innovators. It accredits and certifies innovation practices. We influence the inter-relationship between education, business, and government through research and collaborative networks. Our Innovation Manifesto highlights our commitment to support the development of innovative people and organisations. IKE runs think-tanks, conducts research, develops new business models and tools and supports organisations to benchmark their innovation capabilities.

Institute of Marine Engineering, Science and Technology (IMarEST)



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Established in London in 1889, the IMarEST is a leading international membership body and learned society for marine professionals, with over 15,000 members worldwide. The IMarEST has an extensive marine network of 50 international branches, affiliations with major marine societies around the world, representation on the key marine technical committees and non-governmental status at the International Maritime Organization (IMO) as well as other intergovernmental organisations.

The Institute of Materials Finishing



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The Institute of Materials Finishing is the premier technical organisation representing industry, academia and individual professionals in both the UK's and global surface engineering and materials finishing sector.

We actively promote continual education and knowledge dissemination by providing both distance learning and tutored training courses, as well as a technical support service. We also provide bespoke courses that are tailored to an employer's specific needs. The Institute also publishes *Transactions of the Institute of Materials Finishing* and a bimonthly newsletter (*IMFormation*), as well as holding regular regional and international technical meetings, symposia and conferences.

Institute of Measurement and Control



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The Institute of Measurement and Control is a professional engineering institution and learned society dedicated to the science and application of measurement and control technology for the public benefit. The InstMC has a comprehensive range of membership grades for individuals engaged in both technical and non-technical occupations. Also, it is licensed by the Engineering Council to assess and register individuals as Chartered Engineers (CEng), Incorporated Engineers (IEng) and Engineering Technicians (EngTech).

The InstMC works to develop the knowledge and skills of individual engineers, fostering communication and advancing the science and practices within the industry.

IOP Institute of Physics

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The Institute of Physics is a leading scientific membership society working to advance physics for the benefit of all. We have a worldwide membership from enthusiastic amateurs to those at the top of their fields in academia, business, education and government. Our purpose is to gather, inspire, guide, represent and celebrate all who share a passion for physics. And, in our role as a charity, we're here to ensure that physics delivers on its exceptional potential to benefit society.

Alongside professional support for our members, we engage with policymakers and the public to increase awareness and understanding of the value that physics holds for all of us. Our subsidiary company, IOP Publishing, is a world leader in scientific communications, publishing journals, ebooks, magazines and websites globally.



Institute of Physics and Engineering in Medicine

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IPEM is a registered, incorporated charity for the advancement, in the public interest, of physics and engineering applied to medicine and biology. Its members are medical physicists, clinical and bio-engineers, and clinical technologists. It organises training and CPD for them, and provides opportunities for the dissemination of knowledge through publications and scientific meetings. IPEM is licensed by the Science Council to award CSci, RSci and RSciTech, and by the Engineering Council to award CEng, IEng and EngTech.



The Institution of Chemical Engineers

With over 44,000 members in 120 countries, IChemE is the global membership organisation for chemical engineers. A not for profit organisation, we serve the public interest by building and sustaining an active professional community and promoting the development, understanding and application of chemical engineering worldwide.

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Institution of Civil Engineers



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Established in 1818 and with over 86,000 members in 167 countries worldwide, ICE is a leading source of expertise in infrastructure and engineering policy and is widely seen as the independent voice of infrastructure. ICE provides advice to all political parties and works with industry to ensure that civil engineering and construction remain major contributors to the UK economy.

Institution of Engineering Designers



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The only professional membership body solely for those working in engineering and technological product design. Engineering Council and Chartered Environmentalist registration for suitably qualified members. Membership includes experts on a wide range of engineering and product design disciplines, all of whom practise, manage or educate in design. **New for 2015: Chartership for Product Designers (CTPD).**



The Institution of Engineering and Technology

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The IET is a world leading professional organisation, sharing and advancing knowledge to promote science, engineering and technology across the world. Dating back to 1871, the IET has over 163,000 members in 127 countries with offices in Europe, North America, and Asia-Pacific.

Institution of MECHANICAL ENGINEERS

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The Institution provides politicians and civil servants with information, expertise and advice on a diverse range of subjects, focusing on manufacturing, energy, environment, transport and education policy. We regularly publish policy statements and host political briefings and policy events to establish a working relationship between the engineering profession and parliament.



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LGC is an international science-based company and market leader in the provision of analytical, forensic and diagnostic services and reference standards to customers in the public and private sectors.

Under the Government Chemist function, LGC fulfils specific statutory duties as the referee analyst and provides advice for Government and the wider analytical community on the implications of analytical chemistry for matters of policy, standards and regulation. LGC is also the UK's designated National Measurement Institute for chemical and biochemical analysis.

With headquarters in Teddington, South West London, LGC has 36 laboratories and centres across Europe and at sites in China, Brazil, India, South Africa and the US.



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As the world's oldest biological society, the Linnean Society of London is an essential forum and meeting point for those interested in natural history. The Society holds regular public events, publishes three peer-reviewed journals, promotes the study of the natural world with several educational initiatives and is home to a world famous library and collection of natural history specimens. The Society's Fellows have a considerable range of biological expertise that can be harnessed to inform and advise on scientific and public policy issues.

A Forum for Natural History



London School of Hygiene & Tropical Medicine

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The London School of Hygiene & Tropical Medicine is a world-leading centre for research and postgraduate education in public and global health, with over 4,000 students and more than 1,000 staff working in over 100 countries across the world. Our depth and breadth of expertise encompasses many disciplines, and we are one of the highest-rated research institutions in the UK.

L'ORÉAL UK AND IRELAND

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L'Oréal employs more than 3,800 researchers world-wide and dedicates over €850 million each year to research and innovation in the field of healthy skin and hair. The company supports women in science research through the L'Oréal UNESCO For Women In Science Programme and engages young people with science through the L'Oréal Young Scientist Centre at the Royal Institution. L'Oréal also collaborates with a vast number of institutions in the UK and globally.

Marine Biological Association



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Since 1884 the Marine Biological Association has been delivering its mission 'to promote scientific research into all aspects of life in the sea, including the environment on which it depends, and to disseminate to the public the knowledge gained.' The MBA represents its members in providing a clear independent voice to government on behalf of the marine biological community. It also has an extensive research programme and a long history as an expert provider of advice for the benefit of policy makers and wider society.



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The Met Office doesn't just forecast the weather on television. Our forecasts and warnings protect UK communities and infrastructure from severe weather and environmental hazards every day – they save lives and money. Our Climate Programme delivers evidence to underpin Government policy through the Met Office Hadley Centre. Our Mobile Meteorological Unit supports the Armed Forces around the world. We build capacity overseas in support of international development. All of this built on world-class environmental science.



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The Microbiology Society is the largest learned microbiological society in Europe with a worldwide membership based in universities, industry, hospitals, research institutes and schools. The Society publishes key academic journals, organises international scientific conferences and provides an international forum for communication among microbiologists. The Society promotes the understanding of microbiology to a diverse range of stakeholders, including policy-makers, students, teachers, journalists and the wider public, through a comprehensive framework of communication activities and resources.



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The National Physical Laboratory (NPL) is the United Kingdom's national measurement institute, an internationally respected and independent centre of excellence in research, development and knowledge transfer in measurement and materials science. For more than a century, NPL has developed and maintained the nation's primary measurement standards - the heart of an infrastructure designed to ensure accuracy, consistency and innovation in physical measurement.



Advancing the science of nature

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Website: www.nhm.ac.uk

We challenge the way people think about the natural world – its past, present and future

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The University of Northampton is an institution committed to science education through initial teacher training, a STEM Ambassador network which works within the community and teaching and research to doctoral level. We are an Ashoka U 'Changemaker Campus' status university recognising our commitment to social innovation and entrepreneurship.



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With 43,000 students and campuses in Nottingham, China and Malaysia, The University of Nottingham is 'the nearest Britain has to a truly global university'. With more than 97 per cent of research at the University recognised internationally according to the Research Excellence Framework 2014, the University is ranked in the top 1% of the world's universities by the QS World University Rankings.



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Physiology is the science of how molecules, cells and organs work in the body. Representing over 3500 life scientists, The Physiological Society supports scientific research through its grants schemes, conferences and its three open access journals.

The Society also supports the teaching of physiology in schools and universities, and works to promote an understanding of physiology amongst policy-makers and the general public.



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The Rainbow Seed Fund is a £24m, early-stage venture capital fund dedicated to kick-starting promising technology companies emerging from the UK science base. The Fund is backed by ten UK publicly-funded research organisations and the Department of Business, Innovation and Skills and holds investments in some of the UK's most innovative companies in areas as diverse as novel antibiotics, research into Alzheimer's disease, "green" chemicals and airport security. The Fund is managed by Midven, a specialist venture capital company. We are prepared to invest early and help build a proposition to attract additional investment and get to market.



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As the UK's national academy for engineering, we bring together the most successful and talented engineers for a shared purpose: to advance and promote excellence in engineering. We have four strategic challenges: drive faster and more balanced economic growth; foster better education and skills; lead the profession; and promote engineering at the heart of society.



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RBG Kew is a centre of global scientific expertise in plant and fungal diversity, conservation, and sustainable use, housed in two world-class gardens. Our scientific vision is to document and understand global plant and fungal diversity and its uses, bringing authoritative expertise to bear on the critical challenges facing humanity today.

Kew's strategic priorities for science are:

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2. To curate and provide data-rich evidence from Kew's unrivalled collections as a global asset for scientific research.
3. To disseminate our scientific knowledge of plants and fungi, maximising its impact in science, education, conservation policy and management.

These priorities enable us to curate, use, enhance, explore and share Kew's global resource, providing robust data and a strong evidence base for our UK and global stakeholders. Kew is a non-departmental government body with exempt charitable status, partially funded by Defra.



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The Royal Society is the academy of science in the UK and the Commonwealth comprising 1400 outstanding individuals representing the sciences, engineering and medicine. The Society has played a part in some of the most fundamental, significant and life-changing discoveries in scientific history and Royal Society scientists continue to make outstanding contributions to science across the wide breadth of research areas. Through its Fellowship and permanent staff, it seeks to ensure that its contribution to shaping the future of science in the UK and beyond has a deep and enduring impact, supporting excellence in science and encouraging the development and use of science for the benefit of humanity.



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The Royal Society of Biology is a single unified voice, representing a diverse membership of individuals, learned societies and other organisations. We are committed to ensuring that we provide Government and other policy makers – including funders of biological education and research – with a distinct point of access to authoritative, independent, and evidence-based opinion, representative of the widest range of bioscience disciplines. Our vision is of a world that understands the true value of biology and how it can contribute to improving life for all.



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The Royal Society of Chemistry is the world's leading chemistry community, advancing excellence in the chemical sciences. With over 50,000 members and a knowledge business that spans the globe, we are the UK's professional body for chemical scientists; a not-for-profit organisation with 170 years of history and an international vision of the future. We promote, support and celebrate chemistry. We work to shape the future of the chemical sciences – for the benefit of science and humanity.



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SfAM is a UK organization, serving microbiologists internationally. It works to advance, for the benefit of the public, the science of microbiology in its application to the environment, human and animal health, agriculture, and industry. With Wiley-Blackwell, SfAM publishes five internationally acclaimed journals. Value for money and a modern, innovative and progressive outlook are its core principles. A friendly society, SfAM values integrity, honesty, and respect, and seeks to promote excellence and professionalism and to inspire young microbiologists.



Society for Underwater Technology
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The SUT is a multidisciplinary learned society that brings together individuals and organisations with a common interest in underwater technology, ocean science, and offshore/subsea engineering. The society was founded in 1966 and has members from over 40 countries, including engineers, scientists, other professionals and students working in these areas.

Society of Chemical Industry

SCI: where science meets business

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Established by Royal Charter in 1881, SCI is a unique multi-disciplinary community. Set up by a prominent group of forward thinking scientists, inventors and entrepreneurs, SCI continues to be a multi-science and industry network based around chemistry and related sciences. Our charitable objective is to promote links between science and industry for the benefit of society. Our passion is invention and creation.

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Society of Cosmetic Scientists



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Advancing the science of cosmetics is the primary objective of the SCS. Cosmetic science covers a wide range of disciplines from organic and physical chemistry to biology and photo-biology, dermatology, microbiology, physical sciences and psychology.

Members are scientists and the SCS helps them progress their careers and the science of cosmetics ethically and responsibly. Services include publications, educational courses and scientific meetings.



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The Society of Maritime Industries (SMI) is the voice of the UK's maritime engineering and business sector promoting and supporting companies which design, build, refit and modernise ships, and supply equipment and services for all types of commercial and naval ships, ports and terminals infrastructure, offshore oil and gas, maritime security and safety, marine science and technology, maritime autonomous systems and marine renewable energy.



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Understanding Animal Research is a not-for-profit organisation that explains why animals are used in medical, veterinary, environmental and other scientific research. We aim to achieve a broad understanding of the humane use of animals in medical, veterinary, scientific and environmental research in the UK. We work closely with policymakers to ensure regulation is effective and are a trusted source of information for the national and international media. We are funded by our members who include universities, professional societies, trade unions, industry and charities.



University of Essex

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Established in 1964, the University of Essex is ranked as one of the Top 20 universities in the Research Excellence Framework and is awarded Gold in the Teaching Excellence Framework. It is home to world-leading expertise in analytics and data science, with research peaks spanning the social sciences, sciences, and humanities. Pioneers of quantitative methods and artificial intelligence techniques, Essex is also in the UK top 10 for Knowledge Transfer Partnerships, and works with businesses to embed innovation into operations, through KTPs, knowledge exchange and contract research.

Universities Federation for Animal Welfare



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Registered in England Charity No: 207996

UFAW, the international animal welfare science society, is an independent scientific and educational charity. It works to improve animal lives by:

- supporting animal welfare research
- educating and raising awareness of welfare issues in the UK and overseas
- producing the quarterly scientific journal Animal Welfare and other high-quality publications on animal care and welfare
- providing advice to government departments and other concerned bodies.



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The Welding Institute is the leading institution providing engineering solutions and knowledge transfer in all aspects of manufacturing, fabrication and whole-life integrity management.

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Monday 15 January 2018 5:30pm
Discussion meeting followed by drinks reception

Data as a Resource
Boothroyd Room, Portcullis House

Monday 5 March 2018 5:30pm
Discussion Meeting
Revolutionising cancer treatment
Boothroyd Room, Portcullis House

Monday 12 March 2018 12:15pm
The Annual Science Poster Competition
STEM for BRITAIN
Attlee Suite, Portcullis House

ROYAL SOCIETY OF BIOLOGY

13 March 2018
Voice of the Future
Boothroyd Room, Portcullis House, Houses of Parliament, London SW1A 2LW

25 April 2018 7:00-10:00pm
Royal Society of Biology Accreditation Award Ceremony
Terrace Pavilion, House of Commons, Houses of Parliament SW1A 0AA

26 June 2018 10:00am-12:30pm
Parliamentary Links Day
The Attlee Suite, Portcullis House, Houses of Parliament, London SW1A 2LW

10 October 2018
Biology Week Reception
Churchill Room, House of Commons, Houses of Parliament SW1A 0AA

5 December 2018
Christmas Parliamentary Reception
Churchill Room, House of Commons, Houses of Parliament SW1A 0AA
Please contact Karen Patel and Stephen Benn at events@rsb.org.uk for more details.

THE ROYAL SOCIETY

Details of all events can be found on the events calendar at events@royalsociety.org.
For scientific meetings queries: scientific.meetings@royalsociety.org

THE ROYAL INSTITUTION

Details of all events and booking information can be found at www.rigb.org/whats-on.

PARLIAMENTARY OFFICE OF SCIENCE AND TECHNOLOGY

POST organises events that connect Parliamentarians to leading experts from the research community and other sectors including government, the third sector and business on a range of topics. Details can be found at www.parliament.uk/mps-lords-and-offices/offices/bicameral/post/post-events/



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on

Monday 12 March 2018

Atlee Suite, Portcullis House

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www.stemforbritain.org.uk

