fst journal

The Journal of The Foundation for Science and Technology

Volume 24 Number 3
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Under the microscope

Delivering the Life Sciences Sector Plan to drive UK economic growth and innovation in the NHS

AI and work

Impacts and implications for Northern Ireland and beyond

FFL conference

Successful science in the UK and the role of the regions

UK infrastructure

Exploring key threats and strategies to mitigate them

PLUS:

Guest editorial: The potential benefits of naturally occuring hydrogen

Guest editorial: Defence research in universities – navigating tensions

THE FOUNDATION FOR SCIENCE AND TECHNOLOGY

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The Foundation for Science and Technology is a registered charity established in 1977. Its role is to facilitate debate between parliament, Whitehall Departments, the Devolved Administrations and the business and research communities on policy issues that have a science, engineering or medical element.

The Foundation holds regular discussion events and policy roundtables, debating issues such as AI, Net Zero, STEM skills, fusion, quantum technologies, and equity and diversity in the STEM workforce, among many others. It explores both how science, innovation and technology feed into all policy areas (such as transport, environment and energy), and the policy for funding and delivering science and innovation in the UK. All discussion events are free and open to all, with recordings available on our website.

The Foundation runs the Foundation Future Leaders programme, which each year brings together a cohort of around 35 mid-career professionals drawn equally from the research community, industry, and the civil service and wider public sector. Over a 12-month period, the group meet and discuss with senior figures from government, parliament, universities, large industry, SMEs, research charities and others. Just as importantly, Future Leaders present their own expertise, develop skills and make future contacts. The programme includes external visits and the development of an annual conference.

The Foundation for Science and Technology runs a regular podcast, publishes blogs, and produces this Journal. In addition, it provides advice on governance and operational matters to Learned and Professional Societies.

The Foundation is strictly neutral and does not express an opinion on any policy question.

Information about supporting the work of the Foundation can be found at www.foundation.org.uk/About/Support-Us

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LINKS

The online version of the Journal is available by scanning this QR code and includes links to featured research and reports.

DOI: 10.53289/VWEP6121

How prepared is the UK for the impacts of climate change?

After a thought-provoking January event on the resilience of infrastructure on the British Isles, we hosted a discussion exploring the UK's preparedness and resilience to climate change, the following month. The 25th February saw experts including Professor Jim Hall, Professor

Anjali Goswami FRS, Professor Mike Tipton and Professor Rachel Kyte take to the stage in the Wellcome Trust Lecture Hall at The Royal Society to explore the issue. You can watch the whole discussion, including the Q&A that followed at https://bit.ly/FST_infrastructure.

News in brief

New leadership for Foundation

On Tuesday 24th March we said farewell to our Chief Executive of seven years, Gavin Costigan at the House of Lords with a luncheon surrounded by family and colleagues. The role of CEO has been taken on by Dr Alex Rhys OBE who will activate his vision for the Foundation in the coming months *(see page 3)*.

More listening in 2026

We have a string of new podcast episodes for 2026 including conversations with Professor of Neuropsychopharmacology at Imperial College London, Professor David Nutt; Dr Kath MacKay, Chief Scientific Officer of Bruntwood SciTech, Ocean 'Champions', and more. A recent episode was with Programme Director at Insights North East, Liz Shutt who helped us explore cross-system collaboration with research, academia and regional policy-making. Listen at https://bit.ly/FST_podcast-Shutt.

Upcoming events

UK Space Policy and Supporting UK Space Industry – Past, Present and Future
Wednesday 29th April 2026
The Royal Society

Innovation in Scottish Cities and Regions
Wednesday 27th May 2026
University of Strathclyde, Glasgow

In Conversation with Professor Sir Ian Chapman
Tuesday 16 June 2026
The Royal Society

Science Diplomacy
Tuesday 7th July 2026
The House of Commons, London

The case for science activism

Our March event focused on science activism and whether there was a case for scientists to speak out and lobby more around their findings, particularly around the impacts of climate change. With a panel including three scientists turned Extinction Rebellion activists and one former Government Chief Scientific Advisor, the debate that followed was lively. Our Chair for the evening, Professor Paul Monks supported the Foundation in platforming the thought-provoking conversation. You can watch the discussion and Q&A at https://bit.ly/FST_activism.

Science for Government – Future Leaders' first in-person meeting

Our 2026 cohort of Foundation Future Leaders begin their first in-person event at St Matthew's Conference Centre for a Science and Government Day. With 'behind the scenes' insights from the Rt. Hon the **Lord Willetts** on science policy, **Holly Yates** from the Department for Science, Innovation and Technology, **Professor Emily Shuckburgh** CBE of the Department for Energy Security and Net Zero, **Ted Hayden** from the Government Office for Science, and **Professor Charlotte Deane** on how UKRI funding works.

Field-trip finale to CERN and ESRF

Our 2025 Foundation Future Leaders made their final field trip of the programme, crossing borders to visit both CERN in Geneva and The European Synchrotron Radiation Facility (ESRF) and the Institut Laue-Langevinn (ILL) in Grenoble. One participant commented that CERN brilliantly combines research, innovation, international collaboration, and education. While also capturing something bigger- "the very thing that makes us human; a curiosity at the edge of the universe, engineered into reality". Another participant said that the FFL programme "has been a fantastic year of science, technology and innovation discussions exploring so many different perspectives across academia, government, industry and policymaking. It has made me think about the broader science and technology ecosystem in ways that I'd never even considered before."

Find out about our 2026 Foundation Future Leaders at https://bit.ly/FST_FFL.

We are not asking new questions – but they have never felt more urgent

Beginning a new role is an invitation to look forward. And yet, as I sat down to write this foreword, I found myself drawn first to the archive, curious about what the Foundation for Science and Technology (FST) was discussing when I was born. Given the topics I found, I will leave you to do the maths.

What I found was striking. The FST was hosting conversations on genetic engineering and its regulation, while the journal was exploring the impact of information technology on the 21st century. Both have followed extraordinary and often unpredictable trajectories since.

The genetics landscape has evolved into something far more complex and contested than anyone anticipated, from the promise of gene therapy to the profound ethical questions raised by editing the human genome. And the information technology authors were then extrapolating into the future is now so woven into daily life as to be almost invisible, its most dramatic chapter, artificial intelligence, still very much unfolding.

I write this not just as an observer, but as someone whose career has been shaped by exactly these forces. I came to science through biochemistry and molecular oncology, completing my PhD at a time when the tools available to cancer researchers were changing rapidly. By the time I was working with CRISPR, a gene-editing technology that allows scientists to alter DNA sequences with remarkable precision, I was using something that would have been unimaginable to the scientists debating genetic engineering in FST meeting rooms years before. Technologies like CRISPR open up extraordinary new paths in medicine and research, and with them come equally important ethical and regulatory questions that science and policy must work through together. That is not a tension to be feared. It is precisely the kind of conversation that the FST exists to host.

Rhys: How do we harness transformative technologies for good?

That dynamic has run through much of my subsequent career. Most recently, leading work in infection prevention in a post-Covid world, I was part of efforts to bring together clinicians, researchers, industry and policymakers around a shared ambition: a world where no one is harmed by a preventable infection.

Achieving that requires scientific progress, the breaking down of silos, the alignment of health and care infrastructure and public policy, and sustained cross-sector collaboration that does not happen by accident. That experience deepened my appreciation for what organisations like the FST make possible.

The questions that matter most sit at the intersection of scientific and technological possibility and societal readiness. How do we harness transformative technologies for good? How do we build governance frameworks to manage their risks? How do we ensure that those making decisions about science and technology in Parliament and across public life have the knowledge they need to do so wisely? These are not new questions. But they have never felt more urgent.

As we approach our 50th anniversary in 2027, I am struck by the unique role that the FST has played, and continues to play, in convening conversations that help society navigate these moments, bringing together researchers, policymakers, parliamentarians, industry leaders and civil society across disciplines and sectors.

The Future Leaders programme is a particular source of excitement, investing in the policy leaders of tomorrow and ensuring those who will shape these landscapes are equipped, connected and ready. The challenges ahead will require not just brilliant science and technology, but brilliant governance. The FST is in the business of building both.

It is a privilege to be joining at such a moment, and I look forward to the conversations ahead. □

Dr Alex Rhys OBE, CEO, The Foundation for Science and Technology

Exploring for hydrogen?

Paul Davies looks at the potential for naturally occuring hydrogen to be a component in the decarbonisation of our energy system

Can we mine for hydrogen in the way we currently do for fossil fuels?

Decarbonising the energy system in time to limit the worst impacts of climate change is a pressing but difficult problem. Energy has traditionally been used in many forms for many things; natural gas for heating, petrol for transport, electricity for lighting and coal for steelmaking. Sustainable electricity is seen as the primary energy source of a fossil-free energy future, but electricity cannot be used for all energy uses such as aviation.

Other energy sources or "energy carriers" are needed, such as biofuels, ammonia and synthetic electro-fuels and many of these will be based on hydrogen. However, currently low-carbon hydrogen is made from either the electrolysis of water (known as green hydrogen) or from reforming fossil fuels (known as blue hydrogen). Both methods have their own drawbacks. Electrolysis requires large amounts of renewable electricity and clean water. Reforming natural gas requires carbon dioxide (CO_2) capture and storage to avoid carbon emissions.

But does hydrogen gas exist in nature, like oil and natural gas? Hydrogen has been known about as a nuisance gas in the mining industry for years. It is produced by natural processes deep underground and can seep upward through diffusion and through fractures in rocks to the surface. Under certain geological conditions, the hydrogen can become trapped in pockets under rock formations through which the hydrogen cannot readily move (known as cap rocks). If these pockets can be found, they could be exploited using similar technology to natural gas extraction. As with oil and gas, the challenge is finding where the gas has been produced and accumulated.

So where can natural hydrogen (also called white hydrogen) be found? There are two main natural, underground processes that produce natural hydrogen: serpentinisation and radiolysis, as illustrated in figure 1. Serpentinisation occurs as a chemical reaction between certain rock types containing iron (eg ultramafic rocks) and water. Radiolysis occurs in rocks containing uranium, thorium or potassium, where natural ionising radiation from those elements splits water to produce hydrogen.

Rocks with the potential to produce hydrogen, through either serpentinisation or radiolysis, exist in many places all around the world, but additional conditions must also be met. These include temperature, pressure, cap rocks and routes for the hydrogen to rise to below the cap rock. There also needs to be an absence of microbes or other types of reactive rocks that could consume the hydrogen.

Figure 2 shows many of the areas of the world where exploration for natural hydrogen reservoirs is ongoing, including

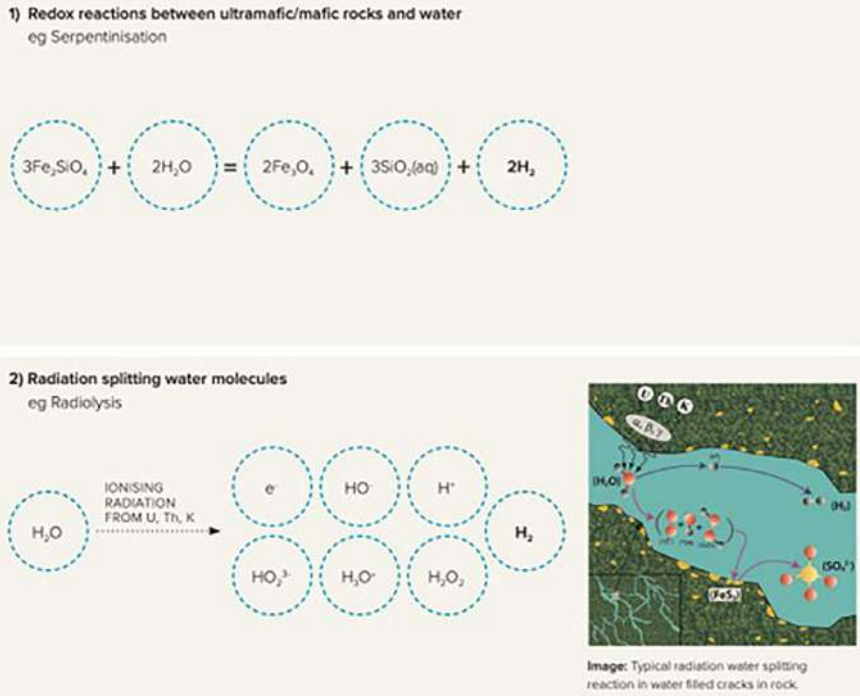
Hydrogen has been known about as a nuisance gas in the mining industry for years. The challenge is finding where the gas has been produced and accumulated.

Both reactions are slow and occur over very long time periods. A challenge is that natural hydrogen is often found in varying concentrations with other gases, including nitrogen, methane and helium. Helium is a valuable gas and could improve the business case for hydrogen extraction. Other impurities could increase production costs because they would require separation and disposal.

in Africa, Europe, the Middle East, Australia and the Americas. Some encouraging results have been reported, but to date there has been no confirmed commercially exploitable discoveries, and more research and exploration is needed.

Will extracting the hydrogen be economically viable? Predicting the cost of natural hydrogen is difficult as it has not yet been exploited at scale. Costs will vary

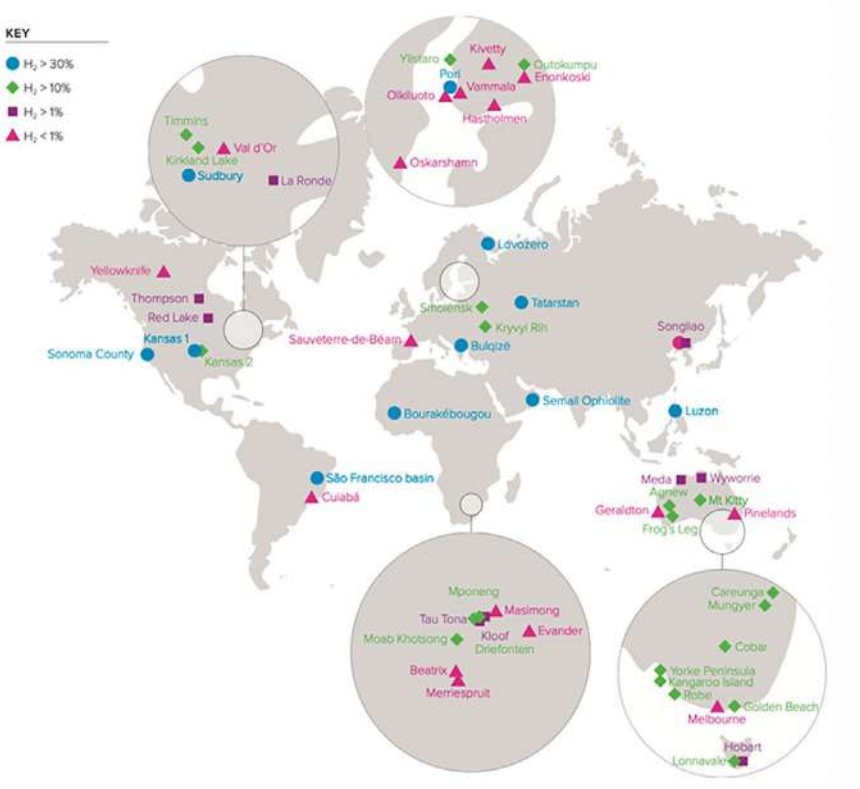
Figure 1: How natural hydrogen is produced



(Figure updated and adapted from Sherwood Lollar et al 2014)

There are two main natural, underground processes that produce natural hydrogen: serpentinisation and radiolysis

Figure 2: Locations and concentrations of hydrogen sources



(Figure updated and adapted from Sherwood Lollar et al 2014)

Locations and published concentrations (expressed as % of exsolved gas phase) for hydrogen found in the continental crust

Encouragingly, the geology of the UK includes some of the rock types that could potentially produce hydrogen

depending on the size, location and purity of the reservoir. Some estimates have put the cost as being competitive with or cheaper than other forms of low-carbon hydrogen, but these remain to be proven.

With natural hydrogen showing the promise of a cheap, alternative source to green or blue hydrogen, does the UK have untapped hydrogen fields? The encouraging news is that the geology of the UK includes some of the rock types that could potentially produce hydrogen, most notably in the Scottish Highlands and in Cornwall. However, there is currently insufficient data to determine if there are any significant, commercially exploitable natural hydrogen reserves in these regions. Again, more research is needed, along with a supportive regulatory regime for exploration and potential exploitation.

In summary, there is the potential for natural hydrogen to play a role in the global decarbonisation of energy and industry, but much depends upon further research and exploration to determine the scale, location and purity of any discoveries. □

For more information, download the Royal Society's briefing Natural Hydrogen: Future energy and resources www.royalsociety.org/natural-hydrogen

DOI: 10.53289/BXFD3275

Paul Davies is a senior policy adviser at The Royal Society where he leads policy work on low carbon energy and net zero. Recent projects have included the need for large-scale, long-term energy storage in the UK and a roadmap for green hydrogen. Prior to the Society, Paul was the Head of Policy for the Institution of Engineering and Technology. Before getting into policy, he was a Chartered Engineer, working in industry and managing the development of products and processes for a number of international companies.

Delivering the Life Sciences Sector Plan

The Government has outlined ambitious plans to make the UK the leading life science economy in Europe by 2030 and, by 2035, the third most important life science economy globally, after the US and China

After a warm welcome to the new Arc Refinery lab space for Life Sciences from its Managing Director, Jim Stretton, Lord Willetts (FST Chair) captured the excitement and anticipation in the room by stating that "we have really got the right people in the right place, at the right time". The first speaker was **Steve Bates OBE, Executive Chair for the Office of Life Sciences**. He began by looking at the 10-Year Health Plan for England, published by the Department of Health, the UK's Modern Industrial Strategy by the Department of Business, which focuses on business investment in eight growth driving sectors, of which life science is one, and finally the Life Sciences Sector Plan.

The plan's ambition is that the UK will be the leading Life Science economy in Europe by 2030 and, by 2035, the third most important life science economy globally, after the US and China. The UK is trying to ensure that all of these ambitions will be underpinned by investment targets for commercial research and development (R&D), particularly access to scale up capital, and access for patients to new therapies, for example. Across each of the 33 actions, there is a granular set of details which are really important. Mr Bates described them as the floor, not the ceiling, for what the UK needs to do within the public sector. These are enabling world class R&D, making the UK an outstanding place in which to start, grow, scale and invest, and driving health innovation and NHS reform.

In the manufacturing sector, it can be hard to compete globally with other countries that have more resources to support investment decisions. However, this has changed in recent times with support from the Government, giving us a more competitive footing and enabling attraction of investment. The world is moving fast in this area, alongside science. Mr Bates said he was grateful to Lawrence Tallon, Chief Executive at medicines regulator MHRA, for leadership that is thinking about both the AI-enabled world and how fundamental science is changing.

He noted that it is hard to sell to the NHS, which has so many different parts. However, through what is being called a "rules-based pathway", teams are putting together the best of the British public sector and the best of the private sector. He said that the UK is small enough to be "exquisitely networked", and large enough to be globally impactful, making our private-public partnerships workable and giving us a competitive advantage.

The Office for Life Sciences now sits across three departments – the Department for Science, Innovation and Technology, the Department of Health and Social

EVENT BACKGROUND

Life sciences is one of the UK's key strengths, with strong and innovative companies both large and small complementing a world-leading university research base. On 16th July 2025, the Government published the Life Sciences Sector Plan, looking to drive both economic growth and health innovation in the NHS.

That plan came with ambitious targets – its aim is to make the UK the top life sciences economy in Europe by 2030, and third globally by 2035. To achieve this, the plan has some key areas for action. On Wednesday 12th November 2025, we hosted a discussion event at ARC West London to explore how the UK life sciences sector and the research community could work with Government to deliver this sector plan and achieve those ambitious goals.

The Foundation for Science and Technology partnered with ARC for this event.

Speakers included:
Steve Bates OBE, Executive Chair for the Office for Life Sciences
Baroness (Nicola) Blackwood, Chair of Genomics England
Tony Wood, Chief Scientific Officer of GSK
Professor Sir John Bell FRS, Emeritus Regius Professor of Medicine of University of Oxford
The Rt Hon the Lord Willetts FRS, Chair of The Foundation for Science and Technology [Chair]

Figure 1. The Sector Plan on a Page

(Source: Office for Life Sciences)

Care, and the Department for Business and Trade.

Some examples of progress that the Office has made recently include a biotech agreement deal, cancer vaccines, exciting work around genomic processes, and the Obesity Pathway Innovation Programme. Mr Bates spoke about the grand opening of the Moderna Innovation and Technology Centre in Oxfordshire – now able to produce 250 million vaccine doses a year. The UK remains committed to pioneering science and technology and he noted that the UK did well in a period where stem cell research became more difficult in competitor nations. He concluded that staying true to the course of science during periods where others may be vacillating is a competitive advantage.

The second speaker was **Tony Wood, Chief Scientific Officer at GlaxoSmithKline (GSK)**, who has worked within the life sciences industry for more than 30 years. He explored the Life Sciences Strategy Plan through the lens of his current role at GSK. Having worked both in the UK and the US in Cambridge, Massachusetts, he has watched the UK's approach to drug discovery and development, mature and change, and said that we are at a pivotal point.

In his early career, he was involved in the discovery of an HIV drug in the 1990s that took the disease from a death sentence to a chronic, livable condition. People living with HIV now take one tablet a day, or, increasingly, get a long-acting injection that protects them from the progression of their disease.

Vaccines have had the single biggest impact on world health after clean water, and for many reasons, people are living much longer than they have in the past. Largely speaking, we are only just starting to see those curves begin to dip. There are now more 60-year-olds than there are five-year-olds in the UK, for example. However, one issue is that a longer life does not always equate to a healthier one. In addition, once you have had a single disease, your chances of a second one increase. Although we think about disease as a singular proposition, multi-morbidity is the greater problem.

Every year, chronic diseases are responsible for something like 43 million deaths worldwide. One example is fibrosis – excess fibrous connective tissue that can lead to organ failure. Nearly 45% of all deaths have some pathobiological component of fibrosis associated with them.

The number of people living with dementia is expected to reach 78 million by 2030, and cases of cancer are continuing to rise and are becoming more prevalent in younger populations. All of this has a big impact on patients and their families and comes with substantial economic cost.

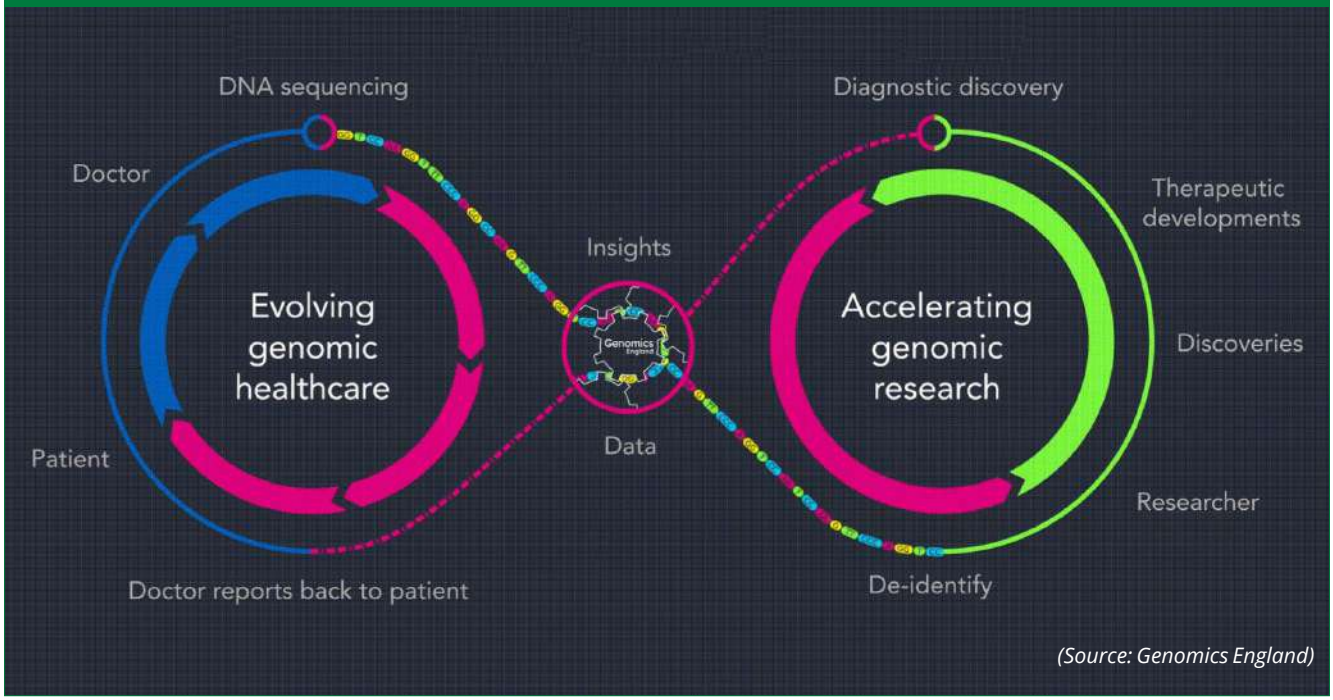
The UK wants all of these ambitions underpinned by investment targets for commercial R&D

Preventable conditions

For example, the members of the G20 lose around a trillion dollars of productivity each year from preventable conditions in people aged 50 to 64. Mr Wood cited Andrew Scott's book *The Longevity Imperative*, which agues that we need a radical rethink of healthy ageing across economic, social, health and scientific fronts. For example, when we are ill in our 80s, living to our 90s has limited appeal, but when we are healthy, we look forward to future stages in life.

The decisions that we take in our 30s influence the health of our 50-year-old selves, so preemption or prevention is an important component of the R&D undertaken at GSK. There is a growing field associated with the science of ageing and the exploration of biological

Figure 2. Genomics England Infinity Loop



A virtuous infinity loop allows the NHS to deliver the world's first nationwide whole genome sequencing service

pathways to allow earlier intervention and the connection of those pathways to conditions which were a result of a prior injury or illness. A bridge can then be made between preventative actions and a framework of treatment that we currently understand in the context of regulation. The aim is to better understand age-related diseases and develop new treatments and prevention strategies.

We can measure disease before we try to start to intervene and design molecules for that purpose

Mr Wood recalled that, when he started in the industry as a medicinal chemist, it was only possible to approximate the understanding of a disease, and it was rare to design a medicine that was successful. However, we are now in a position where we can measure disease before we try to start to intervene and design molecules for that purpose. This allows medical chemists to provide transformative opportunities for preemption. GSK is investing significantly in collaborations to build that understanding. Examples include the metabolic component of Steatotic Liver Disease (SLD). It affects 12m people globally, but, through the work that GSK has done with the UK Biobank and other partners, it is increasingly getting to a point where researchers can draw a straight line between a molecular target in SLD, validated by human genetics through individual points, all the way through the intervening layers of biology, in which every single layer (if it is successful) increases the probability of success of the next one. All this can be done without reaching for a single pipette in the laboratory to design a molecule. Once this has been done for a particular disease such as SLD, a complete list of molecules can be generated, which ultimately improves analysis and furthers potential treatment of other diseases.

He concluded by noting that, if the audience accepted his thesis that we are now in a world where we can measure disease before we choose to intervene, this puts the patient firmly at the centre of everything, from start to finish. Collaboration is key and the UK has a unique opportunity, through translational research networks, to be a leading force as technologies change.

The third speaker of the evening's panel was **Baroness Blackwood, Chair of Genomics England**, who gave a policy perspective. She spoke about Genomics England (GE) as a case study on how to invest in life sciences assets, and how long-term political commitment and investment policy alignment can drive better care in the NHS, through successful public-private partnerships. GE's vision is a world where everyone benefits from genomic healthcare.

In the infinity loop pictured *(see Figure 2, above)*, readers can see healthcare – patients and clinicians working together through the Genomics Medicine Service – that enables the NHS to deliver the world's first nationwide whole genome sequencing service.

Since its launch in 2020, GE has helped more than 100,000 patients and this is growing. On the right side of the image, readers can see research – both from academics and industry partners – interrogating the data in GE's secure research environment. Genomics England sits in the centre, operating the sequencing pipeline, managing the data infrastructure, and trans-

lating research back into clinical practice. The power of this model is that the two loops reinforce the diagnostic discoveries made in the research environment. These flow back into the clinic, and consented clinical data replenishes our data set for further discovery.

Getting to the current stage has not been straightforward, however, as UK infrastructure had never previously embedded genomics into routine healthcare. Her teams had to redesign clinical pathways, train thousands of clinicians and make genomics more mainstream-aware, while building public trust. This was at a time when concerns about data were very high. She explained that it required years of very close partnership with the NHS and a determination to not just prove that the science worked, but to build a system that could adopt it. The payoff is that it is now a virtuous cycle that generates three forms of return:

- For participants, with better diagnostics and better therapeutics
- For the NHS, with better productivity and efficiency through stratification, screening and early intervention
- For the UK, through increased R&D investment and clinical innovation.

It is important to remember that none of this works without public trust. At the heart of the GE model is the participant panel – patients and families who directly advise the board that safeguards consent. This helps ensure data is always used responsibly and for the public good. The trust that this helps to build ensures that 95% of patients who are asked say yes to using their data for research. This is critical for the data set to be used nationally. However, genomic data alone is not enough. It only becomes powerful when it is linked to other information, such as clinical records, pathology and radiology results, and transcriptomics (DNA data). GE therefore invests heavily in quality and linkage with other national data initiatives such as the Cancer Registry and the National Pathology Imaging Collaborative. The GE research environment now hosts more than 700 active projects and more than 1500 accredited researchers, who all work with that data.

One example is the work of Dr Jack Bartram, a consultant haematologist at Great Ormond Street Hospital, who explored what happened when he introduced whole genome sequencing into his routine practice, with striking results. In 81% of cases, whole genome sequencing provided additional information for diagnosis. In 24% of cases, it changed how the condition was managed, and in 14% of cases it reclassified diagnosis entirely. Genomics is not always about condition management. Sometimes it does not just guide care, it can change it – sparing children from having treatment that they never needed in the first place.

For example, 'Baby Oliver' was born with a six-centimetre tumour on his leg. Under the microscope, it looked like a very aggressive cancer and the molecular tests were inconclusive. It therefore required whole genome sequencing to tell the full story. This found that the condition was not cancer at all. It was a benign myofibroma and, because of that single test, Baby Oliver was spared chemotherapy and surgery – a major win for a newborn.

Genomic sequencing can help with individual diagnosis as well as the discovery of a new syndrome

Another example is how national scale genomics drove the discovery of a new syndrome. By the time he was 12 years old, 'Charlie' had been through years of investigations – a long diagnostic odyssey trying to understand his severe learning disability. All of the standard tests got him and his family no closer to understanding what was going on. It was only when his genome was analysed critically within the National Genome Research Library, alongside thousands of others, that the pattern began to emerge.

Children with the same variant of RNU4-2, which is a tiny noncoding gene, were found to share the same developmental features. Although no therapies yet exist, now that the genetic cause is known, discovery and research can begin. Crucially, his family, and thousands of children like him, have hope that they will find an answer.

By linking whole genomes with pathology, radiology and clinical records, GE is creating a rich data set. Combining that with multi-model data and AI, the results are becoming very powerful. Researchers are already starting to detect cancer subtypes that were previously invisible and predicting which tumours will behave aggressively. In another project, GE has developed an AI approach to scan across whole genomes to pick up hidden so-called 'indel mutations'

Where we can live better lives, we also become more successful economically

– a type of genetic variation involving the insertion or deletion of nucleotides in a DNA sequence – which standard sequencing panels often miss. These are the kinds of mutations that can change treatment decisions and outcomes for patients, so they are meaningful in the clinic, as well as in research.

Baroness Blackwood argued that the UK can only stay competitive if it keeps pushing forward the frontiers of Genomic Health Care. This is what 'the generation study' is all about. It is the world's first pilot of whole genome sequencing and genomic screening at birth through the NHS. So far, more than 25,000 babies have been recruited across more than 50 hospitals. GE is testing for 200 rare but treatable conditions at birth, and abolishing the diagnostic odyssey that children such as 'Charlie' experienced. This means re-engineering newborn screening workflows, training midwives and earning the trust of new parents at one of the most vulnerable moments in their lives. This is the kind of work that we need to put in place if we are serious about shifting genomics from reactive and research environments into predictive public health.

Transformational vision

In conclusion, Baroness Blackwood argued that Genomics is now one of the big bets in the NHS 10 Year Health Plan for England and the Life Sciences Sector Plan. It is central to the Government's vision of a transformed health system. The UK is in the foothills of this journey and needs sustained political commitment to build on the assets and the investment we already have. It requires policy alignment across research, healthcare and industry partners, and to define key public private partnerships to realise that vision. She said that it is clear we can get ahead when we drive these missions and identify what we are good atand it is vital to make sure that we do not lose the advantage in the next decade.

The final speaker was **Professor Sir John Bell FRS**, Emeritus Regius Professor of Medicine at the University of Oxford, who started advising on Life Sciences when the original Office of Life Sciences was created in 2009. He began by saying that the wider life sciences community has grown considerably in the past 20 years and, under Theresa May's Government, there was a discussion around an industrial strategy, with life sciences being chosen as a key focus. He noted that the UK had three sector deals, which was miles ahead of other countries. Citing an observation made by Alan Langland (former CEO of NHS England), he said that this was because we act as a group, we hunt as a pack, and we try and work together wherever we can. That includes various components including academic research programmes and the universities, which are crucial to the strategy.

The NHS, despite all challenges, is still crucial to our success as a life sciences hub. Government funders and charities also contribute to what we are trying to do. There is now a growing network of small companies alongside large, global companies in the UK which knit it all together so that we can deliver the things that we have been asked to do by Government and make a difference. We have seen the growth of small companies into mid-sized companies and have had an enormous amount of success around our big programmes. Things are not perfect, but he urged UK policy makers to "lean into what we are good at". Mentioning China, he said that their biotech sector was thriving and that the UK should try to work in synergy with them, otherwise risking coming "head to head" with them.

Another key issue is delivering healthcare to the population. Although he commended the NHS, he said that it is in trouble due to what he described as large amounts of money going into a failing system. He argued that a healthcare system designed in the 1950s which has extended life expectancy by 15.7 years since it was invented, is the biggest achievement of any human endeavour in the last 100 years. Many of those successes have come from the UK. However, we have a healthcare system that is not working. We need to take stock of some of the options described by previous speakers such as early intervention and use these ideas to help solve how we deliver health care more effectively.

Where we can live better lives, we also become more successful economically. Life Sciences is a place where we can do that with the discoveries we make. However, the absence of an effective healthcare system that deals with the problem of comorbidity and chronic disease adds a drag on the economy, as a very large number of people are out of the workforce due to long-term illness. According to the November 2025 *Keep Britain Working* report, we spend £85 billion a year keeping millions of people off work because of sickness, when many of those illnesses are treatable and manageable.

Exploring some examples of where the UK has been leading on life science work, he cited the UK Biobank, a repository that stores a wide range of biological samples and health-related data. This was turned down by several Medical Research Council committees before being taken on. With 2.5 million people recruited, there is also an opportunity to blend this with the NHS Prevention Programme. He said that we are in a good position to take advantage of data and get it to a good place. We need to think about how we blend that data story with clinical trials here. The truth is, we know how to do it, but we just need to line ourselves up. Citing some past successes, he said that there are real opportunities, particularly in the cancer space, to think a little bit harder about how early diagnostics will actually help us get to a better place.

You can view and listen to the whole event including the Q&A at https://bit.ly/FST_life-science. □

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Defence research in universities: navigating structural tensions

Geraint Rees outlines the challenges and opportunities for those UK research universities which contribute to national security

The Hypersonic Attack Cruise Missile, delivered through AUKUS Pillar II.

UK research-intensive universities are well-positioned to make substantial contributions to national security, but doing so effectively requires both the government and universities to navigate six structural tensions where legitimate institutional values conflict. Understanding these tensions enables both universities and government to develop frameworks for sustained, productive engagement.

Recent debates about research partnerships, student and staff concerns about defence industry links, and questions about export controls reveal the complexity universities face. These are not obstacles to engagement but governance challenges requiring thoughtful policy support.

Here, I focus on the relatively small number of universities that conduct research, innovation and commercialisation at scale across advanced technology domains. Perhaps 10–20 exist in the UK, and a similar number across Europe. They possess world-leading capabilities in areas like artificial intelligence, quantum technologies, and advanced materials. They have precisely the expertise that government seeks to mobilise for defence innovation and broader national security through initiatives spanning UK Defence Innovation (UKDI), the Strategic Defence Review, and programmes including AUKUS Pillar II.

Across Europe, this subset of universities confronts similar pressures as defence budgets grow, strategic autonomy frameworks recognise research as foundational to security, and geopolitical competition demands technological advantage. The UK's post-Brexit position creates distinctive opportunities, as many UK institutions have strong defence research traditions. All have flexibility from operating outside EU frameworks while maintaining European scientific partnerships. And the Prime Minister's emphasis on national security as encompassing economic resilience, technological sovereignty, and societal preparedness creates natural alignment with the broader research strengths of UK universities.

The UK's post-Brexit position creates opportunities, as many UK institutions have strong defence research traditions.

This paper identifies six structural tensions underpinned by two fundamental ambiguities that require updated policy frameworks. Rather than prescriptive solutions, I seek to clarify where competing institutional values require balancing and why sustained engagement depends on governance and policy frameworks that acknowledge these complexities.

Universities, as independent institutions, can make principled choices about which values to prioritise. But doing so effectively requires both institutional clarity and policy support. The goal is enabling productive long-term partnerships by making trade-offs explicit and creating frameworks that allow different institutions to contribute according to their particular missions and capabilities.

Two fundamental ambiguities

Two underlying ambiguities shape all discussion of national security research and understanding them is essential for

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A British soldier tests a robotic dog – the development of autonomous systems means AI is a defence technology

developing productive engagement frameworks.

The erosion of civil-military boundaries. It has become impossible to categorise research definitively as either "civil" or "military" in scope. This reflects two developments. First, modern security threats increasingly involve areas like cyber operations, information warfare, supply chain resilience, and societal preparedness rather than solely conventional military capabilities. Research on topics as diverse as social media algorithms, semiconductor supply chains, or pandemic preparedness can all strengthen national security without traditional weapons applications. A computer scientist studying misinformation propagation contributes simultaneously to democratic resilience and information security. Second, defence establishments now recognise that strategic advantage emerges from an extraordinarily broad knowledge base and its applied uses encompassing disciplines such as behavioural psychology, climate science, urban planning, and biosecurity alongside traditional defence domains.

This breadth means the full strength of UK research-intensive universities becomes relevant to national security. The same algorithms serve autonomous vehicles and autonomous systems. The same quantum sensors enable medical imaging and advanced detection. The same materials science improves energy systems and protective technologies. The fundamental capabilities of research-intensive universities can directly support national security without requiring distinct "military" programmes. The Strategic Defence Review's emphasis on emerging technologies, MoD partnerships in AI and quantum, and programmes like UKDI all recognise domains where research-intensive universities possess world-leading capabilities. But governance frameworks that depend on clear civil-military distinctions cannot accommodate this convergence. When quantum computing, AI, and advanced materials inherently serve both civilian and security ends, categorical prohibitions become incoherent.

The fluidity of strategic relationships. Determining appropriate partners for research with national security relevance requires more nuanced judgment than Cold War friend-adversary distinctions allowed. China is now simultaneously a major research partner, economic competitor, strategic rival, and security concern. The 2025 Strategic Defence Review groups Russia, Iran and North Korea as threats requiring the UK to move to warfighting readiness alongside describing China as 'a sophisticated and persistent challenge', a significantly harder framing than the previous Integrated Review's characterisation of China as a "systemic challenge". Russia and Iran are subject to comprehensive sanctions making collaboration straightforwardly prohibited. Ambiguity also lies elsewhere. Middle Eastern states, Turkey, and numerous other countries resist simple categorisation as partners or adversaries. Some partnerships are therefore clearly prohibited, while others are clearly permitted with trusted allies. But a substantial middle ground requires sophisticated judgment about which collaborations serve UK interests versus creating genuine security risks.

A university collaborating with institutions in a competitor state on quantum computing must balance maintaining scientific leadership against potential technology transfer risks. Export control regimes provide one framework for managing these complexities, though their application to emerging technologies requires ongoing refinement. The UK government's Trusted Research agenda and Research Collaboration Advice Team (RCAT) represent progress toward sup-

porting universities in navigating partnership risks. But universities need clearer policy signals about which partnerships government considers strategically valuable versus problematic, along with support for the due diligence infrastructure required to make sound judgments.

These ambiguities compound each other. When research serves both civilian and security purposes, and when international partnerships resist categorical classification, traditional frameworks permitting "peaceful research with allied partners" while prohibiting "weapons development with rivals" become inoperable. Nearly all research partnerships with nearly all countries become contestable. Universities must develop case-by-case judgment about strategic implications, geopolitical risks, and dual-use potential for significant collaborations. This forces a level of security assessment that some institutions currently lack the expertise to conduct. The gap is not one of willingness but of capacity, requiring investment in specialised knowledge and infrastructure. Government can enable university contribution to national security by providing clear demand signals, supporting development of institutional capacity for strategic assessment, and creating frameworks that acknowledge inherent complexity rather than demanding impossible categorical clarity.

Six structural tensions

Against this backdrop, research-intensive universities must navigate six structural tensions where legitimate institutional values conflict. Different institutions will balance these differently based on their traditions, national contexts, and missions. The value for both universities and government comes from understanding what is genuinely at stake.

Individual versus institutional academic freedom. The freedom of individual researchers to pursue knowledge can conflict with institutional autonomy to shape collective identity. When a researcher claims academic freedom to accept defence funding while the institution claims academic freedom to decline such positioning, both make legitimate appeals to the same principle but mean different things. In Germany, constitutional protections for Wissenschaftsfreiheit create high bars for institutional restrictions on individual research choices. In the UK, academic freedom is a professional norm, giving institutions more flexibility but less principled grounding for constraints. The erosion of civil-military boundaries amplifies this tension. When a computer scientist can reasonably argue that their machine learning research serves both civilian and security purposes, institutions must either make contentious judgments about ultimate use or apply restrictions so broadly that they constrain significant swathes of legitimate science. Frameworks that evaluate research based on substantive criteria such as openness, publication, and collaborative relationships are more defensible than categorical prohibitions based on funding source alone.

Can universities maintain selective partnerships with institutions in strategic rival states?

Clean hands versus critical engagement. Universities adopt different postures toward security research based on their histories and national contexts. This diversity can be a strength. Some institutions emphasise maintaining analytical distance, arguing that intellectual independence enables more valuable long-term contributions to sound security policy. They study defence technologies, analyse strategic implications, and educate future security professionals without direct involvement in capability development.

Others emphasise active engagement, arguing that universities have a responsibility to embed ethical frameworks into defence technology development. If autonomous systems and AI will be developed regardless, participation enables shaping how technologies evolve in ways serving democratic values and international humanitarian law. A third approach, emerging from Nordic "total defence" frameworks, positions universities as contributing to societal resilience alongside other sectors. This neither emphasises moral distance nor frames engagement primarily as weapons development, but rather as fulfilling societal responsibilities for comprehensive national security including cyber resilience, supply chain security, and technological sovereignty. This approach aligns naturally with the Strategic Defence Review's emphasis on a 'whole-of-society' approach to national security. All three approaches can legitimately contribute to UK national security, and policy should enable this diversity.

National security versus international collaboration. Research-intensive universities derive their excellence from international collaboration and knowledge exchange. This itself strengthens UK research competitiveness and technological advantage. The question is not whether to maintain international partnerships but how to do so in ways that advance rather than compromise national security. Can universities maintain selective partnerships with institutions in strategic rival states while contributing to UK quantum capabilities? Can they balance security screening with attracting international talent that strengthens UK research capacity?

These are navigable challenges requiring appropriate frameworks rather than binary categorisation. The complexity of contemporary strategic relationships also demands sophistication. For example, is collaboration with specific institutions on quantum research acceptable if framed as fundamental science with appropriate safeguards; what due diligence on partner institution links is sufficient; and which technical domains require enhanced scrutiny versus remaining open? Export control regimes compound this difficulty by imposing restrictions based on technology domain, partner nationality, and end-use in ways that create complex matrices of permitted and prohibited collaboration.

After Brexit, UK universities now have flexibility to develop bilateral partnerships and position themselves as trusted partners for international research with security relevance. The goal should be enabling universities to maintain international competitiveness while managing specific security risks, recognising that technological leadership requires international collaboration and itself serves national security.

Democratic legitimacy versus expert judgment. Public funding creates legitimate democratic claims on university decision-making about security-relevant research. Students, staff, and civil society organisations argue they should have voice in decisions about weapons development or surveillance technology. Simultaneously, research decisions require technical expertise and some insulation from short-term political pressure. The challenge is governance design: incorporating legitimate concerns while enabling institutions to fulfil societal responsibilities. The ambiguity about what constitutes defence-relevant research makes this particularly fraught. If a university community votes to prohibit weapons research, does this extend to AI algorithms that might in other circumstances have autonomous weapons applications? Or to psychology research that potentially can be used to inform military recruitment? Different communities will draw these lines differently, and governance must evaluate research based on substantive criteria rather than categorical prohibitions.

Institutional autonomy versus funding dependency. Defence and security budgets are currently growing faster than civil research funding, creating opportunities for universities to strengthen their resource base while contributing to national security. The challenge is ensuring engagement develops through deliberate institutional choice rather than incremental drift. Investing in secure facilities, cleared personnel, and governance infrastructure creates capacity serving national interests. But it also creates path dependencies and constituencies with vested interests. The costs of exit become significant. The blurred civil-military boundary creates a particular trap, a 'boiling frog' problem. Universities might accept funding framed as civilian only to find successive iterations increasingly emphasise security applications. Each incremental shift seems manageable. Cumulatively they can transform institutional character without any single decision crossing a clear line.

The commercialisation of dual-use technologies offers a distinct pathway. Research-intensive universities increasingly pursue spinouts and licensing arrangements that can strengthen national security by ensuring UK-developed technologies serve UK and allied interests. Areas like AI algorithms, quantum sensors, semiconductors or advanced materials all have inherently dual-use commercialisation potential. When universities license these technologies or support spinouts with security applications, they contribute directly to technological sovereignty. Defence customers often require higher technology readiness levels than civilian markets, meaning defence contractors typically act as essential intermediaries. Universities need to understand these different pathways when developing governance for commercialisation with security relevance. And the UK Government can support sustainable partnerships through multi-year funding commitments that allow universities to plan capacity development deliberately.

Transparency versus security. Academic legitimacy rests on transparency, open publication, and peer review. Some national security research requires classification, restricted access, and publication controls. These need not be fundamentally incompatible. Universities can contribute through predominantly open research while accepting limited classified work where genuinely necessary. The challenge is ensuring clarity about classification requirements before research begins, so institutions and researchers make informed choices. Classification decisions are typically made by funders rather than universities, meaning institutions can lose control over whether research remains open. Work can be retrospectively classified, creating structural constraints on academic freedom that most governance frameworks fail to address. Export controls add further complexity, particularly as their application extends to emerging technologies. Machine learning for medical imaging need not trigger controls unless specific military applications are intended. But the expanding scope of strategically relevant research means universities can find themselves unexpectedly constrained in domains they considered removed from defence concerns. Government can support this by providing early clarity about likely classification requirements and clearer guidance on which domains require enhanced protection.

The European and UK context

EU policy increasingly frames research through security and strategic autonomy lenses. The European Chips Act, quantum and AI flagships, and similar initiatives blend civil and security rationales. This potentially means that Horizon Europe-funded quantum research might be considered "defence research" if its explicit purpose included maintaining European technological sovereignty. Universities that would refuse national defence ministry funding may accept EU funding for functionally equivalent research because the framing differs. This suggests institutional positions sometimes rest on political symbolism rather than principled distinctions about research character. The EU's approach exemplifies the collapse of civil-military boundaries: strategic autonomy explicitly treats civilian and security objectives as inseparable.

The European Defence Fund explicitly funds defence and dual-use research. UK universities are excluded post-Brexit, creating both constraints and opportunities. The exclusion limits access to substantial funding but frees institutions from governance complexities that EDF participation would create. The May 2025 UK-EU Security and Defence Partnership creates a framework for closer cooperation but has not yet opened EU defence industrial programmes to UK participants. More broadly, UK universities combine established defence research traditions with flexibility from operating outside EU frameworks. This positions them well to leverage European scientific collaboration selectively while contributing fully to UK national security priorities.

UK defence and security policy creates clear demand for research-intensive university contributions. The 2025 Strategic Defence Review identifies innovation as central to warfighting readiness, with AI, quantum, advanced materials, and synthetic biology among its priority

domains. The establishment of UK Defence Innovation, consolidating the former DASA and other innovation bodies with a ring fenced £400 million annual budget, provides a single point of engagement for universities. DSTL provides research support, and the MoD Chief Scientific Adviser coordinates research priorities. Several UK institutions maintain significant national security research portfolios while others adopt more selective approaches. This diversity strengthens the national research base. Government policy can leverage it by providing clear demand signals, supporting institutional capacity development, and recognising that varied approaches create a more robust ecosystem than uniform engagement.

Governance and policy

Understanding these tensions enables productive partnerships. For universities, clarity enables principled decision-making about contributing to national security while preserving academic characteristics that make them valuable partners. For government, it clarifies what policy support universities need and where barriers to engagement can be removed.

The two fundamental ambiguities mean categorical approaches are no longer sufficient. Practical governance frameworks might include several elements. First, presumptive positions with case-by-case override. Presumptions should be established with clear criteria and processes for exceptions, acknowledging that categorical rules cannot address inherent ambiguity. Second, transparency about uncertainty: acknowledge publicly when partnerships fall in genuinely ambiguous territory, explaining competing considerations and institutional reasoning. This builds legitimacy even when stakeholders disagree. Third, dynamic review mechanisms: that accept strategic relationships shift and dual-use applications emerge, building periodic review into major partnerships. Fourth, distributed expertise: that develops institutional capacity for strategic assessment beyond traditional research ethics review, including expertise on geopolitical risk, export controls, and technology security.

Government itself faces analogous tensions. Defence spending competes with other priorities. In devolved nations, the Scottish Government's position on nuclear weapons creates tensions with UK defence policy even as nuclear submarines operate from Scottish bases. Recognising that government navigates its own structural tensions, rather than speaking with a single voice, should inform how universities and government engage on these issues. And it is well established that multiple government departments have stakes in university research, sometimes with competing or even conflicting objectives. Productive partnerships require acknowledging complexity on both sides.

For Parliament and the government, several implications follow:

- Expect and accommodate diversity in university responses. Research-intensive universities will respond differently to defence research opportunities based on their traditions, missions, and governance structures. Policy should treat variation as ecosystem strength rather than institutional obstruction.
- Understand structural constraints. Universities cannot easily segregate "defence" from "civilian" research or "friendly" from "adversarial" partnerships when fundamental categories have eroded. Policy demanding such segregation will produce arbitrary distinctions disconnected from actual security implications.
- Recognise inherent trade-offs. Deeper defence partnerships may constrain international collaboration, research security restrictions may reduce access to international talent, and transparency requirements may conflict with classification needs. The temptation to demand both deep engagement and unrestricted openness sets universities impossible tasks.
- Support institutional capacity development. Universities need expertise to navigate geopolitical risk, export controls, and strategic assessment. Most institutions currently lack resources to conduct sophisticated analysis of which partnerships pose genuine security risks versus which restrictions are administratively convenient but substantively arbitrary. The Trusted Research agenda and Research Collaboration Advice Team represent progress, but sustained investment in such mechanisms remains essential. Government should also consider how to support universities in building the rapidly evolving compliance and assurance infrastructure that sophisticated security assessment demands. This requires resources, not merely policy direction.
- Finally, create space for ongoing dialogue as the landscape shifts. New technologies emerge, strategic relationships change, and security threats evolve. Regular structured engagement helps both sides understand evolving constraints rather than allowing policy and practice to drift apart until crisis forces confrontation.

UK research-intensive universities possess world-leading capabilities in domains critical to national security. Enabling their contribution requires clear demand signals, investment in institutional capacity, multi-year funding commitments, and recognition that varied institutional approaches create robust national capability. The path forward requires intellectual honesty about the complexity of contemporary security research, and mutual recognition that universities and government share interests in strengthening UK security and technological advantage. □

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Impacts and implications

The first speaker, Patricia O'Hagan, Deputy Chair of Matrix (Northern Ireland's independent Science and Technology Advisory Panel), introduced the findings of the report, AI and the Future of Work in Northern Ireland. This explores one the most pressing questions of our time: how is artificial intelligence transforming the nature of work, and what does it mean for the people, the economy and the future in Northern Ireland? The signs of disruption were already visible through many sectors, and so too were the opportunities. AI is no longer a horizon technology. It is already transforming the nature of work. It is reshaping sectors, disrupting business models and redefining career paths. The report examines AI's projected impact through to 2030, based on current capabilities and adoption trajectories. It focuses on six key objectives:

1. Understanding how AI is reshaping workforce structures in an AI powered economy,
2. Assessing sectoral susceptibility and displacement risks,
3. Developing plausible futures with timelines for reshaping work across Northern Ireland,
4. Economic and productivity implications,
5. Governance, ethics and societal implications,
6. Actionable strategies.

When Matrix created the report, several key trends quickly stood out. First, the pace of technological change. AI is evolving from a supportive tool into an autonomous decision maker. This shift is already being see in finance, healthcare and supply chains. Also, the workforce disruption is uneven and is concentrated in entry level and knowledge-based roles. These risks

AI will have a transformative impact on work – but how will workers and businesses navigate these stormy waters?

deepen inequalities by gender, age and digital access, with women particularly exposed as most of the threatened areas are dominated by female workers.

What we thought could take years is unfolding in months. In the US workforce, the use of AI jumped from 30% to 46% in just six months, an increase of over 50%. The level of uncertainty is high. Global forecasts range from large-scale job losses to net job creation outcomes that depend heavily on how AI is implemented and governed.

The report revealed that AI's impact is uneven across sectors, organisations and individuals. Knowledge intensive industries such as Information and Communication Technology (ICT) and professional scientific services are already feeling disruption, along with finance, insurance and admin support.

Northern Ireland faces specific vulnerabilities because of its economic structure. Much of its foreign direct investment has centred on back-office roles, which are the roles that are most exposed to AI automation. Professional services, including legal accountancy and technical consultancy are an important part of NI's economy and serve UK and international markets. However, the traditional billable hours model is under pressure, as clients are predicted to expect AI-related productivity gains to be reflected in pricing.

Northern Ireland is also an SME economy, with more than 81,000 registered small and medium-sized

EVENT BACKGROUND

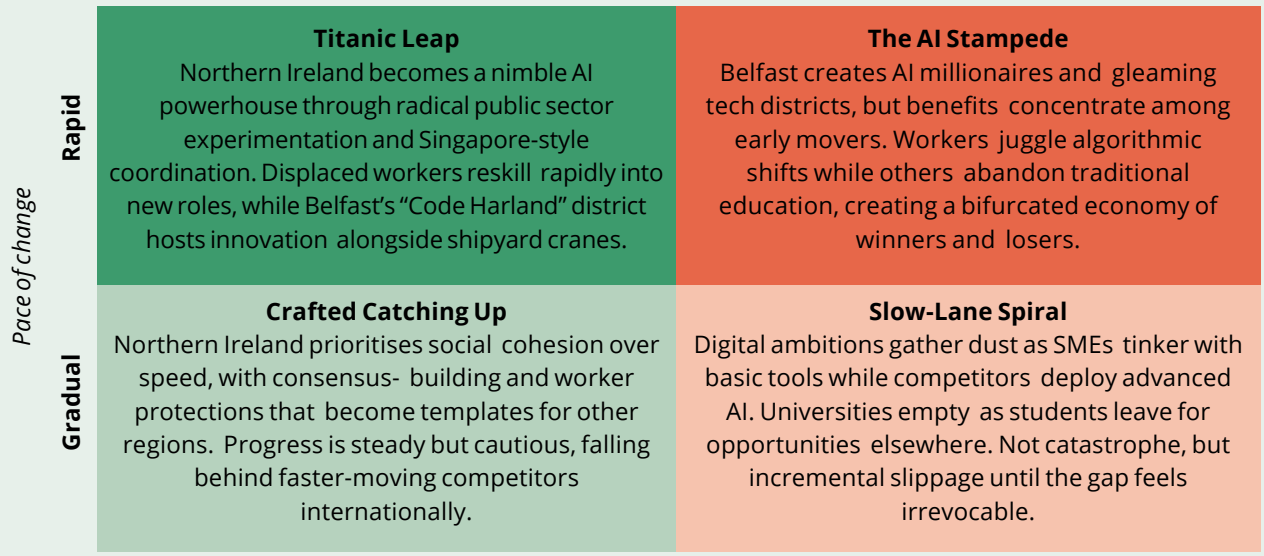
There is no doubt that artificial intelligence will have a transformative impact on work. There is the potential for significant economic benefit, and many new types of jobs may emerge. Equally, other types of roles will change significantly, and some will disappear completely.

What are these changes likely to be, and how can companies and governments prepare? In Northern Ireland, Matrix (Northern Ireland's independent advisory body on science and technology) published a report on AI and the Future of Work in September 2025, exploring the benefits, impacts and implications. The report was commissioned on behalf of the Department for the Economy to explore how Northern Ireland can position itself at the forefront of AI-driven economic transformation whilst addressing the profound societal and ethical questions arising from AI's impact on work, workers, and the nature of employment.

On Wednesday 22nd October, the Foundation jointly organised a discussion event with Matrix, and Queen's University Belfast.

Speakers included:
Patricia O'Hagan, Deputy Chair of Matrix
Professor Helen, Chief Scientific and Technology Adviser of the Northern Ireland Assembly
Professor Philip Hanna, Dean of Education at the School of Electronics, Electrical Engineering and Computer Science at Queens University Belfast
Dr David Jordan, Lecturer in Economics at Queens University Belfast, and Ministerial Adviser on Productivity

Figure 1. Four scenarios



(Source: Matrix – Northern Ireland Science Industry Panel)

Will workforce skilling, reskilling and adaptation keep pace with the changes brought by AI?

businesses employing most of its workforce. AI adoption in SMEs lags behind the larger firms that are already transforming their operations. However, this also provides an opportunity. The accessibility of AI means it can be deployed on existing digital infrastructure. The Northern Ireland economy sits at the lower end of UK productivity and innovation rankings, but with targeted support to upskill SMEs and build AI capability, it can unlock new efficiencies, boost productivity and free up capacity for innovation, driving growth in new products, services and markets.

During the making of the report, a working group was created to identify 10 critical uncertainties that would shape AI's impact on work. They focused on two key uncertainties – the pace of AI adoption (whether it would be gradual and managed or rapid and disruptive), and the capacity for workforce reskilling (whether people and systems can keep up with the technological change). By combining these two dimensions, the group developed four scenarios, each one painting a different picture of Northern Ireland's AI-powered future and the actions that can make the difference between disruption and opportunity *(see Figure 1)*.

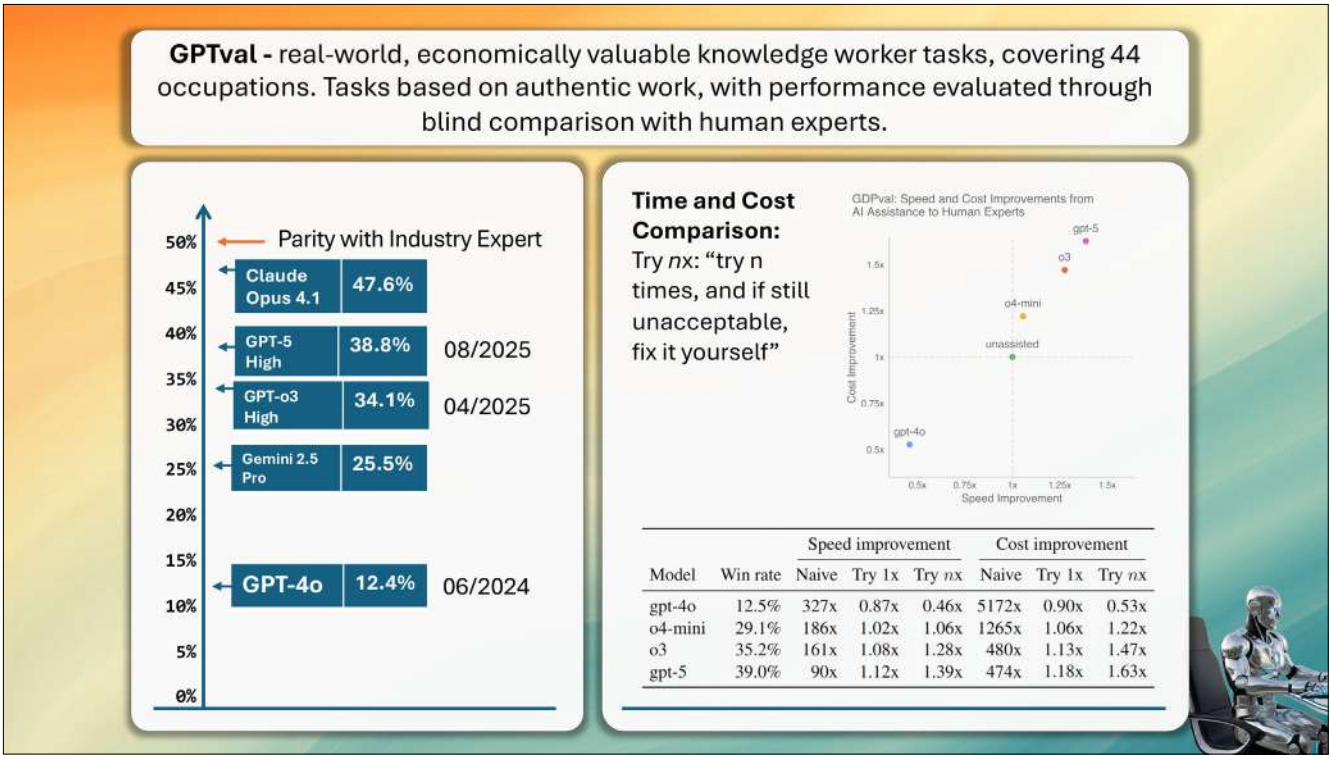
Ms O'Hagan concluded that Northern Ireland has what it takes to lead in the age of AI. It has world-class research in cybersecurity and health technology, a culture of collaboration and the agility that comes with small scale. Northern Ireland stands at a critical juncture. AI is not a distant horizon, it is already here, shaping the world around us. Northern Ireland has the talent, creativity and collaborative spirit, but leadership now demands urgency and unity of purpose.

The second speaker was Professor Helen McCarthy, appointed the Chief Scientific and Technical Adviser to the Northern Ireland Assembly in June 2024. Her main role is to embed science and technology across policymaking, across all Government departments. Alongside an Office for Science and Technology sits an Office for AI and Digital. There are a number of different strands and projects which use the Offices as an advocate for change. Some key things coming out of this are the use of AI and data, and that one of the areas of data to flag is women in STEM. Professor McCarthy added that we are never going to embed true change and disruption unless we include everybody in the conversation. As an example of a network in this space, she cited the Stemettes – a social enterprise working to "engage, inform and connect the next generation of women and non-binary people into Science, Technology, Engineering, Arts and Maths (STEAM)".

It is the Office for Science and Technology's duty to help the Civil Service upscale in what has been a very difficult and technologically challenging time. A digital review across the Civil Service, and had found that every level was at beginner level.

After a meeting with Sir Ian Chapman, the head of UKRI, Professor McCarthy said that her team were particularly keen to "join ourselves up". With this in mind, she placed a science champion in each of the Government departments, with the aim of getting areas of research interest (ARIs) into each department.

There are now 80 ARIs going through a process of approval, with 60 of them having AI-based technologies that departments want to work with. This is a golden opportunity to join the dots between the Post-Graduate Award Scheme and the Department for the Economy, which she described as the other levers that can be



The 'GPTval' is an evaluation framework introduced by OpenAI to measure the performance of AI models on real-world, economically valuable tasks

pulled to help support Northern Ireland Government departments and do the relevant research projects. It was also important to get the departments thinking about what they want out of the research. Getting the public on board and being open and transparent is key.

Professor McCarthy also touched on the software training needs of the Civil Service as well as the need for better shareability and collaboration. For example, the Northern Ireland Civil Service had 110 million documents sitting in a format that was inaccessible to every AI tool. It is taking a systems-wide approach to rectify that and transition to a more accessible network of resources. The Office is drafting its AI strategy in collaboration with several external and internal stakeholders. Taking a collaborative approach is key and the strategy will be published soon.

The third speaker was Professor Philip Hanna, Dean of Education at the Faculty of Engineering and Physical Sciences at Queen's University. He explored skills and how education relates to that area. He talked about an area of the Matrix report, which makes predictions based on specific observations or an "inductive response" with regard to AI literacy and complementary human skills. From the perspective of those upskilling, and those reskilling, alongside education systems, we must be concerned about the future success of individuals going through those systems.

As an example of why why AI will have an impact on jobs, Professor Hanna discussed a recent benchmark. The 'GPTval' *(see image above)* is an evaluation framework introduced by OpenAI to look at economically relevant jobs and measure the performance of AI models on real-world, economically valuable tasks. The left-hand side of the image shows what some of the AI models can do in terms of quality. This is compared to people in those areas. The right-hand side looks at time, and cost. He concluded that we could say with confidence that AI is going to have an impact on a significant number of job roles. But what does that mean in the longer term? What are the questions around jobs? What are the questions around society?

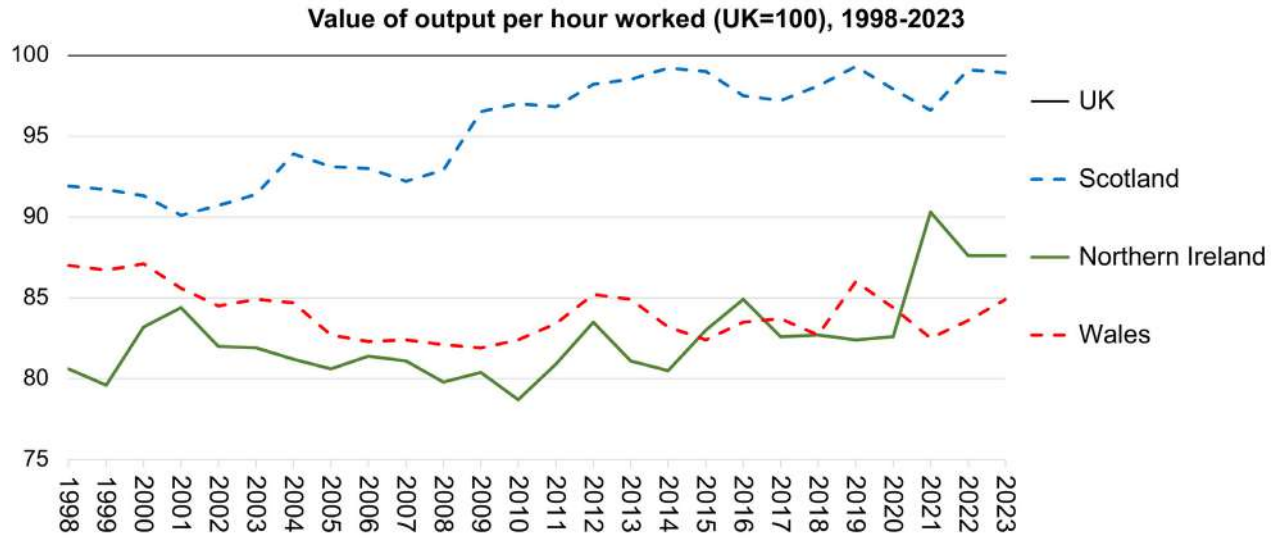
With these questions for context, what skills will individuals, either already established in a role or entering into one, need to find success in their future? Referencing the Matrix report, assuming that, inside a job or a team, people are still fulfilling particular aspects of their role, but with AI taking on some tasks, it will be essential for the team to have skills around AI and data that should include domain expertise.

Big picture thinking

In terms of thinking, evaluative and analytical skills, these would likely need to be at a higher systems level – or 'big picture' thinking. To enable people to be able to use AI in a way that is productive and is beneficial, Professor Hanna argued that we need individuals who are curious, resilient, who can self-learn, and who have passion. He said that 'the complementary human skills' mentioned in the Matrix report will do a lot of heavy lifting in the future.

Thinking about AI in learning, specifically, it is a double-edged sword. According to Professor Hanna, all of the time, effort and struggle that we put into learning is what 'learning' actually feels like, and in doing that, our brains are activated: we are setting down and establishing our revised neural pathways. AI can provide explanation and examples to practice on. It can provide feedback and can reflect upon it. It

Figure 2. Four scenarios



(Source: ONS (2025) Subregional productivity: labour productivity indices by UK ITL2 and ITL3 subregions)

Factors affecting Northern Ireland productivity performance include skills, policy and investment infrastructure

can also just give us an answer, but with very little work on our part. However, we must make sure we are looking at the journey to a destination in education and not just the outcome.

The fourth and final speaker was Dr David Jordan, Lecturer in Economics at Queen's University Belfast. He and his team carry out research for the Northern Ireland Productivity Forum, which is led by the university. The definition of productivity is different for different people. His team approached productivity by thinking of it from an economy-wide perspective and in terms of labour productivity and the total value of output produced for a given amount of work. The key thing with productivity is that it is what ultimately determines our economy's health and standard of living. It determines the wages that businesses can pay, and the taxes that can be generated for public spending. This ultimately feeds through to the competitiveness of an economy.

The recent stagnation of productivity growth in the UK and in Northern Ireland is a key challenge for the economy. Dr Jordan emphasised the idea of there being a "high road" and a "low road" to sustainable productivity growth and that we need to get away from the idea that productivity is simply about efficiency.

While efficiency is an important part of seeing improved productivity, it is also about the value of what we produce. The most recent data from the Office for National Statistics puts the productivity gap in Northern Ireland at around 12% when measured per hour worked relative to UK level. Over the past 10-15 years, Northern Ireland's productivity has been around 15-20% below the UK level, although there has been some recent improvement. In terms of comparisons with the Republic of Ireland, the gap in the most recent dashboard last year showed Northern Ireland to be around 20% below the level of Irish productivity.

The graph (*figure 3, above*) shows how Northern Ireland productivity performance has changed over time. It goes back to 1998, comparing to the UK, Scotland and to Wales. Northern Ireland 'lags behind' other regions. Dr Jordan and colleagues had looked at the reasons for lower productivity in Northern Ireland's economy. Key challenges and areas that determine Northern Ireland's productivity potential included:

1. Business performance and characteristics,
2. Skills, in terms of employees,
3. Policy and institutions,
4. The health and wellbeing of individuals more broadly within society,
5. Investment infrastructure and connectivity.

The team looked at this set of areas through the perspective of the business environment that firms are operating in. In the past, the key elements supporting growth in Northern Ireland had tended to be technology (for example textiles), investment and policy. The main takeaway from the research is the potential tension between productivity and employment, seen in terms of people losing their jobs, for example. As a result Dr Jordan argued the need for support for improvements and structural change over the long term. He said that this will be inescapable, because Northern Ireland is a small economy operating in a global environment.

You can listen to the full event, including the Q&A that followed, at https://bit.ly/FST_AI-work. □

DOI: 10.53289/JFON8968

One strand of the conference was how the UK can meet tomorrow's challenges in energy while keeping public support

Navigating challenges and opportunities

The Foundation Future Leaders 2025 Conference brought together the sixth cohort of the Foundation for Science and Technology's Future Leaders Scheme to explore barriers to success in science, technology and innovation

The Foundation Future Leaders 2025 Conference was held on November 19th at Liverpool Hope University, with a welcome from the Vice-Chancellor.

The conference programme made the most of the location and participants heard from representatives from across the North of England, as well as speakers from the Welsh Government, Research England, Wellcome Trust, UK Space Agency, Gaba Labs, Prospect, and the universities of Cambridge and Kings College London.

Sessions throughout the day reflected the breadth of experience of the 2025 cohort. The panel-based plenaries allowed attendees to gain expert perspectives on the importance of place-based R&D, and barriers to success in science, technology and innovation. Three breakout sessions then gave participants the opportunity to discuss the future challenges and opportunities in energy, responsible AI, and AI in healthcare.

While the topics were diverse, the discussions emphasised the common themes of the importance of collaboration, community involvement, and maximizing diverse funding sources to sustain long-term research and ensure a successful and inclusive science, technology and innovation landscape in the UK. The following sections are written by a selection of Future Leaders 2025 who helped organise and partook in the conference. They explore each session in more detail and put forward recommendations for a wide range of stakeholders. □

DOI: 10.53289/LACC1078

Energy – preparing for tomorrow's challenges

Marie Longnecker is a multidisciplinary scientist and analyst with more than ten years' experience informing and assessing the effectiveness of policy interventions. Currently working at Defra, she specialises in land use, with wider experience across digital services, data analytics, farming, marine conservation and, most recently, air quality.

The Energy breakout session was led by **Sue Ferns** of Prospect. She explored how the UK can meet tomorrow's challenges in energy while keeping public support and delivering tangible benefits.

Key themes

1. *Affordability:* Participants agreed that, for many households and energy-intensive industries, the immediate question is cost. Speakers noted that the cost-of-living context makes it difficult for people to prioritise future benefits when they are focused on today's challenges, for example bills, food costs, and transport. The group emphasised that if the transition is experienced mainly as added friction, such as travel restrictions, planning changes or higher upfront costs, public consent will weaken.

2. *Pace, delivery, and trust:* A major concern of the group was the credibility gap between ambition for areas such Clean Power 2030 or Net Zero 2050 and delivery mechanisms. Several contributors highlighted that people do not relate to big national targets but to changes in the everyday lived experience. There was also critique of retrospective planning: that is, building housing and infrastructure first, then trying to solve congestion, energy demand, or public transport later, creating avoidable backlash and additional cost.

3. *Workforce – the meaning of a "good" or "green" job:* Skills shortages were described as pervasive in the discussion, raising questions about where the required workforce will come from. Sue Ferns argued that meeting demand will require significant diversification and a broader view of a "just transition" beyond oil and gas, including bringing in workers from other sectors and those historically excluded from secure jobs. The group also emphasised that geography or place matters, noting that transitioning workers is not realistic if new roles are not available where people live.

4. *Local, place-based benefits and community energy:* The group explored whether a place-based approach could reconcile speed with legitimacy. Community energy was raised as a practical route to visible benefits (lower costs, local resilience), which can build confidence even among people not traditionally as motivated by environmental messaging.

5. *Government, industrial strategy, and supply chains:* Participants contrasted the success of other areas, such as solar, with the UK's inconsistent progress on nuclear. Several argued that government must provide stable long-term signals to public investment to ensure the development of UK supply chains and domestic skills. Energy policy was repeatedly linked to industrial strategy by participants, especially for sectors like steel, cement and chemicals.

6. *Technology enablers and cautions (R&D and AI):* R&D, along with less visible underpinning roles such as data, surveying, modelling, safety critical expertise, was recognised as essential in discussions. AI was viewed as valuable for optimisation and modelling, but the group raised concerns about employment impacts, governance, and risk in safety-critical decisions. □

RECOMMENDATIONS

Government: Prioritise cost of living and fairness as explicit transition outcomes; consider place-based delivery demonstrators to show near-term wins; facilitate strategic technologies; utilise policy tools to build UK supply chains; join up education, skills, and industrial strategy to develop a workforce plan.

Industry and investors: Co-design workforce pathways with unions and local partners; commit to apprenticeships and training at scale (not incremental growth); provide transparent job architectures for emerging technologies.

Local leaders and communities: Develop community energy and local benefit models that visibly lower costs; use trusted local messengers and workers to communicate benefits; plan infrastructure proactively alongside housing growth.

Unions and workforce bodies: Champion "good job" standards (security, pay, progression, safety culture) and ensure transition routes include underrepresented groups and regions, not only sector-to-sector moves.

AI to support sustainable and inclusive growth

The AI breakout session was led by **Zoi Roupakia**, a Policy Affiliate at Cambridge Industrial Innovation Policy (Cambridge University), CAIDP Policy Group Lead, and Founder of Noetic AI. She examined how AI ecosystems can support sustainable and inclusive growth and, drawing on global survey data and governance indices, she explored links between public trust, governance and AI readiness.

Evidence showed that optimism toward AI is higher in countries with strong governance frameworks, responsible AI capabilities, and robust data infrastructure. Structural challenges included digital divides, compute concentration, and uneven global distribution of AI capabilities.

Within this context, the UK was characterised by fragile public attitudes toward AI, uneven business adoption concentrated among larger firms and specialised sectors, and a relatively small share of global high-performance computing capacity despite strong research strengths.

Following the presentation, participants discussed implications for science, society, and innovation, focusing on trust, governance, and policy implementation.

Although awareness of AI is increasing globally, concern continues to outweigh excitement. Trust varies by application, and effective governance was seen as central to public confidence.

Key themes

Discussion of the UK focused on public attitudes, business adoption, and infrastructure. It was mentioned that growing familiarity with AI has led to greater scrutiny, while adoption remains uneven. Participants highlighted challenges related to access to compute resources, open infrastructure, and long-term competitiveness.

It was also emphasised that responsible AI depends on governance in practice, not policy design alone. Gaps between policy ambition and implementation risk slowing innovation without preventing harm, while uneven access to skills, infrastructure, and digital literacy may reinforce existing inequalities.

Skills, education, and productivity were key themes. AI has strong potential to enhance productivity, but benefits are not automatic. Upskilling citizens, strengthening digital literacy, and promoting adaptable learning were viewed as essential, particularly as AI discussions in universities have yet to reach wider public audiences.

Ethical and environmental concerns included surveillance risks from computer vision, large-scale data collection, public misunderstanding caused by broad use of the term "AI," and the environmental impact of large language models alongside limited benchmarking practices.

Looking ahead, participants pointed at priorities including specialised domain-specific systems, continuous learning models, and improved explainability to strengthen transparency and trust. Policy directions aligned with the UNECE Transformative Innovation Policy Charter included mission-oriented investment, experimentation-based governance, strategic public procurement, international collaboration on standards, and institutional capacity-building.

Overall, the session emphasised that responsible AI requires sustained attention to governance implementation, skills and education, transparency, infrastructure access, and public engagement to ensure societal benefit. □

Gustavo Berumen is a senior UX researcher. He specialises in the development of user-centric software, hardware, and robotics. He serves as an adviser for the Horizon Centre for Doctoral Training at the University of Nottingham and was a member of the FST 2025 Future Leaders Programme.

RECOMMENDATIONS

Strengthen governance implementation alongside policy design. Translate AI policy ambitions into effective operational governance through experimentation-based approaches such as regulatory sandboxes and learning-based oversight.

Invest in skills, digital literacy, and institutional capacity. Expand workforce development and education focused on adaptability and lifelong learning to ensure AI productivity gains are broadly shared.

Improve access to infrastructure and promote trustworthy AI ecosystems. Address compute concentration and uneven infrastructure access while supporting strategic public procurement and international collaboration on shared standards.

Barriers to innovation in science and technology

Lauren Taylor is Major Projects Lead for the National Space Innovation Programme (NSIP) at the UK Space Agency since July 2023. She is responsible for the successful delivery of NSIP; a multi-million-pound portfolio of high-risk, high-profile, ground-breaking projects involving UK research consortia and industry, focused on innovation and commercialisation.

Jennifer Postles is Lead Specialist for Innovation Talent at Innovate UK, supporting emerging research and innovation leaders across industry and the wider R&I system. Before working in Innovate UK, Jennifer worked at BBSRC on the delivery of doctoral training investment. Jennifer is a member of the 2025 Foundation Future Leaders cohort.

Speakers at the session on UK's research and innovation landscape included: **Simon Hepworth**, Director of Knowledge Exchange at Research England, **Shomari Lewis-Wilson**, Senior Manager of Research Culture and Communities at the Wellcome Trust and **Natalya Zavina-James**, Deputy Head of Exploration at the UK Space Agency.

One of the clearest concerns was the fragility of the current funding model. Universities are facing growing financial pressures: tuition fee income has been eroded by inflation, operating costs continue to rise, and international student numbers are increasingly uncertain due to changing visa policies and global instability. All of this makes it harder for institutions to stay financially stable at a time when demand for research funding is rapidly increasing.

Participants noted that success rates are falling across many major funding schemes, and short grant cycles are creating instability, especially for early career researchers. These problems are particularly acute in fields that depend on long-term continuity. Large programmes, like those run by the UK Space Agency, require decades of planning, cross-government coordination and consistent investment. Even small funding gaps can undermine complex missions in areas like planetary science, climate modelling or space exploration. Several attendees remarked that typical three-year funding cycles simply don't match the timelines of modern scientific work.

Equity and workforce sustainability were also major themes. As one panellist highlighted, the UK research workforce still isn't equitable: established researchers and well resourced institutions continue to dominate many major funding calls. This concentration of opportunity limits diversity of thought and can slow progress for underrepresented groups.

At the same time, the system is struggling to retain and develop the talent needed for a high growth innovation economy. There is a particular shortage of experienced leaders who can take deep tech companies from the lab through to scale. As a result, some spinouts and investors are increasingly recruiting senior talent from overseas. While universities are starting to adapt training and curricula to better align with industry needs, efforts remain inconsistent, and instability early in research careers continues to push skilled people out of the sector.

The discussion also highlighted that science delivers value far beyond economic outcomes. Science acts as a form of soft power, helping the UK build partnerships, influence and long term diplomatic relationships. Participants saw an opportunity for the UK to develop deeper collaborations with emerging science nations, aligning capacity building with areas where the UK has strategic strengths.

However, there was concern that the UK's reputation as an open and welcoming place to study and work has weakened in recent years. Restrictive immigration policies and mixed messages to international students were highlighted as key factors. Rebuilding confidence will be essential if the UK wants to attract global talent and remain a trusted partner in international research.

Despite the challenges, the session closed on an optimistic note. The UK continues to produce exceptional research that delivers impact far beyond what might be expected from its level of investment. Recent moves, such as increasing ARIA's budget and UKRI's renewed focus on growth, suggest a shift toward a more deliberate national strategy for supporting high-risk, high-reward research. □

RECOMMENDATIONS

Three priorities stood out as essential for unlocking the UK's full potential:

1. Create a more stable, long term funding environment that can support ambitious, sustained programmes of research.
2. Build a more equitable, supportive system with better pathways for diverse talent and more sustainable research careers.
3. Use the UK's scientific excellence more strategically – domestically and internationally – with clearer priorities and stronger partnerships.

While the challenges are real, the session identified practical steps forward: expanding participation through targeted schemes, deepening international ties through science diplomacy, and tackling structural barriers to entrepreneurship. Taken together, these changes offer a credible path toward a research and innovation system that is more equitable, globally connected and ready for the future.

AI in healthcare

AI systems are transforming healthcare. They can analyse chest X-rays, read heart scans and flag potential health issues faster than human doctors – in some cases, in seconds rather than minutes. Hospitals are adopting these tools to improve efficiency, reduce costs and standardise care. As the Science Technology, Engineering Mathematics and Medicine (STEMM) community and the public collectively look forward to advances in the field of medical AI and the resulting benefit on patient care, it is vital that AI models are trained responsibly so that the unique needs of all patients can be addressed to ensure societal equity and patient safety.

Fairness and bias impact AI for healthcare

In her invited talk, **Dr Tiarna Lee** (Kings College London) emphasised that fairness encompasses both equality (treating everyone the same) and equity (allocating resources based on need), and that protected characteristics (e.g. age, sex, and race) must be carefully monitored when developing and deploying AI tools. Dr Lee explained that bias can arise at any stage of the AI pipeline, from defining the clinical problem to data collection, preprocessing, model training, and downstream clinical decision-making, with early-stage biases propagating through the pipeline.

The datasets that are used to train many AI models are often imbalanced in terms of subject demographics and so the resulting AI models have a better performance for the overrepresented group(s) and worse for the underrepresented group(s). In her research on cardiac MRI segmentation, Dr Lee identified that models trained on imbalanced datasets demonstrate significant racial performance differences. This can lead to delayed or poorer-quality treatment for heart disease with worse outcomes overall, which then reinforces or worsens existing disparities. The talk concluded by calling for intentional and transparent development practices supported by frameworks such

Dr Claudia Lindner is Senior Research Fellow and Sir Henry Dale Fellow in Translational Medical Imaging at The University of Manchester. She leads a research group which develops automatic software systems for analysing structures in medical images.

RECOMMENDATIONS

AI developers

- Build trust to incentivise inclusive user participation, using transparent communication to address historical mistrust and encourage the involvement of underrepresented groups.
- Build a culture of reputational risk around non-compliance and opportunistic sampling, encouraging equity as an explicit requirement not an optional addition.
- Educate AI developers on the risks of using imbalanced training data, including how bias propagates through the pipeline from early design through to deployment.
- Prioritise representative and diverse datasets, actively seeking data that reflect the patient populations the AI tools will serve.

Market end-users

- Build a digitally skilled health workforce with training on equity issues and patient engagement barriers to avoid perpetuation of systemic bias and health inequalities.
- Implement standardised and transparent data practices, ensuring clinicians and patients understand how to interpret results and their limitations.
- Use subgroup performance checks and bias-focussed, pre-market safety checks before deploying AI tools in healthcare settings.
- Require clear evidence of dataset representativeness from AI tool providers, including details of the data used to develop and test the tool as well as on the validation procedures.
- Conduct local validation to confirm that AI tools perform reliably on the demographics of the local patient population.

Funders, government and policy sectors

- Implement governance and accountability framework models to set shared standards and monitor compliance.
- Establish a national regulatory framework and mandate transparency for reporting demographic performance to have oversight on whether datasets meet diversity metrics.
- Create national challenge datasets to stress-test AI tools for demographic bias before deployment.
- Align incentives with fairness goals, ensuring that funding calls and procurement decisions reward representative data practices over speed of development.
- Create guidelines and pipelines to allow for faster sharing of anonymised clinical data.

Dr Helen Coulshed is Associate Vice Dean (Assessment & Quality Assurance), Faculty of Natural, Mathematical and Engineering Sciences and Senior Lecturer in Chemistry Education, King's College London.

Hospitals are adopting AI tools to improve efficiency and reduce costs – but must be careful to maintain patient trust

Dr Jessica Pollitt is Senior Strategy and Planning manager, Biotechnology and Biological Sciences Research Council, UK Research and Innovation. With a varied 25-year career across different sectors – from academic researcher to society publisher to public funder – Jess has a holistic knowledge of the research and innovation landscape.

as FUTUREAI, which is an international consensus guideline for trustworthy and deployable artificial intelligence in healthcare.

Groups of conference attendees discussed what incentives could make sectors share responsibility for creating and maintaining diverse, representative datasets, and what practical steps could ensure how health technologies are regulated, commissioned or deployed.

Key themes

1. Data representativeness is essential: Participants consistently emphasised that AI systems cannot be fair without representative datasets but, in practice, current datasets are often skewed by age, ethnicity, geography or scanner differences.

2. Bias is multidimensional: Bias arises not only from data imbalance but also from data curation, variable selection, annotation practices and institutional workflows.

3. Transparency and traceability are lacking: Participants highlighted a lack of visibility into how datasets are constructed, what populations they represent, and how AI models are trained and validated.

4. Regulatory gaps hinder safe deployment: There are currently no dedicated UK regulatory requirements for assessing dataset representativeness or model bias.

5. Public trust must be strengthened: Given historical inequalities in healthcare, underrepresented communities may mistrust data collection initiatives. Trust was widely recognised as essential for gathering representative data, necessitating clearer communication and community-led engagement.

6. Incentives are misaligned with fairness objectives: Both researchers and companies are often incentivised to demonstrate successful results rather than to interrogate bias. Developers may avoid rigorous fairness evaluations because finding bias can slow publication or complicate regulatory processes.

7. Collaboration across stakeholders is essential: Fairness cannot be solved by technical teams alone. It requires collaboration between AI developers, clinicians, regulators, funders, and the public.

Looking ahead, participants pointed at priorities including specialised domain-specific systems, continuous learning models, and improved explainability to strengthen transparency and trust. Policy directions aligned with the UNECE Transformative Innovation Policy Charter included mission-oriented investment, experimentation-based governance, strategic public procurement, international collaboration on standards, and institutional capacity-building.

Overall, the session emphasised that responsible AI requires sustained attention to governance implementation, skills and education, transparency, infrastructure access, and public engagement to ensure societal benefit. ❐

Why does place matter?

Speakers on the Regional Science and Technology session included **Mike Wharton**, Leader of Halton Council, **Professor Richard Jones** of the University of Manchester, **Liz Shutt**, Programme Director at Insights North East and **Gareth Cross**, Deputy Director of Science, Research and Evidence for the Welsh Government.

Research and Development (R&D) is central to the economic, social, and cultural fabric of UK regions. Strong research activity not only drives innovation but also boosts productivity, supports high-quality jobs, and enables long-term economic growth. Evidence also shows that strong local R&D ecosystems correlate with better health outcomes and improved wellbeing for local populations, supporting healthier lives and increasing productivity.

Currently, around two-thirds of the UK's R&D is funded by industry, with the remaining third coming from the public sector, predominantly through UK Research and Innovation (UKRI). While the public share is smaller, it plays a disproportionately critical role. Public investment acts as the early-stage catalyst, enabling proof of concept work, reducing risk for industry, and helping to draw in later-stage private investment. Regions that attract significant levels of public R&D funding typically experience much higher levels of private R&D investment in turn. This is why securing public R&D funding is so strategically important to regional growth and long-term prosperity.

Addressing regional disparities is not simply a matter of fairness. It is essential for unlocking the UK's full R&D and economic potential. Place-based R&D is not about spreading resources thinly across the UK, but about identifying, nurturing, and scaling pockets of excellence, particularly those that have been historically overlooked or under-recognised. Targeted investment in these areas delivers stronger research, greater economic impact, and a more resilient national research and innovation system. □

Dominic Jones is a Strategic Engagement Manager at the Medical Research Council (MRC), part of UK Research and Innovation (UKRI). He leads MRC's engagement with key partners across the medical research landscape, with a particular focus on higher education institutes (HEIs).

RECOMMENDATIONS

AI developers

1. *Tackle place-based barriers through long-term, locally anchored investment.*

The challenges associated with place-based R&D mirror wider regional productivity constraints. Addressing these shared structural issues requires sustained local investment, capacity-building, and a stable, long-term policy direction. A demand-led and challenge-backed approach, rooted in regional economic strengths and societal needs, will strengthen both research outcomes and regional growth.

2. *Treat collaboration as core infrastructure.*

Discussions at the conference underlined the importance of deep collaboration between policymakers, industry, and academia. These "triple helix" partnerships should be seen as essential infrastructure for regional innovation. Building coalitions of the willing around shared projects, and incentivising complementarity between institutions, will help demonstrate the value of R&D to local communities and support sustainable, long-term strategic planning.

3. *Strengthen strategic coherence.*

Regional innovation ecosystems are inherently complex, often involving multiple institutions with evolving priorities. Effective place-based R&D requires clear strategic planning, long-term funding cycles, consistent priorities, and deliberate investment in relationship-building capacity. Creating space for cross-system collaboration, rather than short-term competition, will be critical.

4. *Design national strategies that reflect regional diversity and devolved realities.*

Regions differ markedly in R&D maturity, governance arrangements, and economic priorities. National strategies and funding processes must be reflect this. This is particularly important for the devolved nations, which contribute to UK-wide ambitions such as the UK's Modern Industrial Strategy, while operating within their own democratic mandates and governance structures. Constructive alignment between national and devolved R&D priorities is essential to achieve a coherent UK-wide approach that works for individual places.

5. *Build a stronger, shared evidence base to support decision-making.*

To underpin effective place-based policy, there is a need to curate an evidence mosaic that brings together quantitative data, local intelligence, and lived experience. This will enable more informed investment decisions, support accountability, and strengthen the case for long-term, place-based approaches to R&D-led growth.

Dr Tobiasz Trawiński is a Senior Lecturer in Psychology at Liverpool Hope University. His cross-cultural focuses on how personality and attitudes shape the way we engage with other and the art and cultural heritage that represent them. He is also a member of the Health Research Authority's Research Ethics Committee, the Parliamentary and Scientific Committee APPG, and a Fellow of the Royal Society of Arts.

Tackling vulnerabilities in UK infrastructure

How the judicious application of science and technology can analyse and remedy the current lack of resilience in the UK's national infrastructure

The 2025 Hayes electricity substation fire disrupted supply to 70,000 customers

Opening the panel discussion, **Dr Deborah Petterson** began with a story. She said "It is midnight, maybe you're in bed, and there's smoke, dark smoke, no light, and there is someone banging at your door. Why? Because there's been an explosion. A substation is on fire, and it will take five days to put out that blaze."

That scenario was actually a reality for 127 people on the 20th of March 2025 in West London and illustrates the widespread impact of energy failures on homes, businesses, transportation, and emergency services. That incident, which disrupted power for up to 70,000 customers and affected hundreds of thousands of travellers, exposed vulnerabilities in infrastructure not yet officially deemed critical.

Dr Petterson is Director of Resilience and Emergency Management at the newly created body the National Energy System Operator (NESO), and in her talk she addressed the critical importance of energy resilience and its connection to other essential infrastructure, such as telecommunications.

As we decarbonise, weather becomes our fuel. It is the cornerstone of our clean energy future, but it is also inherently variable. Adaptation is a strategic imperative. Heat waves strain our electricity grid. Storms and fires damage our infrastructure. Cold snaps drive up demand, and when there are storms, industry must step up and respond. We are in a heightened few years of space weather, solar flares, coronal mass ejections that produce electric fields on our surface that can damage energy assets.

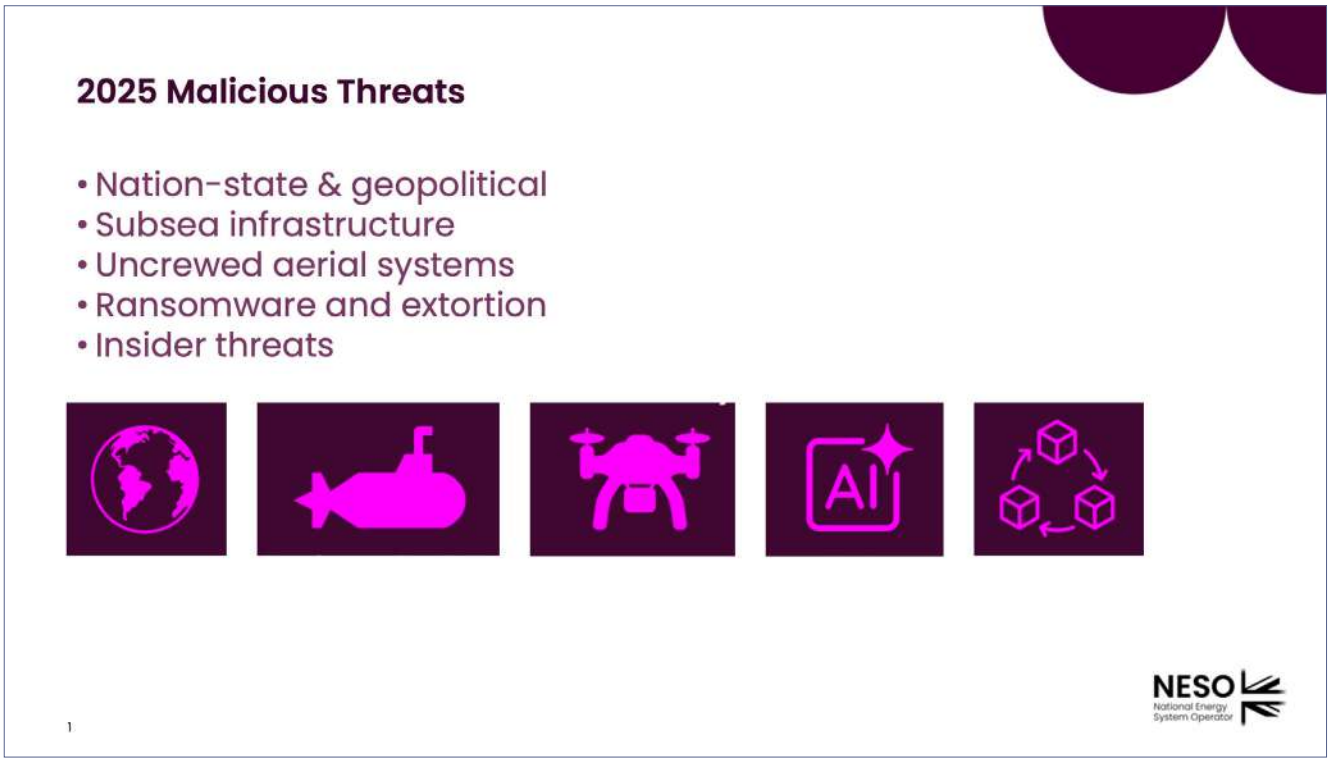
NESO has an independent role in safeguarding the UK's energy system through risk analysis and recommendations to Government and industry. The focus is on proactive strategies to anticipate and adapt to risks – including extreme weather, space weather, cyber-attacks, and physical sabotage – that are becoming more frequent and complex.

The example of the North Hyde substation fire

EVENT BACKGROUND

Recent events have shown the damage that can be done when there is a lack of resilience in national infrastructure. From a fire at a substation closing Heathrow, to flooding affecting the electricity grid and IT and telecoms issues (accidental or cybercrime) leading to shutdowns. This is a global issue. On Wednesday 28th January 2026 the Foundation held a discussion event to explore key threats to our national infrastructure and how technology can help us understand and protect against those threats.

Speakers included:
Natalie Black, Group Director at Ofcom
Professor Peter Bonfield, Vice-Chancellor at the University of Westminster, and Chair of the FloodReady review
Blythe Crawford CBE, Director Grail at Tiberius Aerospace, and adviser to the Alan Turing Institute
Joanna Cavan, Managing Director at the UK Telecoms Lab and National Physical Laboratory
Dr Deborah Petterson, Director of Resilience & Emergency Management at the National Energy System Operator (NESO).
The Rt Hon the Lord Willetts FRS, Chair of the Foundation for Science and Technology



highlighted that there was no shared understanding across organisations such as Heathrow Airport, Transport for London, and the National Grid of the resilience needed, due to their different niches and focus. The varying degrees of preparedness and resilience across different sectors was stark.

She concluded by emphasising the need for a shared understanding of resilience, encouraging collaboration between government and industry to meet rising societal expectations in an interconnected world.

The second speaker was **Natalie Black, Group Director of** Ofcom. Her talk highlighted the critical importance of resilience in the UK's digital and energy infrastructure, emphasising that such resilience was not a luxury, but the quiet, unseen foundation that keeps the country functioning. She said that her job was to 'inject some urgency' into the discussion. She represented a regulatory perspective, underscoring how a single technical failure – such as a software error in a telecom network or a subsea cable fault – can have severe and widespread impact on businesses, individuals, and entire communities. These vulnerabilities reveal the interconnected and fragile nature of modern society.

As someone who has lived and worked in Asia, Ms Black said that it was like "living in the future" where the impacts of climate change and geopolitics were very real and digital adoption was "sky high". Resilience is part of the national psyche there and she argued that resilience is central to national security, economic stability and public trust here too.

The proliferation of digital technologies has deeply embedded communications into daily life, making robust networks vital for everything from finance and healthcare to education and emergency services. However, the consequences of network failures are both economic—costing hundreds of millions or even billions—and social, disconnecting people and potentially putting lives at risk.

The evolving responsibilities of Ofcom and industry now call for resilience to be designed into systems from the outset, not merely patched on after vulnerabilities appear. Modern risks compound and cascade due to interconnections across sectors and supply chains, and that innovation—such as AI, satellite communications, and advanced cybersecurity—offers new tools for anticipating and mitigating these risks.

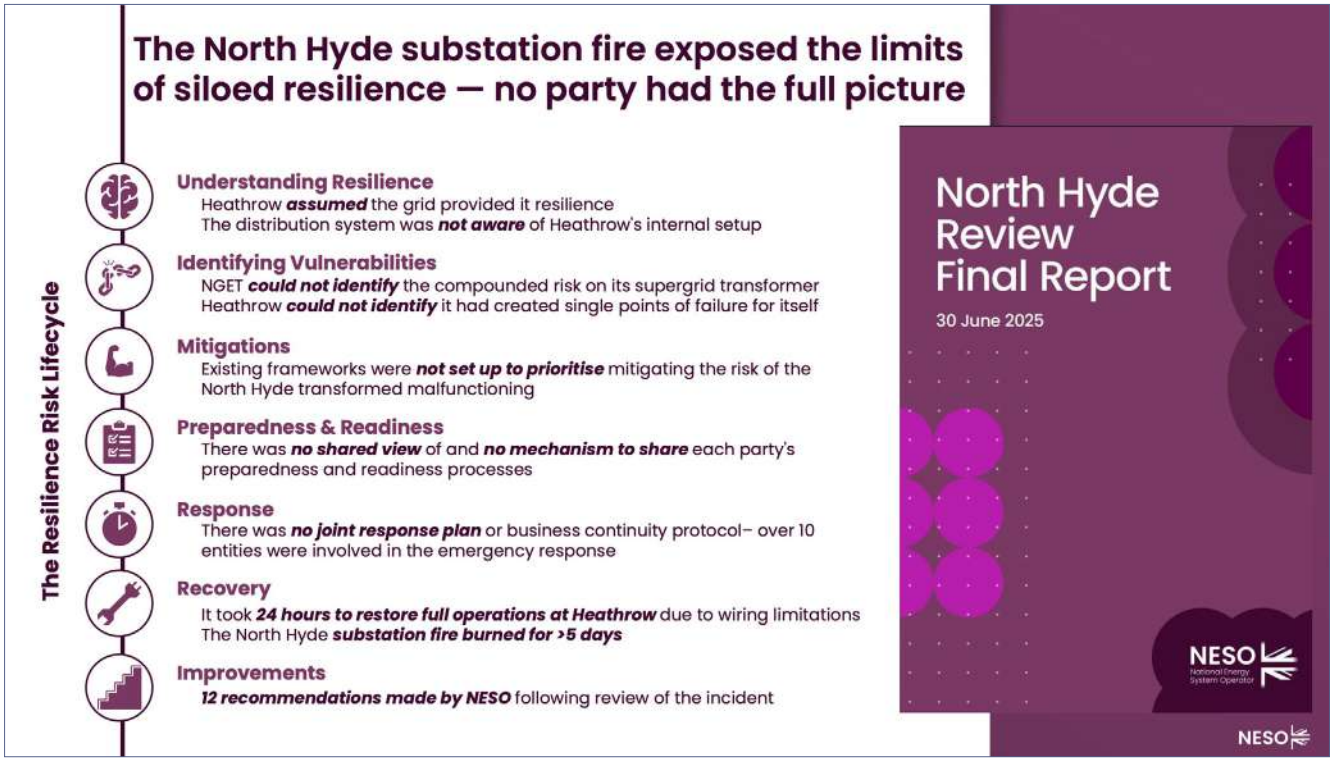
A key message was the need to shift the national conversation: resilience should be valued not just in terms of network coverage, but also in terms of performance and reliability. Regulatory enforcement, market incentives, and international cooperation are stressed as essential elements for achieving this.

Resilience requires ongoing foresight, learning, governance, and strong partnerships between Government, regulators, industry, and international partners. Trust in infrastructure is fundamental, and safeguarding it must remain a relentless, long-term commitment.

The third speaker, **Blythe Crawford CBE, Director GRAIL at** Tiberius Aerospace, also has extensive experience in the UK Ministry of Defence as a former Royal

NESO's focus is on proactive strategies to identify risks to the UK's energy supply

A single technical failure can have severe and widespread impact on businesses and communities



The North Hyde substation fire revealed the lack of resilience across a range of interconnected organisations

Air Force Air Commodore. He discussed the critical importance of resilience in national security, using Ukraine's response to the Russian invasion as a case study. His talk highlighted how resilience is a systems property revealed under stress, noting Ukraine's rapid adaptation across data communications, energy, and logistics. He said that Ukraine did not set out to become resilient but was forced to do so very quickly. By offshoring data, leveraging Starlink, diversifying energy, and quickly pivoting manufacturing (such as wardrobe makers becoming drone makers) to support defence, Ukraine demonstrated that resilience is about robustness, recoverability and adaptability, not perfection.

In contrast,Western systems have become fragile due to efficiency-driven centralisation and cost-cutting, leading to vulnerabilities in data, energy, communications, and supply chains. Mr Crawford argued that fragility grows quietly during peace time. For example, here in the UK we hold our data in data centres based in urban centres optimised for cost and latency rather than survivability. We have a huge reliance on GPS, which can get jammed in times of conflict, and our energy systems are brittle. Real-world incidents, such as cyberattacks and infrastructure breaches, including news updates that we have seemingly come to normalise, such as infiltration of drones in classified spaces, illustrate that the West is already operating in a pre-conflict phase.

One major threat is the growing frequency and severity of cyberattacks targeting telecoms

He concluded that there have been recent positive steps in the UK – such as diversifying communications, securing energy, and federating manufacturing – and argued that resilience is not an expensive luxury but a necessary investment. The costs of systemic failure far outweigh the investments required to build robust, redundant, and recoverable systems for both national security and economic prosperity.

The next speaker was **Joanna Cavan, Managing Director at the UK Telecoms Lab**. She highlighted the essential role of telecommunications as the backbone and connective tissue of all sectors, including energy, defence, finance, transport and healthcare, for which she cited an example of a "pill camera" swallowed by patients that uses telecommunications technology to detect bowel cancer. Disruptions to telecoms networks can trigger widespread impacts on everything from daily life to economic stability, national security and international confidence.

At the UK Telecoms Lab, teams conduct advanced security research to safeguard critical telecoms by proactively 'hacking into' telecoms systems to identify and patch vulnerabilities before they can be exploited by cybercriminals or hostile states. Recent telecoms vulnerabilities found by UK Telecoms Lab researchers would have cost the UK economy £1bn per day if it had been exploited and would have caused a severe mobile phone outage.

Two major threats are the growing frequency and severity of cyberattacks targeting telecoms; and the increasing complexity of modern networks, which now rely on distributed software, data, satellite, and cloud technologies. She said that these factors make telecoms both more powerful and more vulnerable.

DAWN HUDSON

Notable examples included cyberattacks in Luxembourg and the global, persistent "Salt Typhoon" campaign, thought to be a cyber-espionage operation by Chinese state security. She argued that traditional security measures are insufficient in today's interconnected environment.

Instead, she advocated for a holistic approach – combining strong partnerships, skilled personnel, and a security-first culture – while also embedding resilience by design into technology development and international standards. She concluded that national resilience in telecoms is not just a matter of security, but also of economic prosperity and the protection of citizens' way of life.

The final speaker was **Professor Peter Bonfield, Vice-Chancellor at the University of Westminster, and Chair of the FloodReady review**. He outlined some of the conclusions of the review – a detailed examination of property flood resilience in the UK – which notes the increasing risks posed by climate change and extreme weather. Professor Bonfield said that, over the past decade, the prevalence of flooding had grown, with millions of properties now at risk – especially from surface water flooding, which is less visible but widespread. His presentation highlighted the disproportionate impact on society's most vulnerable, who often face repeated property damage, lengthy displacement, and escalating insurance costs.

Traditional approaches, which replace damaged materials with identical ones, have proved inadequate, subjecting households to cycles of loss. The review advocates for practical, system-wide solutions: preventing water entry with flood doors and air-brick covers, using water-resilient materials for faster recovery, and taking steps to reduce surface water flooding.

A central message of the presentation was the importance of collaboration. Mortgage lenders, insurers, government bodies, builders, manufacturers, and community volunteers have been brought together to set clear goals and responsibilities within the review. Recommendations include training and certifying competent professionals, creating registers to ensure trustworthy work, and providing accessible information to empower households – such as the innovative "Floodmobile" mobile demonstration unit.

Overall, he called for coordinated, practical, and people-focused measures to boost property flood resilience and mitigate the long-term impacts of flooding across the UK.

To watch to the full discussion including the Q&A that followed, please visit: https://bit.ly/FST_infrastructure. □

DOI: 10.53289/YCZP9060

The UK faces increasing flooding risks posed by climate change and extreme weather

Flooding has a disproportionate impact on the most vulnerable, who face repeated property damage, lengthy displacement, and escalating insurance costs

A privilege to know, a duty to act

Scientists have a duty to use their knowledge to drive meaningful change in order to tackle today's pressing social and environmental challenges, argues Tracey Elliott

Many science activists support grassroots social movements pushing for urgent and transformational change

Albert Einstein's words — "those who have the privilege to know have the duty to act" — affirm that those with knowledge carry a responsibility to use it for the common good. The science community stands at a crossroads. It can continue as a provider of knowledge, or it can rise to the role of knowledge activist, applying its insights to drive meaningful change. I believe the gravity and urgency of our situation makes the choice clear.

Why? Because the world is on fire, literally and figuratively. Recent national initiatives – like the privately-funded National Emergency Briefing, multiple reports from the Institute and Faculty of Actuaries (here and here), and the UK Government's national security assessment of global ecosystem collapse have set out, starkly, how woefully unprepared we are for the catastrophic societal and economic impacts of the climate and ecological emergency. Some governments are abandoning net zero and reneging on longstanding international commitments; ideologies are trumping evidence; and lies and misinformation are becoming common currency. The case for evidence-informed policymaking and the battle for a fair, sustainable, liveable future for all are being lost.

Regrettably, the global science community must accept that it is part of a collective, systemic failure. Vested interests of the oil and gas lobby, backed by billionaire-owned media, continue to wield greater influence than decades of scientific evidence and advice. Money and power trump knowledge, yet scientists have relentlessly pursued an information deficit model, based on the assumption that policymakers just need more information to make better policy decisions. Practices at the science-policy interface are largely unchanging and unchallenged, while lies peddled by the fossil fuel industry and climate sceptics dominate political decision-making. There is an urgent need for more honesty, scrutiny and a rethink, from both science-policy practitioners and science leaders shaping the governance and culture of science.

With knowledge comes responsibility, and a strong case can be made for responsible science activism where actions speak louder than words and where traditional expectations of professional and political detachment in science are no longer appropriate (Wyatt *et al*, 2024, a must-read). More than ever, the world needs scientists to speak up and speak out, to affirm the reality, gravity and urgency of the multiple challenges we face.

Exasperated by the lack of political progress, and feeling genuinely scared, some scientists have turned to activism to try to accelerate action; moving from publications to public actions (*The Conversation*, 2023). Continued government, corporate and societal inaction, they argue, justifies direct action, peaceful protest and disruption (Frickel and Tormos-Aponte, 2023; Grossman, 2024). Their activism is driven by evidence and urgency, not personal or political bias (Anguelovski *et al*, 2025). They do not do this lightly. They do it because they have a professional conscience and compulsion; an obligation not just to document the natural world in ever more detail but to help protect it. They argue that scientists can only be credible, trustworthy messengers if they are coherent and consistent in what they say, how they say it, and how they act.

Many science activists support grassroots social movements pushing for urgent and transformational change. Historically, social movements have shown that peaceful protest and civil disobedience can stimulate media coverage, public

scrutiny, debate and action (Chenoweth, 2021) and even the IPCC recognises that social movements underpin systemic change (IPCC, 2023). History shows it only takes a small minority acting in solidarity to catalyse a social tipping point and galvanise change: for example, recycling household waste, the banning of CFCs, moratoria on whaling and fracking, and the UK's Climate Change Act have all been driven in large part by grassroots activism. As a still largely trusted and privileged community (Wong, 2024), scientists can help galvanise the "silent majority" concerned about climate change (Andre *et al*, 2024; *The Guardian*, 2026).

Scientists – from across disciplines and career stages – are finding multiple ways to be heard, through public outreach, advocacy and activism. This includes supporting national and local action-based communities, redirecting research and teaching, giving media interviews, writing op-eds and letters, being vocal on social media, directly engaging and lobbying MPs, taking to the streets in peaceful protest, and civil disobedience (Perrin *et al*, 2025).

RANDI SOKOLOFF

As environmentalist commentors like Jonathon Porritt note, neutrality could be "tantamount to complicity" with climate emergency denial

Empowered to act

Surveys show that many scientists would like to be more proactive but do not feel empowered to do so, for fear of losing professional credibility or even their jobs (Dablander *et al*, 2024). Some senior academics and commentators accuse science activists of politicising science and compromising its neutrality and integrity (e.g. Grawitch, 2025), while many universities blithely accept funding from the fossil fuel industry (Solid Sustainability Research 2023). This is disingenuous and inconsistent. Similarly, they argue that protesting about science-for-policy issues, like climate change, is too political; yet they make public statements on policy-for-science issues, like the impact of Brexit or cuts in science funding, which are also political. These inconsistencies risk being self-serving, whilst undermining and marginalising science activists.

Scientists are trained to remain neutral and objective, and they generally receive little training to speak to politicians and publics. This has contributed to a "pervasive complacency", a palpable apathy as composed observers of a world in crisis (Perrin, 2025). Speaking up and speaking out, in whatever capacity, can help raise political and public awareness of what is going on, reinforce the credibility of scientific messages, counter misinformation and strengthen public trust. In times of emergency, these should not be purely extracurricular but an integral responsibility of a scientist, in any discipline. Scientific institutions have a vital role to play in supporting faculty, alumni and students who choose to become activists (Gardner *et al*, 2021).

Twenty years ago, science diplomacy was regarded by many scientists as the politicisation of science and a risk to research excellence. Yet now it is firmly established and features prolifically in scientific discourse. It is time for responsible science activism to have a similar awakening, and be openly recognised as a legitimate part of the science community's toolkit for bringing truth to power; supplementing more traditional ways of influencing policy, and stimulating much-needed professional and institutional reform.

To conclude, there is a strong case for scientists to move beyond business-as-usual and proactively challenge policies that have us inexorably on a trajectory of planetary, economic and societal collapse. Scientists must be more proactive in public outreach, advocacy and activism, including peaceful and sometimes disruptive protest. Maintaining a position of neutrality ultimately acquiesces to those defending the status quo, which – some commentators have posited – could be construed as "tantamount to complicity with those who deny the climate emergency" (Porritt, 2024). Something we should all give careful thought to. □

On Wednesday 18th March, The Foundation held a discussion event at The Royal Society on science activism entitled 'From publication to public action: the case for responsible science activism'. You can watch this again at https://bit.ly/FST_activism.

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Dr Tracey Elliott works on a freelance basis for wide-ranging scientific organisations and networks in the UK, EU and globally; advising them on governance, strategy and operations. She was the interim Executive Director of the European Academies of Science Advisory Council (EASAC) and Project Director of the InterAcademy Partnership (IAP), the global network of science academies. Prior to this, she was Head of International at the Royal Society and has served in various science-policy and international roles in the UK Civil Service, working for the Government Chief Scientific Adviser and Science Minister. Most recently, Tracey has been working with the scientist activist community, and has presented their perspective to the World Science Forum and European chapter of the International Network for Government Science Advice (INGSA).

2016 Bringing science to the heart of Government

In each issue, the Foundation will look back at an event from our archive. In this edition, we will be digging into an FST discussion that we hosted at The Royal Society a decade ago on the Nurse Review of the Research Councils.

CREDIT

Sir Paul Nurse: "Obvious gains from working more collaboratively"

Held at The Royal Society on 12th January 2016, the evening's discussion was highly topical at the time with the Nurse Review – an independent review of the UK's seven Research Councils – having been published just two months before in November 2015. Sir Paul Nurse (who led the review which examined how research councils could best support research, promote collaboration, and ensure effective use of public funding), was himself part of the panel of expert speakers.

The panel also included:

- **Professor Philip Nelson,** Chief Executive of the Engineering and Physical Sciences Research Council
- **Gareth Davies,** Director General for Business and Science at the Department for Business, Innovation and Skills
- **Professor Dame Jocelyn Bell Burnell,** President of The Royal Society of Edinburgh.

Sir Paul Nurse said that his review had been the product of a positive process of consultation and engagement. This included close working with the Research Council themselves – with support from an excellent Advisory Group covering the full breadth of the research agenda.

Although he said that they had been starting from a 'high base' and emphasised that the Research Councils had done well for many years and were highly respected across the world, he said that they were over-stretched administratively. They needed more space and time to operate strategically and as leaders in the scientific community.

There were obvious gains to be derived from working more collaboratively and collectively. The process of maintaining high quality peer review across the board could only benefit from more effective sharing of good practice and from consistency and transparency on process and outcomes. He proposed the creation of a stronger, more effective single voice for science in the form of Research UK*, which needed in turn to be matched by a stronger base for science within the structure of central government.

dialogue between the research community and policy makers at Ministerial level within central Government was welcomed.

Read the full event summary and listen again at https://bit.ly/FST_Nurse. □

** "Research UK" was the name given in the report to the recommended single body, and the report envisaged it as an organisation bringing together the seven UK Research Councils. Following the Nurse Review, the Government brought forward the Higher Education and Research Act 2017, which established a single body bringing together not only the seven Research Councils but also Innovate UK and the research funding part of the Higher Education Funding Council for England (which was renamed Research England). That combined body, UK Research and Innovation (UKRI) was formally established in April 2018.*

> Research Councils had done well for many years and were highly respected, but they were over-stretched. They needed more space and time to operate strategically

In the discussion it was clear that there was considerable support for much of the Nurse review. The emphasis on diversity was welcomed, although it was also important to guard against fashions and bandwagons from which the research agenda was not immune.

The commentary in the report on the principles underpinning excellence on research, including the importance of high-quality peer review, was also commended by several participants. The ambition to develop a more effective

Forthcoming and recent events

Presentations and audio recordings from all meetings of the Foundation for Science and Technology are available at: www.foundation.org.uk

Science Diplomacy
Tuesday 7th July 2026
The House of Commons, London
Further details TBC

In Conversation with Professor Sir Ian Chapman
Tuesday 16 June 2026
The Royal Society, London
Further details TBC

Innovation in Scottish Cities and Regions
Wednesday 27th May 2026
University of Strathclyde, Glasgow
Further details TBC

UK Space Policy and Supporting UK Space Industry - Past, Present and Future
Wednesday 29th April 2026
The Royal Society, London
In November 2025, the House of Lords UK Engagement with Space Committee published its report *The UK Space Economy: Act Now or Lose Out*, with recommendations on the UK's strategy for space and growing the space economy. Meanwhile the UK Space Agency (UKSA) has been absorbed into the Department for Science Innovation and Technology. What is needed now to support the UK space economy in 2026 and beyond?

From publication to public action: the case for responsible science activism
Wednesday 18th March 2026
The Royal Society, London
In this event, we explored whether there is a case for responsible science activism, where scientists speak out, to affirm the reality, gravity and urgency of the multiple challenges we face. And if there is a case for science activism, how should the science community, universities and other employers, and the science structures within government, respond?

Enhancing the UK's preparedness and resilience to climate change
Wednesday 25th February 2026
The Royal Society, London
The impacts of climate change are already being felt in the UK, and we can see the costs of inaction on growth, security, and health. Coordinated climate adaptation action is needed now to ensure the resilience of the UK to increasing climate-related shocks. In this event we discussed priorities for climate adaptation action in the UK, and the development of climate adaptation targets.


Professor Sir Ian Chapman

Innovation in Scotland


UK Space Policy

Past events

Resilience of the UK's national infrastructure
Wednesday 28th January 2026
The Royal Society, London
Natalie Black, Group Director, Ofcom
Professor Peter Bonfield, Vice-Chancellor, University of Westminster, and Chair of the FloodReady review
Blythe Crawford, Director of GRAIL, Tiberius Aerospace, and adviser to the Alan Turing Institute
Joanna Cavan, Managing Director, UK Telecoms Lab, National Physical Laboratory
Dr Deborah Petterson, Director Resilience & Emergency Management, National Energy System Operator

Opportunities and challenges in science, technology & innovation
Wednesday 19 November 2025
Liverpool University
The Foundation Future Leaders Conference. Applications are now open for the 2026 Foundation Leaders scheme.

The UK Life Sciences Strategy
Wednesday 12 November 2025
London
Steve Bates OBE, Executive Chair, Office for Life Sciences
Baroness (Nicola) Blackwood, Chair, Genomics England
Tony Wood, Chief Scientific Officer , GSK
Professor Sir John Bell FRS, Emeritus Regius Professor of Medicine, University of Oxford

AI and the Future of Work
Wednesday 22 October 2025
Belfast
Patricia O'Hagan, Deputy Chair, Matrix
Professor Helen McCarthy, Chief Scientific and Technology Adviser, Northern Ireland Assembly
Professor Philip Hanna, Dean of Education, School of Electronics, Electrical Engineering and Computer Science, Queens University Belfast
Dr David Jordan, Lecturer in Economics, Queens University Belfast, and Ministerial Adviser on Productivity

In Conversation with Professor Dame Ottoline Leyser
Wednesday 8th October 2025
The Royal Society

Exascale computing for research and the implications of quantum computing, AI and Net Zero
May 29, 2025
Professor Mark Wilkinson, Professor of Theoretical Astrophysics and Director of the DiRAC High Performance Computing Facility, University of Leicester
Professor Mark Parsons, EPCC Director and Dean of Research Computing, College of Science & Engineering, University of Edinburgh
Professor Katherine Royse, Director, Hartree Centre, STFC

How can R&D collaboration with Africa support an agenda for sustainable growth in the UK and beyond?
Wednesday 11th June 2025
The Royal Society, London
Dr Rhona Mijumbi, Co-Director at The Center for Rapid Evidence Synthesis (ACRES), Makerere University and Head of the Policy Unit at the Malawi-Liverpool-Wellcome Programme at the Liverpool School of Tropical Medicine
Professor Ambreena Manji, Dean of International for Africa at Cardiff University, and former director of the British Academy's British Institute in East Africa
Professor Christopher Smith, Executive Chair of AHRC and UKRI International Champion

Decarbonising the built environment and delivering the Warm Homes Plan – the role of social science and engineering
May 21, 2025
Professor Jennifer Schooling, Professor of Digital Innovation and Smart Places, Anglia Ruskin University
Helene Gosden, Associate Director, Retrofit at Scale Taskforce Leader, Arup
Professor Chris Wise FREng, Senior Director, Expedition Engineering and the Useful Simple Trust
Professor Mari Martiskainen, Director, Energy Demand Research Centre, University of Sussex

How can space science missions advance science, drive innovation and create a vibrant UK space industry?
April 30, 2025
Professor Carole Mundell, Director of Science at the European Space Agency and Head of the European Space Astronomy Centre
Professor Adam Amara, Chief Scientist, UK Space Agency
Dr Tudor Williams, Chief Technology Officer, Filtronic

Critical Minerals – how can science and technology help deliver the UK Strategy?
February 24, 2025
Professor Paul Monks, Chief Scientific Adviser, Department of Energy Security and Net Zero
Dr Gavin Mudd, Director, Critical Minerals Intelligence Centre , British Geological Survey **Dr Sarah Gordon,** Chief Executive Officer, Satarla , and Co-Director of the Rio Tinto Centre for Future Materials, Imperial College
Professor Emma Kendrick, Chair of Energy Materials, School of Metallurgy and Materials, University of Birmingham

Governing AI for Humanity – what is needed globally and in the UK?
January 29, 2025
Feryal Clark MP, Parliamentary Under-Secretary of State for AI and Digital Government, Department for Science, Innovation and Technology
Dr Douglas Gurr, Director of the Natural History Museum and Chair of The Alan Turing Institute
Professor Dame Wendy Hall DBE FRS FREng, Regius Professor of Computer Science, University of Southampton, and Member of the UN High Level Advisory Board on AI
Adrian Joseph OBE, Board Member and AI Advisor (DirectLine Group, National Lottery, GOSH and Natwest), former Chief Data and AI Officer BT Group

How can science and technology contribute to the UK's Industrial Strategy?
December 2, 2024
Dr Julia Sutcliffe, Chief Scientific Adviser, Department for Business and Trade
Professor Mariana Mazzucato, Professor in the Economics of Innovation and Public Value, University College London
Dr Peter Waggett, UK Director of Strategic Relationships, IBM Research Europe, IBM UK
Rt Hon Greg Clark, Executive Chair, Warwick Innovation District, and former Secretary of State for Business, Energy & Industrial Strategy

Building Careers and Skills in Science and Technology for National and Global Challenges
November 8, 2024
Professor Sarah Sharples, Chief Scientific Adviser, Department of Transport
Dr Stephen Hendry,Programme Manager Socioeconomic Inclusion, Royal Society of Chemistry
Dannielle Croucher, Policy Lead for Skills and Talent, National Centre for Universities and Business
Dr Billy Bryan, Evaluation and Research Leader, RAND Europe
Professor Christopher Smith, UKRI International Champion and Executive Chair of AHRC
Professor Marika Taylor, Pro Vice Chancellor and Head of College of Engineering and Physical Sciences, University of Birmingham
Alex Hale, Technology Programme Manager, National Composites Centre
Dr Geoffrey Neale, Royal Academy of Engineering Research Fellow and Lecturer, Cranfield University

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Institute of Mathematics and its Applications
Institute of Risk Management
Institute of Quarrying
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Institution of Mechanical Engineers

K
King's College London

M
Matrix - The Northern Ireland Science Industry Panel
Medical Research Council, UKRI
Met Office

N
National Centre for Universities and Business
National Physical Laboratory
Natural Environment Research Council, UKRI

P
Parliamentary and Scientific Committee

Q
Queen's University Belfast

R
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Rolls-Royce
Royal Society of Biology
Royal Society of Chemistry
Royal Statistical Society

S
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Society of Operations Engineers

T
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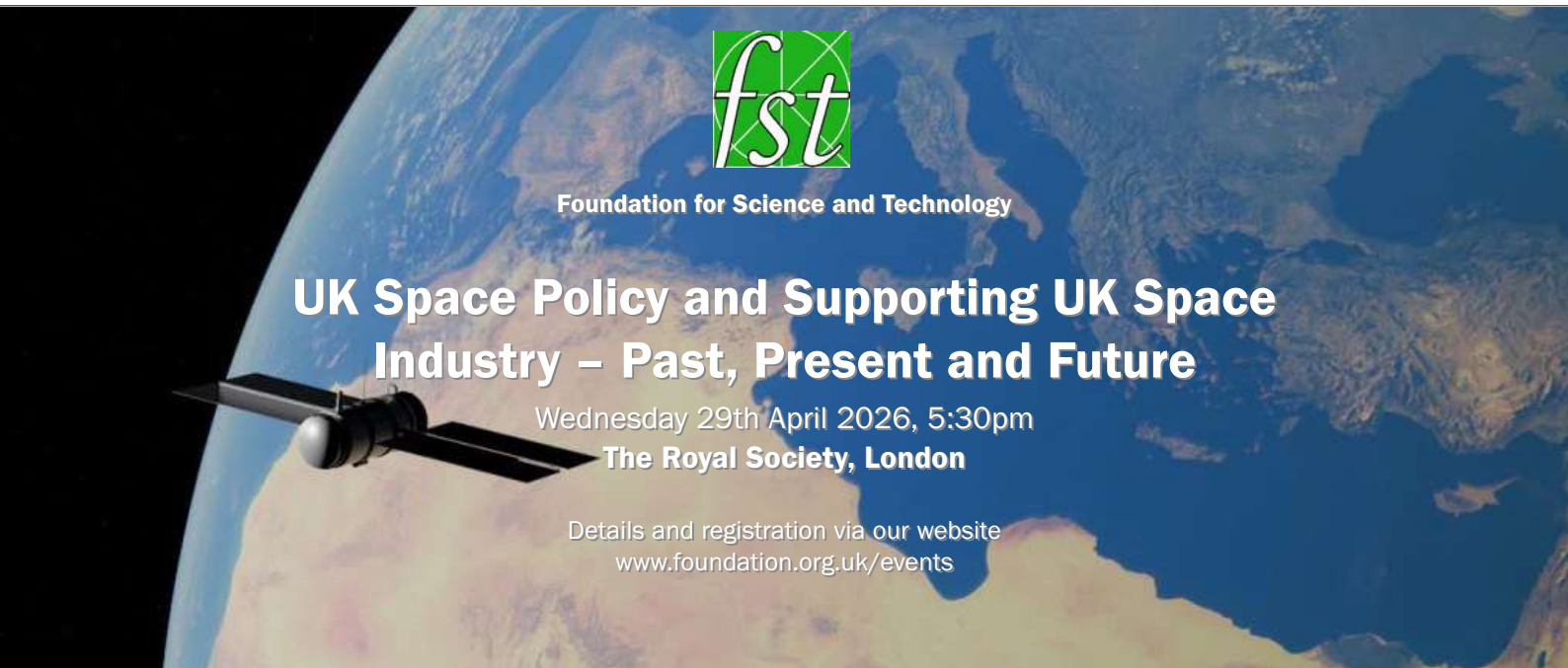

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