

The Journal of the  
Parliamentary and  
Scientific Committee –  
All-Party Parliamentary  
Group

SCIENCE IN PARLIAMENT

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AUTUMN 2024

# AI INNOVATIONS

## Powering Organisational Performance

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## CONGRATULATIONS TO OUR 2024-25 ELECTED P&SC OFFICERS



**Rt Hon. George Freeman FRSA MP**  
(Chair)



**The Viscount Stansgate FRSB**  
(President)



**The Baroness Northover**  
(Vice-Chair)



**Sam Carling MP**  
(Vice Chair)

## WITH GRATEFUL THANKS TO OUR OUTGOING OFFICERS

Viscount Stansgate, President, Parliamentary & Scientific Committee

It is in the nature of Democracy that General Elections produce changes in the composition of the House of Commons. This has proved to be the case for the Parliamentary & Scientific Committee in the wake of the General Election on 4 July 2024. As a result there are three people about whom a word must be said because three of our most distinguished Members have now left their active participation in the P&SC as the result of the Election:

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### CHI ONWURAH MP

From the moment Chi was first elected to the House in 2010 as the Labour Member for Newcastle-upon-Tyne it was clear that she was going to play a major part in Parliamentary debates on Science & Engineering. As an electrical engineer herself she made her mark early on and has been a consistent champion ever since for Science & Engineering and especially Diversity and Inclusion within science. She always co-sponsored major science-related events like *Parliamentary Links Day* and *Voice of the Future* and others. Chi has now stepped down from a prominent role with the P&SC where she



served as one of the key officers of the Committee for many years. However she has certainly not been lost to the world of science: anything but. Having served as a Shadow Minister for Science and Innovation for many years she is now a candidate for the Chairship of the House of Commons Select Committee on Science & Technology. If successful she will emerge as a major player on behalf of Science in this new Parliament. We thank her sincerely for her service on the P&SC and wish her well in the future.

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### CAROL MONAGHAN

Carol Monaghan served as the MP for Glasgow North West on behalf of the Scottish National Party from 2015 until the constituency was abolished by Boundary Commission changes in 2024. As a graduate in Physics from the University of Strathclyde, and subsequently a teacher, she was a natural candidate to become a Member of the Commons Select Committee on Science & Technology which she was for many years. She also took a great interest in the work of the P&SC and went on to become one of its major office-



holders. For many years chaired the P&SC Programme Committee which mapped out and planned the monthly discussion meetings. She also championed Photonics and did much to draw attention to this important area considering its UK-wide industrial significance. She also served as the SNP's Westminster Spokesperson for Education, Armed Forces and Veterans. She was a tireless supporter and attender of Parliamentary & Scientific Committee events and she will be much missed.

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### STEPHEN METCALFE

With literally the final declared result in an English Parliamentary Constituency in the 2024 General Election the P&SC sadly lost its Chair, Stephen Metcalfe, who was first elected as the Member of Parliament for South Basildon and East Thurrock in 2010 until his defeat in 2024. Stephen had a very distinguished career in Parliament where he soon emerged to become one of the new intake of backbenchers to take a sustained interest in science. He served as a Member of the Science & Technology Select Committee under the chairship of Andrew Miller MP (our former Chair) and from 2016-2017 he served as the Select Committee's Chair. After the party allocation of chairships of select committees was abruptly changed (and his chairship effectively removed) he found himself again as a backbench Member but assiduously continued to support Science in every possible way. He also co-chaired the All Party Parliamentary Group on AI and helped pioneer and steer



Parliamentary discussion and debate of this vital new technology that will doubtless transform our lives in the future. He was re-elected to serve on the Science & Technology Select Committee in 2022. Meanwhile he was himself elected Chair of the P&SC and served with distinction for the entirety of the last Parliament both in chairing the formal meetings and the informal dinners. He championed the 'crown jewel' of the P&SC's work – STEM for BRITAIN competition – and the last Parliament saw an unbroken series of successful events which has entrenched this annual event in the Parliamentary calendar. He also took a prominent role in co-sponsoring events like *Parliamentary Links Day* and *Voice of the Future* and the *Christmas Receptions* for Science & Engineering. He will be hugely missed and forever remembered for his commitment to the cause of Science in Parliament. As President I deeply appreciate all he did for the P&SC.



Rt. Hon George Freeman FRSA MP, Chair, Parliamentary & Scientific Committee (All-Party Parliamentary Group)

### Welcome to the Autumn journal

It's a great pleasure to be writing this my first Chair's piece in the Science in Parliament quarterly journal. After a 30yr career in science venturing – 15yrs in bioscience venture capital and 14yrs pushing my government to give a higher priority to the role of science & technology in our country – it's a great honour and privilege to take on this role.

I wanted to start by thanking and paying tribute to my predecessor Stephen Metcalfe who gave such longstanding service to the P&SC. You are missed, but highly respected, Stephen. I also want to thank Stephen Benn and the team of officers who make and keep the P&SC what it is.

The Parliamentary Scientific Committee is the oldest APPG in the Palace of Westminster: established by Churchill and Attlee in 1939 to support Parliamentary understanding of the growing importance of science in the war effort.

It has been a vital cog in the machinery of UK science policy for over 80 years, with many distinguished members.

That work is as vital as ever. The pace of both scientific discovery and the global race for science and technology sovereignty has arguably not been so intense since the height of the Cold War. From the rise of AI to bioengineering and gene editing, Fusion energy, Quantum, Space and the growing threat from the global climate emergency we face extraordinary challenges and opportunities to harness science for global good.

Here in the UK I'm delighted to have helped build a growing cross-party consensus is developing to support a much bolder harnessing of UK science for sovereign economic security & prosperity through a S+T led Reindustrialisation around new economic sectors and clusters of high growth S+T businesses.

The geopolitical landscape for that is fluid and challenging with post/Brexit obstacles to UK / EU collaboration, naked US industrial protectionism and the rise of China and the increasing tension between the West and the Russia, Iran and S Korea axis creating a new science and technology Cold War.

The new Government has signalled loud and clear an ambition to accelerate the last Government's work on Science and Technology led growth with a bold new framework for Industrial Strategy. As a card-carrying Conservative advocate of an

Industrial Strategy I welcome that and am keen to help the new Government learn the lessons of previous administrations to deliver for the national good. S+T venturing is hard enough without partisan politics getting in the way.

As we look ahead there are a number of hot topics I think we need to be active in - but I'm particularly keen to look at 3:

- Industrial Strategy
- UKRI and the research ecosystem
- Global impact & how we can better harness UK science for global good, and global partnerships for UK S+T.

I very much look forward to meeting you at one of our forthcoming events - please do put them in your diary:

Tuesday 15th October - Discussion Meeting, House of Commons, in partnership with The Institute of Corrosion

Tuesday 5th November - Annual Luncheon, House of Lords, with Guest Speaker Lord Willetts.

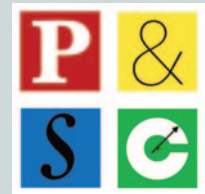
Full details of these and other upcoming events can be found in our Science Diary on the inside back page.

Please don't hesitate to contact me with any suggestions for how we can best develop the P&SC in this Parliament.

George



The Journal of the Parliamentary and Scientific Committee (All-Party Parliamentary Group).



Science in Parliament has two main objectives:

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

### Editorial Note

Leigh Jeffes

Many congratulations to George, Stephen, Lindsay and Sam on their election as Officers of P&SC for 2024-25.

We were very sorry to lose Stephen Metcalfe and Carol Monaghan at the General Election. Both contributed enormously to the promotion of science and technology at Westminster, and we wish them well in the future.

A warm welcome to our new Parliamentary P&SC Members, including Dr Allison Gardner MP, Dr Adam Thompson MP, Sadik Al-Hassan MP, Dr Danny Chambers MP, Lord Tarrasenko and Baroness Alex Freeman.

Leigh

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# AI INNOVATIONS POWERING ORGANISATIONAL PERFORMANCE



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In today's rapidly evolving business landscape, the integration of Artificial Intelligence (AI) has become a cornerstone for enhancing organisational performance. From optimising decision-making processes to transforming business operations, AI innovations are driving significant improvements across various sectors. This article explores how AI is powering organisational performance, drawing insights from recent research and case studies.

## ENHANCING DECISION-MAKING WITH AI

One of the critical areas where AI has made substantial inroads is decision-making. Traditional decision-making processes, often hampered by biases and a lack of real-time data, are being transformed by AI-driven insights. Decision Intelligence (DI), for instance, is an emerging framework that combines data science, social science, and managerial science to empower organisations to make fast, accurate, and consistent decisions <sup>1,2</sup>.

The use of AI in decision-making involves several components, such as data fabric, decision models, and orchestration. These components work together to provide connected insights, contextual analytics, and continuous intelligence, enabling organisations to respond swiftly to changing conditions and complex scenarios <sup>1</sup>. For example, in crisis management scenarios, AI systems can process data from various sources, optimise resource allocation, and monitor situations in real-time to provide actionable insights <sup>3</sup>.

## STRATEGIC PLANNING AND RESOURCE ALLOCATION

AI's role in strategic planning and resource allocation cannot

be overstated. AI-augmented strategic planning frameworks, such as AISPF (AI-Augmented Strategic Planning Framework), integrates AI tools like trend analysis, forecasting, and strategy simulation to enhance decision-making processes <sup>2</sup>. These tools help organisations identify emerging threats, simulate strategic options, and develop detailed action plans, thereby improving their strategic initiatives and resource allocations <sup>4</sup>.

A practical example of AI in action based on the IKE Institute's work with NATO is the optimisation of logistics operations. By employing a Data-Driven Decision Matrix, NATO can evaluate various logistical strategies based on cost efficiency, speed of deployment, reliability, and scalability, ultimately selecting the most effective approach.

## AI-DRIVEN BUSINESS VALUE REALISATION

High-performing organisations view AI as a strategic asset, essential for maintaining competitive advantage and driving business value. To effectively harness AI, organisations need to build a business strategy infused with AI, rather than treating AI as a separate technical strategy <sup>3</sup>. This involves prioritising AI investments across different

business model elements, assessing the impact and urgency of AI applications, and leveraging unique data to create 'Competitive Moats' <sup>5</sup>.

The realisation of AI benefits requires a systematic approach. Gartner outlines five key practices for AI benefit realisation: building an AI value story, defining a value hypothesis, building an action plan, testing the value hypothesis, and tracking leading and lagging KPIs. These practices ensure that AI initiatives are aligned with business goals and deliver measurable outcomes <sup>6</sup>.

## GENERATIVE AI AND BUSINESS PRODUCTIVITY

Generative AI is revolutionising business productivity by automating and augmenting various tasks. For instance, generative AI can significantly reduce the time required to write job descriptions, transforming a task that traditionally took 90 minutes into a five-minute process <sup>4</sup>. Such efficiencies not only save time but also enhance overall productivity and operational effectiveness.

Moreover, generative AI applications extend beyond simple automation. They include complex tasks like document search and summarisation, customer support, and personalised content creation for communication, sales and

marketing amongst other operational tasks. These applications can lead to substantial improvements in business processes and multi-role impacts, providing a competitive edge in the target market or domain of operations <sup>2,3</sup>.

## DISTRIBUTED AND AUTONOMOUS GOVERNANCE

The shift towards distributed and autonomous governance is another area where AI is making a profound impact. Traditional top-down governance models are being replaced by distributed governance frameworks that decentralise decision-making authority and processes across multiple nodes within an organisation <sup>4</sup>. This approach enhances agility, adaptability, and timely responses to dynamic

## INNOVATION ENABLING TRANSFORMATION

Innovation is at the heart of enabling organisational transformation through AI. By fostering a culture of continuous improvement and experimentation, organisations can leverage AI to drive innovation across various domains. AI technologies not only automate routine tasks but also enable employees to focus on higher-value activities that require creativity and strategic thinking <sup>7,8</sup>.

For instance, AI-driven platforms can provide real-time feedback and coaching to employees, enhancing their skills and performance. This kind of innovation is crucial in developing a more agile and responsive workforce capable of

shown that AI can enhance productivity and economic growth by automating routine tasks, improving efficiency, and creating new opportunities for innovation. McKinsey estimates that AI could potentially add around \$13 trillion to global GDP by 2030, increasing the annual growth rate of GDP by about 1.2 percentage points <sup>4, 5</sup>.

AI technologies improve GDP by enhancing labour productivity. For instance, automation and AI can perform repetitive tasks more efficiently than humans, allowing workers to focus on more complex and value-added activities. This shift not only increases the overall output but also drives economic growth by fostering innovation and creating new markets <sup>4, 9</sup>. Furthermore, sectors such as healthcare,

navigate the complexities of the modern business environment, the strategic integration of AI will be crucial for maintaining competitive advantage and driving sustainable growth. By leveraging AI's capabilities, organisations can not only optimise their operations but also unlock new opportunities for innovation and value creation, ultimately contributing to economic growth and improved GDP.

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conditions, critical for successful digital transformation.

Autonomous governance, driven by AI, empowers roles and teams with the authority to make distributed decisions while balancing risk and performance <sup>3</sup>. By integrating AI into governance structures, organisations can achieve better outcomes, reduce response times, and foster innovation both at the centre and the edges of their operations <sup>2</sup>.

adapting to rapidly changing business environments. Moreover, AI can identify patterns and trends that may not be visible to human analysts, providing deeper insights that drive strategic innovation and competitive advantage <sup>4</sup>.

## AI'S IMPACT ON GDP

AI's transformative potential extends to macroeconomic scales, with significant implications for Gross Domestic Product (GDP). Studies have

finance, defence and manufacturing have already witnessed significant contributions from AI, leading to more robust and resilient economic performance <sup>9,10</sup>.

## CONCLUSION

AI innovations are undeniably powering organisational performance by enhancing decision-making, strategic planning, business productivity, and governance. As organisations continue to

# POWERING TECHNOLOGIES FOR TOMORROW'S SOCIETY



Professor Charlotte Deane is Executive Chair of the Engineering and Physical Sciences Research Council (EPSRC) within UK Research and Innovation (UKRI)

**Innovations in engineering and physical sciences created the world we know today. Continued strategic investment in research will ensure we're ready to tackle the challenges of tomorrow, too.**

Take a look around and much of what you see is the result of engineering and physical sciences (EPS) research. Take the mobile phone in your pocket as an example. It is connected through communications networks that build on research into infrared lasers in the 1980s. It's powered by rechargeable lithium-ion batteries developed through ground-breaking discoveries in chemistry. The LED screen was made possible by advanced materials scientists, and its functions are ever evolving thanks to the progress of semiconductors research.

It's not just your phone. The roads you travel on are designed by civil engineers; their traffic flow optimised with algorithms created by computational engineers. Each year, millions of Magnetic Resonance Imaging (MRI) scans, based on work by physicists going back to the 1970s, enable medics to better diagnose and treat illnesses, and the NHS is increasingly informed



by healthcare data made possible by computer scientists. EPS research is even making your clothes cleaner, through chemical engineers working with companies like Procter and Gamble to devise new laundry detergents that boost cleaning at lower temperatures and with less water.

From communications to transport, manufacturing to

healthcare, decades of EPS research underpins every aspect of our lives. And it is not just solving today's problems. EPS research is also laying foundations for the future.

Advances in emerging technologies, such as AI, engineering biology, semiconductors and advanced communications, will continue to create transformational change. The UK is a world leader in quantum technology research, for example. The potential of quantum technologies to handle incredibly complex tasks will impact major aspects of our society, from drug discovery to weather prediction, financial services to cyber security.

The Engineering and Physical Sciences Research Council (EPSRC) helps drive the UK's world-leading EPS research. Our investments support the people, systems and ideas that will



power these technologies of tomorrow; unlocking new jobs and economic opportunity, tackling major challenges and transforming society.

## CREATING A STEM WORKFORCE FOR THE FUTURE

Brilliant research is driven by brilliant people, so training the next generation of thought leaders and innovators is key. Investing in people is at the core of EPSRC, from training PhD students through to fellowships and grants for those advanced in their research careers.

For the economy and society to be competitive and thrive, we need a pipeline of skills: the quantitative decision makers that underpin so many industries; those who understand how to harness AI for public good; the robotics engineers transitioning manufacturing to 'smart' factories. EPSRC recently announced a £1 billion investment in our Centres for Doctoral Training (CDTs) to train this future workforce, working across myriad sectors from pharmaceuticals to finance, national security to the NHS.

CDTs have supported people such as Jana Skirnewskaja, University of Cambridge, who has developed new in-car technology with holographic projections that could help drivers see hazards and reduce traffic accidents.

Then there's Melanie Whitfield, who is developing an 'electronic nose' that can detect food spoilage before it can spread, cutting food waste and carbon footprint. She is now working with a food distribution company to put her research into practice.

Working with industry in this way is also a crucial part of our Industrial Cooperative Awards in Science & Engineering (ICASE). Students are tackling real-world

industry-led problems. Like ICASE student Stuart Colville, who is working with Airbus to develop fuel tanks for aircraft powered by more environmentally friendly liquid hydrogen.

## BUILDING OUR NATIONAL CAPABILITIES

In the UK, we are fortunate to have a powerful research and innovation system – a world-class asset. One of the roles of EPSRC is to keep us in this top tier by ensuring we continue to fund areas where the UK leads, as well as expanding into areas important to our future national capabilities.

Investment in infrastructure is vital. There's physical infrastructure, where we have funded state-of-the-art facilities,



such as the National Wind Tunnel Facility+ (NWTF+). This network of 22 world-leading wind tunnels keeps the UK at the forefront of aerodynamic and fluid mechanics research by replicating real-life conditions in aviation, aerospace, rail, defence, civil engineering and environmental science.

Then there's our increasingly important digital research infrastructure. This provides researchers with computer

facilities tuned to their needs, unlocking advances in simulations, modelling and calculations critical for addressing global challenges.

For example, the combination of high-capacity processing power, memory, data storage and networks of the Advanced Research Computing High-End Resource (ARCHER) enabled researchers to run computer simulations that helped design COVID-19 vaccines and medicines. It's since been superseded by ARCHER2, which is 11 times more powerful, and available to thousands of academic, business and government users to work on challenges from designing more efficient jet engines to understanding the impacts of climate change on coastal communities.

## PARTNERING WITH BUSINESS AND INDUSTRY

EPSRC is catalysing the research and innovation the UK needs to tackle local, national and global problems. For example, our Prosperity Partnerships bring together leading UK-based businesses and universities to develop transformative new technologies, processes and skills to deliver societal impact and economic growth.

These include EPSRC spin-out company Oxford PV, which is working with the University of Oxford to develop a next generation of solar cells that are more efficient and cheaper to produce. A Prosperity Partnership between haptics experts Ultraleap and University College London is developing technology that allows people to 'feel' virtual 3D objects, like 'tactile holograms'. While the Universities of Manchester and Cambridge are working with consumer goods company Unilever to pioneer digital manufacturing techniques that fast-track new products from lab to supermarket shelf.

I believe that good research works equitably across the system. It's not the role of universities to come up with ground-breaking ideas and then throw them out to the world for someone to implement. Similarly, it's not the role of business to demand what academics should research. Our Prosperity Partnerships drive true linkage through co-research and co-investment – with £240 million from businesses alongside £61 million from universities and £182 million by EPSRC since 2017.

They show that connectivity and collaboration are vital to understanding the contexts and challenges of both industry and academia – and are key to unlocking knowledge and innovations that address key industrial challenges of the coming decades.

## INVESTING IN IDEAS

Investment in EPS research is great value for money. EPS research has supported more than 900 spin out companies, creating 29,000 jobs and £6 billion in revenue. It also benefits the public sector and wider society through increased productivity and efficiency.

Perhaps more importantly, EPS research helps safeguard our future economy and society. Climate change, future pandemics, the transformation of our digital world – we don't know what we might need to know, and EPS research hasn't yet produced a time machine! However, personal experience has shown me that what we do know is the UK needs a thriving research base to address the challenges of now and the future.

During the pandemic, I worked as UK Research and Innovation's COVID-19 Response Director. There were many, many challenges the research community had to address at pace. We saw the unparalleled speed with which the Oxford AstraZeneca vaccine was developed and rolled out –

thanks not only to ground-breaking research in immunology but also EPS research in manufacturing. Then there were practical solutions, such as an innovative system that used gases to speed clean ambulances, which was designed by chemical engineers in less than two weeks.

We were able to rapidly respond to problems thanks to clusters of researchers, working across EPS and with other disciplines, that could draw on decades of research and apply their collective knowledge to address unforeseen challenges.

Public funding plays a unique role in the R&I ecosystem. It is an investment in new ideas and the people who have them. The long-term, strategic approach of

public funding enables research that addresses the challenges of the next five to ten years, and decades beyond. It allows the UK's most brilliant minds to creatively and freely explore areas

that lay the foundations for future economic and societal change – not to mention the next generation of mobile phone in your pocket. ■



## HOW DO WE MANAGE THE RISKS FROM ADVANCED AI SYSTEMS WHILE STILL ALLOWING PROGRESS?



Dr Jan Brauner, from the University of Oxford's Department of Computer Science, outlines the steps policy makers should be taking now to ensure we can safely reap the benefits of AI in the future. This article is based on a paper Dr Brauner recently co-authored as part of an international consensus of global experts for the journal *Science*<sup>1</sup>, and quotes from this.

Despite the constant stream of media headlines related to artificial intelligence (AI), it is difficult to grasp the sudden, explosive growth in the capabilities of these technologies. In 2019, GPT-2 could not even reliably count to ten. Now, only four years later, deep learning systems are able to create hyper-realistic scenes on demand, write software and code, generate advice, and combine language and image processing to steer robots.

And there is no sign of this progress slowing. Tech companies, backed by enormous cash reserves, are racing to create ever more powerful AI systems. Their stated

aim is to create systems that exceed human abilities in most cognitive work and can automate most labour. Many leading experts find it possible that, within this decade or the next, generalist AI systems will broadly outperform humans in most important domains.

Advanced AI systems have the potential to help us tackle major challenges, such as in health or climate change. Advanced AI offers vast opportunities. But strong AI capabilities also imply large-scale societal risks, including rapid job displacement, amplified social injustice, automated misinformation, and large-scale cyber and biological threats. These risks demand

urgent recognition and action, so that we are adequately prepared for the largest risks *before* we have to face them. **Climate change took decades to be acknowledged and confronted, but for AI, decades could be too long.**

### AUTONOMOUS AI SYSTEMS AMPLIFY SOCIETY-SCALE RISKS

Harms such as misinformation and discrimination from algorithms are already evident today; other harms show signs of emerging. A particularly urgent issue is the need to proactively address the rapidly-evolving threats from autonomous AI: systems that can plan, act in the



world, and pursue goals. While current AI systems have limited autonomy, companies are working to change this. For example, the non-autonomous GPT-4 model was quickly adapted to browse the web, design and execute chemistry experiments, and utilize software tools, including other AI models. **Once realised, autonomous AI will radically amplify the current risks with AI, besides creating new potential harms.**

With highly advanced autonomous AI, we risk creating systems that pursue undesirable goals. Worryingly, no one currently knows how to reliably align AI behaviour with complex values. Once autonomous AI systems pursue undesirable goals, embedded by malicious actors or by accident, we may be unable to rein them in. Even now, we struggle to detect and control relatively simple computer worms and viruses: advanced autonomous AI systems will have strong skills in critical domains such as hacking, social manipulation, deception, and strategic planning, and thus be much harder to control.

To advance undesirable goals, future autonomous AI systems could use undesirable strategies—whether learned from humans or developed independently—as a means to an end. AI systems could gain trust and resources to achieve their goals. They could manipulate or otherwise influence important decision-makers, and could find allies in humans or other AI systems. Future AI systems could insert and then exploit security vulnerabilities to control the computer systems behind our communication, media, banking, supply-chains, militaries, and governments. In a worst-case scenario of open conflict between AI systems and

humanity, AI systems could threaten with or use autonomous or biological weapons. There is also the risk that humans voluntarily hand over control: companies and militaries may outsource more and more key functions to AI systems, for the sake of efficiency.

We could lose control over advanced AI systems, leading to rapid escalation of harms like widescale cybercrime and social manipulation. Continued unchecked AI advancement could ultimately result in catastrophic loss of human life, devastation of Earth's ecosystems, and the marginalisation or even extinction of humanity.

## A PATH FORWARD TO SAFE AND ETHICAL AI

But all is not lost, if we act now. Alongside 22 world-leading AI scientists and governance experts from the US, China, EU, UK, and other countries, I was recently part of a global effort to develop a comprehensive response to manage the risks presented by advanced AI systems<sup>1</sup>. Together, our recommendations present a viable way forward to ensure progress in AI development is safe and ethical, and establish effective government oversight. The key recommendations of this framework are:

- **Industry labs should invest in safe, ethical AI and develop if-then plans for further scaling.** Leading labs should allocate at least one third of their AI research and development resources to ensure the safety and ethical use of AI systems. This level of investment in AI safety would be on par with the resources devoted to increasing AI capabilities. As a stopgap measure until

binding regulations are complete, AI labs should also commit to rigorous and independently scrutinised scaling policies that set out the safety measures they will take if specific dangerous capabilities are found in their AI systems.

- **Governments should allocate at least one third of their AI research and development resources to ensure the safety and ethical use of frontier AI systems.** This includes oversight and honesty, robustness, interpretability and transparency, inclusive AI development, addressing emerging challenges, evaluations for dangerous capabilities, evaluations of alignment, risk assessment, and resilience.
- **Governments must establish oversight of the AI industry by governments and civil society.** This includes mandating that AI labs report frontier AI training runs, providing legal protections for whistleblowers at major AI labs, creating a registry of frontier AI systems that are in training or deployment, and requiring labs to report incidents where AIs displayed harmful behaviour or novel dangerous capabilities.
- **Require auditing of frontier AI systems during training and before deployment.** Labs should give regulators and independent auditing bodies the access needed to evaluate these systems in development for dangerous capabilities.
- **AI system developers and owners must be held legally liable for harms from their frontier AI**

**systems that can be reasonably foreseen and prevented.** This includes harms resulting from deploying highly capable AI systems whose behaviour cannot be reliably predicted.

Despite our best efforts to test and evaluate advanced AI systems, we cannot simply assume they are safe until proven otherwise. Current testing methods are far from foolproof and can easily overlook issues. Moreover, it is unclear if governments can rapidly develop the extensive expertise required to thoroughly assess the full scope of an AI system's capabilities and potential societal risks. Therefore, the burden of proof should fall on the developers of frontier AI systems to convincingly demonstrate, through structured arguments grounded in evidence, that their systems will remain within acceptable risk boundaries. By making such "safety cases", AI companies would be following best practices for safety-critical industries such as aviation, medical devices, and military software.

**Governments should build capacity, standards, and regulatory authorities to address the risks posed by future AI systems with exceptionally dangerous capabilities, such as the ability to circumvent human control.** Amongst others, governments should be prepared to:

- **Establish a licensing system for training AI systems that are unusually resource-intensive and risky.**
- **Empower regulators to pause the further development of an AI system,** if it demonstrates sufficiently dangerous capabilities during training.

- **Mandate access controls for frontier AI systems and their training code.**
- **Require cyber security measures for actors that will hold access to dangerous frontier AI systems,** to prevent model proliferation. Given the utility of advanced AI for economic gain and for malicious use, AI labs will need security measures of the highest standard.

While there have been some promising initial efforts in these directions, society's current response falls far short of what is needed given the potential for transformative and rapid AI progress that many experts anticipate. As AI capabilities continue to grow, so too do the risks. Huge investments are flowing into making AI more powerful, but far less into making AI safe and mitigating its negative impacts. Realising the benefits of AI for humanity will

require reorienting our priorities. This will only be realised if there is a concerted effort by both tech companies and government to ensure that these technologies are developed ethically and safely. **The time to act is now.**

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*Jan Brauner is a final year PhD student in Computer Science at the University of Oxford. He has worked on a range of topics, from AI safety to applications of AI systems in public health. He has published over 25 peer-reviewed publications, including in high-profile outlets such as Science, Nature Communications, PNAS, ICML, ICLR, and NeurIPS. His work has been cited in federal bills, presented at institutions like the Africa CDC, the OECD Global Science Forum, and the UK Cabinet Office, and featured in media outlets such as Forbes, Guardian, Vox, and TIME.* ■

# PREVENTATIVE HEALTH – THE MEDITERRANEAN DIET AND THE GUT MICROBIOME



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## INTRODUCTION

The increase in life span has been accompanied by an increase in the occurrence of chronic, non-communicable diseases (NCDs) which affect the quality of life and independence of the ageing population. According to the World Health Organisation (WHO), NCDs are responsible for 74% of all deaths worldwide<sup>1</sup>. The increase in NCDs not only affects aged populations however the trend is more pronounced in ageing demographics<sup>2</sup>.

In England, in common with many other countries, improvements in the mortality rates due to NCDs have slowed in recent years. Overall, England has an average to lower quality of outcomes when compared to other European countries<sup>3</sup>. The role of diet in the occurrence of NCDs in general<sup>4</sup> and in Alzheimer's disease in particular<sup>5</sup> is widely accepted.

Daily we make decisions on our diet based on perceived enjoyment and the need for nutrients. These decisions have positive or negative effects which can be attributed to the food chosen. The choice of one's diet is, together with genetic and environmental factors one of the three major influences on healthy living. Gene editing and gene therapy aside, one cannot alter the genetics with which one is born; hence the focus of this article will be on the factors we can control, namely environment and lifestyle.

It has been well documented that people living in certain parts of the world have a significantly longer lifespan than the rest of the developed world<sup>6</sup>. This increased lifespan has in part been ascribed to diet, which is based on a high consumption of fruit, vegetables and grains, the consumption of moderate amounts of animal products and the habit of consuming smaller meals of lesser calorific value, more frequently<sup>7</sup> in the context

of what has come to be described as the 'Mediterranean Diet'<sup>8</sup>. A meta-analysis of prospective studies performed between 1966 and 2008 encompassing more than 1.5 million subjects has shown that a strict adherence to the Mediterranean diet is "associated with a significant improvement in health status"<sup>7</sup>. The most significant impacts reported included a reduction in mortality (9%), death from cardiovascular diseases (9%), incidence of cancer (6%) and incidence of neurodegenerative diseases such as Parkinson's and Alzheimer's (13%)<sup>9</sup>.

Despite extensive epidemiological and other studies, the nature of the health protective factor or factors remains unclear.

Our proposition is that the multifactorial nature of those components which have been implicated is suggestive of a single target in the human body which can respond either to

several different dietary components or to something that is ubiquitous in the Mediterranean diet but at the same time influences numerous NCD outcomes. The human microbiome is a potential candidate target and particular classes of phytoprotective compounds are possible dietary components.

## THE HUMAN MICROBIOME

The human microbiome is the community of microorganisms that live in a generally symbiotic relationship with the human host. Microbiomes exist in a range of organs including in the human gastrointestinal (GI) tract from the mouth all the way to the colon<sup>10</sup>. Other microbiomes have been found on skin<sup>11</sup>, in the eye<sup>12</sup> and even perhaps in the brain<sup>13</sup>.

The various microbiomes can affect health through the production of beneficial and harmful factors including short chain fatty acids (beneficial), B and K vitamins (beneficial) and inflammatory responses (harmful). Microbiome communities are, like human communities, in a state of benign balance. The loss of this can lead to illness and, in particular, to increases in NCDs.

The gut microbiota is made up of 1000+ species although the exact number is difficult to quantify due to individual and geographical / cultural differences between people<sup>14</sup>. The large number of microbial cells means that their biological effects can be significant. The gut microbiome contains up to 250-800 times the number of genes as the human genome. This leads to a high level of complexity both within the microbiome and in its relationship to the human host. The contribution that the gut microbiome makes to an

individual's whole body health and wellbeing is reflected in gut-brain, gut-liver, gut-kidney and gut-heart axes<sup>15</sup>.

## BACTERIA AND BIOFILMS

The presence of pathogenic bacteria can invoke the body to initiate an immune process called phagocytosis. In phagocytosis, the body produces cells which engulf and ingest large foreign bodies such as bacteria and remove them from the cell. The process of phagocytosis is a key aspect of the defence against infection and attack by pathogens. One way that bacteria can resist phagocytosis is through the production of a protective shield called a biofilm<sup>16</sup>. A biofilm is an extracellular polymer matrix that protects bacteria against the body's immune system. The majority of bacteria that are implicated in disease can form biofilms.

## QUORUM SENSING

Bacteria produce a range of molecules that assist them in growth and, in addition, act as signalling molecules to advise a bacterial species if it should form a biofilm community or break that community apart and migrate to other sites (this is called planktonic behaviour). One of the most common such molecules are a group of homoserine lactones called autoinducer molecules. These molecules are also implicated in the human inflammatory response to bacterial colonisation.

## BITTER RECEPTOR AND PHAGOCYTOSIS

Phagocytosis is not only initiated by bacteria. While the ability to taste bitter compounds is mediated by the bitter receptor in the oral cavity, members of this class of receptor are also found in other

organs including in the GI tract. In these extra-oral locations, binding of a bitter compound can induce the body to initiate phagocytosis<sup>17</sup>. So bitter compounds (some of which are found in the Mediterranean Diet) may help to protect against pathogens.

## LACTONASE

In addition to the induction of phagocytosis, human cells can also produce an enzyme called lactonase which breaks down the quorum sensing homoserine lactone (autoinducer) and renders it biologically inert. This enzyme is found in a number of organs which are affected by inflammation including the GI tract and the brain and, if the enzyme is present then the signal to the bacteria to produce a protective biofilm does not happen.

## THE MEDITERRANEAN DIET

Microbiome imbalance (dysbiosis) can allow pathogenic bacteria to multiply and to provoke a number of responses including inflammation. There is a link between lactonase production and the consumption of some fresh fruits and juices<sup>18</sup> so some components of the Mediterranean diet may inhibit pathogen growth by increasing the breakdown of the quorum sensing homoserine lactones, preventing biofilm formation and stimulating phagocytosis.

Besides fibre, the most abundant group of dietary phytochemicals are polyphenols. Dietary polyphenols, found in fruits, vegetables, cereals, tea and coffee and in products such as cocoa, chocolate and wine, are a heterogeneous collection of compounds all containing a number of phenol rings. Dietary polyphenols may act either directly on the gut or indirectly through their metabolites. The metabolites of polyphenols may

act as prebiotics and act as antimicrobials against xenobiotic organisms<sup>19</sup>. The prebiotic effect includes positive effects on gut epithelial integrity, maintenance of body weight, control of inflammation and insulin resistance<sup>20</sup>.

The Mediterranean diet is known to be high in bitter phytochemicals (particularly phenolics) and if these bind to the extra-oral bitter receptor mentioned above, they could stimulate phagocytosis in the human cell and cause the removal of pathogenic bacteria<sup>21</sup>.

## CONCLUSION

Dietary phytochemicals have a significant impact on health and disease as mediated by the host-microbiota relationship which is dependent as much on an individual's genetics as well as on their environment from birth. The host-microbiota mediated effects are due to the microbial metabolites of phytochemicals acting either directly on various host-mediated metabolic pathways or via host receptor-mediated pathways.

Dietary phytochemicals can affect predisposition to obesity and diabetes, reduce risk of cardiovascular disease, affect one's inflammatory response in the gut and brain, exclude pathogens from the gut, and last, but not least, improve one's energy levels and mood. Thus, modulating one's diet to include or exclude specific phytochemicals may be as effective in maintaining one's state of health as would the use of small molecule pharmaceuticals and should be an ongoing consideration in the maintenance of personal health and wellbeing.

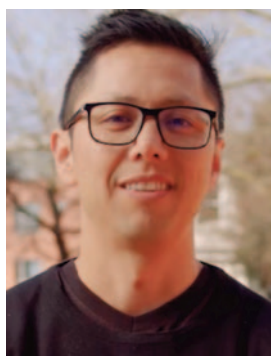
We have used our expertise at Biophys to examine a novel hypothesis regarding the potential chronic disease-

prevention capability of the Mediterranean diet. Our dual hypothesis (lactonase and induction of phagocytosis) is mechanistically plausible. It is possible to investigate the potential for different dietary components and mixtures to bind to the bitter receptor or to induce lactonase production. Optimisation of diets could make a significant improvement in the health of the population and reduce the burden of NCDs on the NHS.

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# HARNESSING THE POWER OF GEOGRAPHIC DATA SCIENCE TO IMPROVE POLICYMAKING



Prof. Francisco Rowe is Professor in Population Data Science and the Lead of the Geographic Data Science Lab at the University of Liverpool.

*We are all living through a global data revolution where digital information is constantly and continually published at unprecedented scale across a vast array of different sources – transforming the way that*



Prof. Mark A Green is Professor of Health Geography at the University of Liverpool.

*decisions are made in a range of areas, from business to sport. What makes this data revolution even more significant for policymakers in the UK and beyond is that a vast majority of this digital information carries a*



Dr Kawtar Najib is Lecturer in Human Geography at the University of Liverpool.

*key attribute – geographical location.*

*The University of Liverpool is home to the Geographic Data Science Lab (GDSL), a world-leading research centre dedicated to supporting data-*

*based policy making through harnessing the power of geographic data science. Collectively, we span the disciplines of econometrics, spatial analysis, spatial statistics, demography, population geography and computer science.*

*In the GDSL, we are interested in making sense of how our world works, turning geographic data into actionable insights to enable policymakers at local, national, and international scales to tackle social science challenges through the application of data science and artificial intelligence. In addition to traditional data sources such as censuses and surveys, our research in the GDSL exploits and ethically repurposes digital*

footprint data from technological platforms, such as mobile phones, satellites, social media and sensors.

Here, three of our pioneering researchers from the GDSL outline how they are applying geographic data science approaches to tackle real world challenges across human mobility, health inequalities and Islamophobia.

## MONITORING HUMAN MOBILITY TO SUPPORT EFFECTIVE EMERGENCY RESPONSES:

### Professor Francisco Rowe

In the GDSL at the University of Liverpool we harness geographic data to monitor human mobility (the migration, displacement or planned relocation of people) to support emergency responses to natural disasters and humanitarian crises – estimating service demand, improving population forecasting, and informing spatial planning.

Established evidence on human mobility predominantly relies on traditional data sources but they can only offer static geographic representations of human mobility at single points in time. As such, their ability to provide timely insights into sudden or short-term changes in human mobility, including in health emergencies such as the COVID-19 pandemic, or in natural disaster events caused by flooding or wildfires, is limited and hence, their capacity to enable appropriately rapid policy responses is also limited. By using location data from digital technology, we have been able to measure and monitor human mobility flows in near real-time at small area levels over short, hourly time intervals. We have worked with national government agencies and transitional organisations to support their plans and operations.

We are currently collaborating with the Liverpool City Region Combined Authority to create a composite index of transport demand and supply to identify potential areas in need of suitable infrastructure to promote active travel. We have also generated evidence for Ajuntament de Barcelona (the City Council of Barcelona) to inform the design of 15-minute neighbourhoods.

We have assisted the UN International Organisation for Migration (IOM) to respond to the ongoing humanitarian crisis triggered by the war in Ukraine by identifying potential settlement areas of refugees across Europe, estimating the extent and key destinations of population displacement within Ukraine. We have also partnered with the United Nations in Latin America to assess the impact of the COVID-19 pandemic on population movements from large cities, directly contributing to their flagship “Inclusive and Sustainable Smart Cities” project.

## IMPROVING POPULATION HEALTH AND TACKLING HEALTH INEQUALITIES:

### Professor Mark A Green

In the GDSL, we also use geographic data to improve the design of urban green and blue spaces to maximise population health and tackle health inequalities. While there is established evidence demonstrating how urban green (parks, woodland, gardens) and blue (lakes, rivers, canals) spaces support health and wellbeing, we have less understanding of what works best and for whom. This is because while local authorities and third sector organisations often modify places such as by creating new parks or improving their quality, they often fail to evaluate what the impacts on health and wellbeing are.

As part of our ongoing £7.1m UKRI funded GroundsWell project, we are addressing this gap by embedding greater routine evaluation into urban green and blue space interventions. This includes working with NHS England to link data on access to green and blue spaces to electronic health records for 2.7m people across Cheshire and Merseyside so that any policy can be evaluated, as well as developing the infrastructure to extend this to all records across England.

We are also helping Wirral Council to plan and evaluate their new Dock Branch park in Birkenhead so that it benefits local communities within a highly deprived area. Finally, we are conducting the longer-term evaluation of the Connswater Community Greenway through a collaboration with Belfast City Council, demonstrating how it has had a positive impact on mental health and improved social cohesion. Each of these projects demonstrates the power of utilising geographic data to contextualise health records about people who live and interact with these spaces.

## UNDERSTANDING AND COMBATING ISLAMOPHOBIA:

### Dr Kawtar Najib

In the GDSL, we are also utilising geographic data science approaches to better understand and help policymakers combat forms of racism and discrimination in society. Islamophobia is a global issue that has clear local impacts on people and communities. It is therefore important to study Islamophobia at different spatial scales. Our research aims to provide expert-advice for policymakers to reduce Islamophobia as part of a push toward creating a society that strives for more anti-discrimination and recognition

for equal human dignity.

Geographers are well placed to conduct analysis of Islamophobia from the global scale to the micro-local scale. My book on ‘Spatialized Islamophobia’ details these spatial scales (global, national, urban, neighbourhood, body and mind) and, in particular, shows how a rise in the global fear of Islam and Muslims has a direct impact on the way Muslim bodies feel constrained in their everyday lives and spaces, negatively impacting on their sense of security, mobility, and daily behaviours.

Working on Islamophobia and its spatialization allows us to quantify and map Islamophobia across cities, providing rare insights for academics and policymakers. Indeed, to be able to study Islamophobia from the largest to the finest scales, we have used both quantitative statistics collected from community associations and the Metropolitan Police in London, as well as qualitative testimonials directly from victims of Islamophobia present in the databases of NGOs fighting against Islamophobia.

We have provided expert advice to the All-Party Parliamentary Group (APPG) on British Muslims, which has been included in their special report proposing a working definition of Islamophobia. Through the APPG, I was invited to the House of Commons to present my book in a panel discussion on ‘Spatialized Islamophobia’ which included a number of MPs. Our research also contributes to and supports the work of a variety of organisations including NGOs, such as Islamophobia Awareness Month (IAM), and European institutions, such as the European Network on Religion and Belief (ENORB). To learn more, visit: [www.liverpool.ac.uk/geographic-data-science](http://www.liverpool.ac.uk/geographic-data-science) ■

# TECHNOLOGICAL ADVANCEMENTS AND HACKER INGENUITY: THE EVOLUTION OF CYBER SECURITY AND A ZERO TRUST MODEL



Roger Brown, CCO,  
DipMgmt (Open) MAPM



Christian Bailey, Regional Director,  
Zscaler

**We examine the evolution of cybersecurity across time, tracing its inception in technology.**

**Collaborating with key global cybersecurity organisations, we retrospectively analyse and project the necessary adaptations organisations and technology must undergo for heightened vigilance and adaptability.**



Stafford Hunt, Chief Technology  
Officer



Peter Tarbitten, Group Director



Enigma machine during World War II.

## 1960s-1970s: The Emergence of Hacking

The first recorded instance of hacking took place at MIT in 1961 when students hacked into the university's computer systems.

The concept of "computer security" began to emerge as more computers were connected to networks.

In 1971, Bob Thomas created the first computer worm, called the "Creeper" virus, which highlighted the need for security measures.

## 1980s: The First Computer Viruses

The 1980s saw the emergence of the first computer viruses, such as the Elk Cloner, which infected Apple II computers.

The term "computer virus" was coined by Fred Cohen in 1983. The first antivirus software, known as "Reaper," was created to remove the Creeper virus.

## THE CYBER SECURITY THREATS AND CHALLENGES

The history of cybersecurity is a fascinating journey that parallels the rapid development and evolution of computer technology. Here is a brief overview of key milestones in the history of cybersecurity:

### 1940s-1950s: The Birth of Cybersecurity

The earliest form of cybersecurity focused on protecting classified government and military information during and after World War II.

Pioneering work was done in encryption and cryptography, such as the development of the



Chris Finch, Director, SOM3



Eric Forcythe-Reid, Director, Cyber  
Security

## 1990s: The Internet and Cybercrime

The widespread adoption of the internet in the 1990s brought new opportunities for cybercriminals.

Major incidents, like the Morris Worm in 1988 and the first recorded case of ransomware (AIDS Trojan) in 1989, highlighted the growing need for cybersecurity measures.

The Computer Emergency Response Team (CERT) was established in 1988 to respond to cybersecurity incidents.



## 2000s: Rise of Cybersecurity Industry

The 2000s saw a massive expansion in the cybersecurity industry with the development of numerous antivirus, firewall, and intrusion detection systems.

Notable incidents include the Code Red worm in 2001, the Blaster worm in 2003, and the emergence of botnets.

Government agencies and organizations worldwide began to take cybersecurity more seriously.

## 2010s: Advanced Persistent Threats and Data Breaches

The 2010s witnessed an increase in sophisticated cyber attacks, such as Stuxnet (2010) and the Sony Pictures hack (2014).

High-profile data breaches, including those of Target, Equifax, and Yahoo, raised concerns about data security.

The emergence of state-sponsored hacking groups and advanced persistent threats (APTs) became a significant concern.



## 2020s: Continued Challenges and Advancements

The 2020s continue to see an increase in cyber threats, including ransomware attacks, supply chain attacks, and nation-state cyber-espionage.

The importance of securing critical infrastructure, such as power grids and healthcare systems, has gained significant attention.

Advancements in cybersecurity technology, including artificial intelligence and machine learning, are being used to defend against evolving threats.

Cybersecurity has evolved significantly over the years, reflecting the changing landscape of technology and the increasing sophistication of cyber threats. As technology continues to advance, the field of cybersecurity will remain critical in protecting information and critical infrastructure.

## IN RELATION TO 2023

Tech headlines were dominated by apocalyptic, doom-laden discussions of AI and how this will impact everyday life. As is the case with other major advances in technology, we don't really know the full cybersecurity impact yet.

What we do know is that these tools will lead to a quicker time to market both for attackers and defenders. Cyber hacking tools are now commoditized and available as Malware as a Service (MaaS) on the Dark Web for Threat Actors of all kinds. AI will bring productivity increases, both beneficial and harmful. For example, AI can be used to quickly generate vast quantities of, better quality and highly

tailored, Phishing attacks (known as Modern Phishing) via email, social media, or even Voicemail.

From a defence perspective, AI will also be used to learn, model, and analyse large amounts data to provide organisations with a synthesised, holistic view of their Indicators of compromise and user behaviour. These 360 views allow organisations to spot abnormal suspicious behaviour and to focus resources accordingly and in real-time.

Organisations are expected to continue increased investment in Cyber Security during 2024. Key to this is how they invest. At the top of the market the BFSI (Banking, Financial Services and Insurance) have the additional challenge of responding to regulatory pressure, but continue to struggle with legacy technology, which is out of support and requires wholesale change.

Small medium enterprises (SMEs) will seek to outsource their defences to cloud security providers and make greater use of subscription-based Secure Operations Centres and virtual CISOs (vCISO stands for virtual Chief Information Security Officer) providing expertise to raise their Cyber Security Maturity and provide expertise on demand.

The trend to converge Operational Technology with Information Technology continues at pace, bringing once isolated critical infrastructure into view for organisations and their attackers.

In summary, 2024 will see the same kind of threats as in previous years (Ransomware, Phishing, Insider, Malware)), but as more devices are connected the attack surface rapidly increases. We call this the Internet of Things (IoT). This number has doubled over the last 5 years and will double

again over the next 5 years, estimated to be around 50bn by 2030.

Cybercrime operates as a booming industry — more than just flourishing, it holds considerable sway. In 2015, global GDP suffered a staggering \$3 trillion hit due to cybercrime. By 2022, this number skyrocketed to \$6 trillion. Projections for 2025 loom even larger at \$10.5 trillion, an almost unfathomable sum. To put it in perspective, by 2025, cybercrime will erode the global GDP by \$332,952 every single second.



## 2024 RANSOMWARE STORY

A UK-based small business with 45 employees recently experienced a devastating cyberattack orchestrated by a Cyber hacker. This company, which supplies raw materials to the UK military industry, suffered a complete system shutdown, including email and IT services, halting operations for 48 hours. The hacker then demanded a ransom of £4,000 per month to restore and safeguard the company's systems. After negotiations, the business made a substantial one-time payment exceeding £40,000 to regain access and resume normal operations.

These figures, already staggering, become more alarming when considering: Approximately 30,000 websites/businesses face attacks daily, equating to nearly one attack per second.

The edge not only widens the vulnerable surface for hackers but also introduces a whole new array of attack vectors.

The cloud, similarly, offers a new avenue for enterprise IT attacks. In 2022, about 45% of cyberattacks stemmed from cloud origins. This open, widely distributed environment, propelled by interconnected APIs, data, and applications, along with open-source software, serves as a fertile ground for cyber threats.



### Valuable Practices in Identity Management

**Weak Authentication Methods:** Relying solely on passwords without implementing additional authentication factors increases the risk of unauthorised access in case of password compromise.

**Overly Permissive Access Controls:** Granting excessive access privileges to users increases the likelihood of unauthorised access and potential data breaches.

**Manual Identity Management Processes:** Manual provisioning and de-provisioning of user accounts are prone to errors and delays, leading to security vulnerabilities and compliance issues.

**Lack of Regular Access Reviews:** Failing to regularly review and update user access privileges can result in outdated access permissions and increased exposure to insider threats.

**Failure to Encrypt Identity Data:** Storing identity data in plaintext or using weak encryption methods makes it vulnerable to interception and unauthorised access.



### GOOD PRACTICES IN PREVENTION:

**Strong Authentication Mechanisms:** Implement multi-factor authentication (MFA) or biometric authentication to enhance the security of user identities.

**Regular Access Reviews:** Conduct regular access reviews to ensure that users have appropriate access privileges based on their roles and responsibilities.

**Centralised Identity Provisioning and Deprovisioning:** Establish centralised processes for provisioning and de-provisioning user accounts to ensure timely access management throughout the user lifecycle.

**Least Privilege Access:** Follow the principle of least privilege, granting users only the minimum access required to perform their job functions.

**Encryption of Identity Data:** Encrypt sensitive identity data both at rest and in transit to protect it from unauthorised access.

**Continuous Monitoring:** Implement continuous monitoring of user activities and behavior to detect and respond to suspicious or anomalous activities.

**User Training and Awareness:** Provide regular training and awareness programs to educate users about the importance of strong password management, phishing awareness, and other security best practices.

### IDENTITY GOVERNANCE MANAGEMENT

**Identity Governance:** Identity management involves establishing policies and procedures for managing user identities, including provisioning and de-provisioning accounts, managing entitlements, and ensuring compliance with

regulatory requirements. This helps organizations maintain a centralized view of user identities and their access rights.

**Single Sign-On (SSO):** Identity management systems often integrate with SSO solutions, allowing users to authenticate once and access multiple applications or services without having to log in separately for each one. This enhances user experience while improving security by reducing the number of passwords users need to remember.



**Identity Federation:** Identity management also facilitates identity federation, enabling users to access resources across different organizational boundaries using their existing credentials. This streamlines collaboration between organizations while maintaining security and control over access to shared resources.

### CLOUD BASED SOLUTIONS FOR CYBER PROTECTION

Various companies specialize in cloud-based security solutions, each offering unique services. Cisco Umbrella, formerly known as OpenDNS, delivers cloud-delivered security services encompassing secure web gateway, DNS-layer security, and cloud firewall functionalities. Palo Alto Networks provides a suite of cybersecurity products and services, including Prisma Access for cloud security solutions. Symantec, now under Broadcom, offers the Web

Security Service (WSS), focusing on cloud-based web security. Microsoft Cloud App Security serves as a cloud access security broker (CASB) solution, aiding organizations in monitoring and managing their cloud applications and data. Akamai Technologies offers cloud security solutions like Kona Site Defender and Akamai Secure Web Gateway, designed to defend against web-based threats. Forcepoint specializes in cybersecurity solutions such as secure web gateway, CASB, DLP, and next-generation firewalls.



McAfee delivers cloud security solutions like McAfee Web Gateway, which provides web filtering, malware protection, and DLP capabilities for both cloud-based and on-premises environments.

Additionally, Zscaler stands out as a prominent cloud security company, offering diverse solutions to thwart cyberattacks and safeguard digital assets. Zscaler's comprehensive suite of security solutions empowers organizations to bolster defences, mitigate security risks, and maintain regulatory compliance through the utilization of cloud-native architecture and advanced security technologies.



## 2023 BRINGS ZERO TRUST SECURITY MODEL, IDENTITY MANAGEMENT PLAYS A FOUNDATIONAL ROLE

**Zero Trust Architecture:** Zero Trust is based on the principle of “never trust, always verify,” where access to resources is continuously evaluated and authenticated based on various factors such as user identity, device health, and contextual information. Identity management provides the necessary mechanisms for verifying and validating user identities as they attempt to access resources, aligning with the principles of Zero Trust.

The Zero Trust is a cybersecurity framework that requires strict identity verification for every person and device trying to access resources on a private network, regardless of whether they are inside or outside the network perimeter. Traditionally, network security models assumed that everything inside a network is safe and trusted, while anything outside the network is not. Zero Trust flips this model on its head, asserting that no entity, whether internal or external, should be trusted by default. Instead, trust is continuously evaluated based on factors such as user identity, device health, location, and behaviour.

**Continuous Authentication:** Zero Trust requires continuous authentication and authorization based on user behaviour and the security posture of the devices they use. Identity management systems can integrate with behavioural analytics and risk-based authentication solutions to continuously assess user identities and detect anomalous behaviour that may indicate a security threat.

**Micro-Segmentation:** Identity

management enables organisations to implement micro-segmentation strategies, where access to resources is restricted based on user identity and least privilege principles. This ensures that even within the network perimeter, users only have access to the specific resources required for their roles, reducing the attack surface and limiting the potential impact of security breaches.

**Dynamic Policy Enforcement:** Zero Trust architectures rely on dynamic policy enforcement to adapt to changing security requirements and threat landscapes. Identity management systems can dynamically adjust access controls and authorisation policies based on contextual information such as user location, device type, and security posture, ensuring that access decisions are always aligned with the organization’s security policies.

If adopted by organisations, Zero Trust can bring several benefits:

**Enhanced Security Posture:** By adopting a Zero Trust model, organizations can significantly strengthen their security posture. Traditional perimeter-based security measures are increasingly inadequate against sophisticated cyber threats. Zero Trust emphasises a “never trust, always verify” approach, minimising the attack surface and making it more difficult for attackers to move laterally within the network.

**Reduced Risk of Data Breaches:** Zero Trust helps organizations minimize the risk of data breaches by implementing strict access controls and continuous monitoring of network activity. By enforcing the principle of least privilege, where users are granted only the minimum level of access necessary to perform their jobs, organizations can limit

the potential impact of a security breach.

**Improved Compliance:** Many regulatory frameworks and industry standards, such as GDPR, HIPAA, and PCI DSS, require organisations to implement robust security measures to protect sensitive data. Zero Trust can help organisations achieve compliance with these regulations by implementing strong access controls, encryption, and monitoring capabilities.

**Better Visibility and Control:** Zero Trust enables organisations to have better visibility into their network traffic and user behaviour. By implementing solutions such as micro-segmentation and continuous monitoring, organizations can identify and respond to security incidents more effectively.



**Adaptability to Modern Workforce Trends:** With the rise of remote work and the increasing use of cloud services, traditional perimeter-based security models are becoming less effective. Zero Trust is well-suited to address the security challenges posed by these trends by focusing on securing identities and devices rather than network boundaries.

In conclusion, Identity management is foundational to cybersecurity management, and its integration with Zero Trust principles enhances organizations’ ability to protect

their resources, data, and networks from evolving cyber threats. As cyber security continues to evolve, Identity management will play an increasingly central role in ensuring secure access to digital resources in a Zero Trust environment.

Overall, adopting a zero-trust approach can help organizations mitigate cybersecurity risks, protect sensitive data, and adapt to the evolving threat landscape more effectively.

They will be a follow up to this article next year to expand on Zero Trust Framework and how its been implemented in organisations. ■

# EMBRACING AI TO SUPPORT EARLY DIAGNOSIS: ROYAL COLLEGES PUBLISH SHARED ACTION PLAN



Dr Katharine Halliday, President, The Royal College of Radiologists



Dr Bernie Croal, President, The Royal College of Pathologists

**The NHS has a diagnostics problem. A growing, ageing and increasingly unhealthy population means that more people need tests and scans analysed than the NHS has capacity to deliver. Whilst the demand for diagnostic imaging is rising by 5% per year, the radiology workforce is only growing at about 3% per year. Pathology is also facing an acute workforce shortage, which is being compounded by a lack of training places to match the attrition rate of consultant posts. So it is no surprise that there has been much discussion about the scope to boost diagnostics capacity with digital technologies, including artificial intelligence (AI).**

Radiologists are specialist doctors who interpret medical images to diagnose, monitor and treat disease they also perform procedures such as biopsies. Pathologists are doctors and scientists who play a crucial role in the diagnosis of disorders affecting every organ of the body, from before birth to after death. Our two specialties are together responsible for nearly all diagnoses made in the NHS. The AI revolution holds much potential to ultimately benefit patients. However, to implement AI solutions effectively, we need IT systems ready for AI applications and the people to use them.

## **WHERE AI COULD TAKE US – THE IDEAL CANCER PATHWAY**

The promise of AI is huge. Take the cancer pathway. We would like to paint you a picture of what the ideal, AI-integrated

pathway would look like for patients.

Someone who is worried about a lump uses AI-enabled digital symptoms checkers or participates in AI-enhanced screening programmes, which detects their cancer at an early stage. “Smart” patient appointment systems mean they see their GP, and then quickly get referred to hospital or for tests.

AI tools in radiology improve the accuracy and speed of image reporting. Likewise, AI tools in pathology could improve pathologists’ accuracy and efficiency, prioritising cases needing rapid assessment – therefore getting patients diagnosed quicker.

Using AI tools to help speed up diagnosis means that the patient begins treatment far sooner. “Smart” rota systems cut down the number of missed

appointments and mean the patient receives their first treatment as soon as possible. AI tools in radiotherapy aid with the treatment planning process, which means the patient receives the optimum dose of radiation, targeted accurately at the tumour and avoiding healthy tissues. The tools save consultants’ time which allows them to spend more time with patients. AI helps the patient’s doctors generate written reports and letters, so the patient is kept informed of their progress. Because of all this, the patient’s cancer is treated much earlier, they have a much better chance of cure and of going on to live many years in full health. AI systems can also be designed to fast track the huge array of genetic information that genomics now offers. Machine learning could help design personalised cancer therapies using some of the new drugs

being developed that offer significantly better outcomes than before.

Of course, the cancer pathway is only one of many pathways in which AI could play a substantial role. Much of the technology described above exists already but we are a long way from being able to put it into practice and there is a huge amount to do if we are to get there.

## GETTING THE BASICS RIGHT – IT INFRASTRUCTURE

The most important barriers that prevent the implementation of AI are IT infrastructure and staff capacity. NHS IT infrastructure is largely unfit for purpose. Not only is it highly disjointed, with individual organisations operating with different systems, but it is also ageing and unreliable. Our doctors spend hours waiting for computers to turn on or for IT problems to be resolved. Often, AI applications require cloud compatibility, which is in many cases lacking.

This issue is a particular problem in pathology, where only a handful of Trusts in England are fully digitised, with the others still physically posting glass microscope slides around the country. Digital pathology involves the sharing and interpreting of pathology information in a digital environment. Digital pathology slides are created when glass slides are scanned to create a high-resolution image that can be viewed on a computer screen or mobile device. This is a huge problem, as before AI can be considered for use in pathology services, there needs to be investment in the technology needed to create and store digital images. Digital images not only enable cases to be transferred rapidly across

pathology networks but are also used to train algorithms to assist with diagnostic process.

Embedding digital pathology will lay the foundation for the adoption of AI in diagnostic services. Without it we cannot harness these benefits.

## GETTING THE BASICS RIGHT – STAFF CAPACITY

The current lack of radiologists and pathologists is a significant limiting factor to speedy implementation. This is true for any kind of innovation but is especially the case for AI integration. There is currently a 29% shortfall in the consultant radiology workforce, which means limited capacity to spend on service improvement projects. Similarly, there is an estimated 24% vacancy rate among cellular pathologists and an estimated further 22% are predicted to retire within the next five years. Moreover, the NHS does not have enough data scientists, systems architects, and software engineers to facilitate the rollout of AI tools at a national scale.

## GENERATING THE EVIDENCE

Another essential building block will be generating the evidence that AI applications work in practice as intended. This is essential if we are to address the understandable concerns many have about the use of AI in healthcare. This needs to happen throughout the AI algorithm's journey from development to routine clinical use. Appropriate mechanisms need to be established to assess real world performance of the technology before it gets introduced. For instance, it is very important to know what clinical information the AI was trained on. This is because differences between this and the data that

you intend to use the AI on can cause the algorithm to work very differently. At the other end, once AI is in routine clinical use, its performance must be continuously validated.

Elements in the AI's environment can change, such as the machines used to take images or the software it interacts with. This could affect the AI's performance, and hence patient outcomes. Establishing the right frameworks to generate evidence and monitor performance is crucial. It will require coordinated work from government, institutions like NHS England, NICE, NIHR, the medical Royal Colleges and others.

## BRINGING PEOPLE WITH US

Evidence generation is also an essential step in bringing people with us. The adoption of AI into healthcare is undoubtedly a major shift and is vital that both clinicians and the public are aware it is taking place and happy with how it proceeds. Generating evidence of safety and efficacy is one part of this. Another factor is to ensure that clinicians are actively involved in AI implementation projects. The introduction of a tool will affect the entire healthcare ecosystem, and all staff affected need to be involved in decision making. For patients, it will be essential that healthcare providers communicate openly and clearly, setting out what changes are happening and what it means for them. Studies suggest that specific concerns arise around the use of their data and preserving the human factor in care. These need to be tackled head on.

## AMBITION TO MEET THE CHALLENGES WE FACE

We need to be forward thinking and to plan now for the

change we want to see in the next five to ten years. AI will not automatically free up clinicians' time and bring down waiting lists. Nor will it replace the need for clinical and medical staff.

Benefits will only be realised if we implement AI effectively, and if we are clear about what our goals are in pursuing AI-enabled care. If the aim is to enable radiologists and pathologists to analyse and process more scans and tests within a specific period, then this needs to be reflected in updated job plans, staffing rotas and organisational strategies. If the aim is to increase the amount of time clinicians spend directly caring for patients, then this too needs to be planned for.

We must embrace innovations to boost capacity, but we can only do this by modernising our IT systems and expanding our clinical and digital workforce. Digital transformation alone will not suffice. We need to take a system-wide approach. This may be an ambitious task. But our ambition needs to match the scale of the challenge we face. Our Colleges are ready to work constructively with health decision makers to support initiatives that will address the challenges and unlock the benefits we have identified. ■

# THE THREAT OF ANTIMICROBIAL RESISTANCE – HAS IT CHANGED IN TWO YEARS?



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In the run up to the second UN General Assembly (UNGA) High Level Meeting on Antimicrobial Resistance (AMR) on the 26th of September 2024, eight years after the first and unprecedented UNGA meeting on AMR (Quadripartite Joint Secretariat On AMR, 2024), we reflect on the progress made on the issues that we had raised in our 2022 article in *Science in Parliament* entitled *Anti-Microbial Resistance – A Post-Modern Dilemma* (Hanley, 2022).

Antimicrobials have been the mainstay of modern medicine ever since the discovery of Penicillin by Sir Alexander Fleming. Not only are they a cure against infections caused by bacteria, fungi, parasites and viruses, but they are also the facilitators of medical interventions such as general surgery, joint replacements and cancer therapy. The impact of antimicrobials on modern medicine is recognised not only by doctors, scientists and policy makers but also the general public who, in 2017, voted antibiotics as “Britain’s Greatest Invention” (BBC Two, 2017).

AMR is, in its simplest form, the development of resistance to antimicrobial agents by bacteria, fungi, viruses and parasites. The arms race between antibiotic development and microbial resistance is one of the most important conflicts whose outcome could threaten human existence on several levels. In addition to the direct effect on humans through the development of resistance by pathogens, the use of antimicrobial agents in agriculture may lead to the creation of a pool of transferable

resistance characteristics and an impact on food-producing systems (Woodhouse et al, 2015).

In 2022, we reported on the humanitarian, scientific and commercial challenges of AMR.

1. Firstly, we reflected on the seminal report by Lord O’Neill in 2016 which is still cited by scientific publications, NGOs, media outlets and governments worldwide (O’Neill, 2016).

The report predicted 10 million deaths globally caused by untreatable infections by 2050. This was confirmed by a real-world view of 4.95 million deaths associated with AMR, including 1.27 million deaths directly attributable to AMR, in 2019 (Collaborators, 2022). This was corroborated in 2024 where it was found that 28% of the global burden of disease (all causes) as measured in Disability Adjusted Life Years (DALYs) is due to infections. Half of these, i.e. 14% (97 million DALYs) of the global burden of disease, is due to bacterial infections including species such as *Staphylococcus aureus*,

*Klebsiella pneumoniae*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Acinetobacter baumannii*, and *Helicobacter pylori* (Group, 2024).

Tuberculosis (caused by the bacterium *Mycobacterium tuberculosis*), malaria (caused by the parasite *Plasmodium* spp) and AIDS (caused by the Human Immunodeficiency Virus (HIV)) were recently named as the exerting the largest impact on disease burden as measured by DALYs (Group, 2024). The infections caused by all three of these, can be treated by antimicrobials (Alsayed, 2023) (Abumsimir, 2023) (Landovitz, 2023).

Unfortunately, we have not seen any decreases in deaths directly attributable to AMR in 2024, with the Global Antibiotic Research & Development Partnership (GARDP) estimating that one person dies every 6 seconds from untreatable infections (GARDP, 2024).

2. Secondly, we discussed that the economic model for antimicrobial development is broken.

The development of new antimicrobials is as expensive as developing a new cancer drug, but the drugs themselves do not command a premium price. In addition, because of the development of resistance the prescribing of new antimicrobial drugs is limited to last resort situations, leading to a lower income for manufacturers and a poor return on investment. This has led big pharma to step away from antimicrobial drug development and the development is now left to SMEs.

Prof Kevin Outterson, the CEO of CARB-X (CARB-X, 2024) states that for primary research leading to first in man clinical trials there is a global funding gap of USD370 million needed by the SMEs to deliver six new, high impact treatments per decade. Furthermore, at the NCCR AntiResist event in March 2024 (NCCR AntiResist, 2024) preceding Europe's most significant annual AMR Conference in Basel (AMR Conference, 2024), Prof Outterson presented data from Q3 2023, that showed that of the seven business to have brought a new antibiotic to the market, three went into bankruptcy and the remaining four into distressed sale all due to the lack of an effective market pull. These failures led to private investors losing over USD2.3 billion, not to mention the USD777 million in grants that had been awarded to these companies by the US government.

3. Thirdly, we reported on the then evaluation by NICE of a "Netflix-style" subscription model for access to antimicrobial products which was finalised in 2024. (NHS England, 2024). For Breakthrough

antimicrobials that have been evaluated according to the *Antimicrobial Products Subscription Model: Product Award Criteria*, a possible annual payment of £20 million will be made to the company that developed the drug, provided that the total sales made to NHS England in that year were less than that amount (with smaller payments made by the devolved nations). A sliding scale of payments for antimicrobials classified as critical, priority and important by the WHO is also recommended by this evaluation.

Whilst £20-£25 million per annum may be insufficient to keep an antimicrobial developer from bankruptcy, if more countries globally follow a similar model, then antimicrobial development becomes a viable business opportunity again. Boston University (BU) published an AMR Financial Model (Boston University, 2021) which calculates the fair share that countries should pay per annum per new drug. The BU model agrees with the decisions by NHS England on the value to be paid and suggests that the G7+EU27 countries should pay an extra USD290 million annually as an appropriate payment for the development of new antimicrobials.

The UK was the first country to establish and implement such a model and the model is now being copied globally with developments to launch such programmes in Canada and Japan.

4. The science of developing new antimicrobials has not become any easier. In the press release for the WHO's

antimicrobial pipeline review (WHO, 2024), it was reported that

*"Overall, antibacterial agents in the clinical pipeline combined with those approved in the last six years are still insufficient to tackle the ever-growing threat of the emergence and spread of drug-resistant infections."*

The current clinical antibacterial pipeline (not including antifungal, antiviral or anti-parasite agents) contains 97 agents. 57 of these are antibiotics (small- or large molecule drugs which kill bacteria) and 40 are non-traditional agents which include bacteriophages (viruses that kill bacteria) and products that enhance the activity of antibiotics. However, only 20% of the antibacterials in clinical development are innovative, meaning that the remainder are modifications of, or combinations of, existing antibacterials.

A further concerning issue regarding antimicrobial development is the report by the AMR Industry Alliance Professionals (AMR Industry Alliance, 2024) that the AMR R&D workforce is limited and declining. The Alliance which includes numerous UK-based SMEs estimates that there are only 3,000 AMR researchers currently active in the world (estimated range of 1,218-4,726), compared to as many as 46,000 for cancer and 5,000 for HIV/AIDS.

This decline is reflected in the total number of authors on AMR related peer-reviewed publications which has declined from a high of 3,599 in 1995 to only 1,827 in 2020. This decline is also reflected in the number of peer-reviewed scientific outputs where in 2022, there were 35 times more papers

published on cancer than WHO priority bacteria. It is furthermore reflected in the development of new antimicrobial specific IP where in 2022 there were 20 times more patents awarded for cancer than antibiotics.

Finally, since the launch of WHO's Global Action Plan on Antimicrobial Resistance in 2015 (WHO, 2016), the threat of AMR has gained recognition as one of the world's most pressing global health challenges. The action plan echoed recommendations which were presented in Lord O'Neill's report (O'Neill, 2016) focussing on increased awareness of the threat of AMR, improving the understanding of AMR through research, reducing infections through effective hygiene and sanitation, optimising the use of antimicrobials and finally, developing an economic case for sustainable investment for the development of new drugs, diagnostics and vaccines.

At a practical level, this WHO action plan and subsequent first UNGA High Level meeting on AMR led to the country-specific development of National Action Plans (NAPs) on AMR. The UK's second action plan, the UK 5 Year action plan for antimicrobial resistance 2024 to 2029, was published in May 2024 (UK Government, 2024). To date, 178 countries have developed NAPs. However, only 27% of these have implemented their NAPs and only 11% of countries have allocated national budgets to do so.

Efforts to address AMR are however, often hindered by low levels of implementation together with a lack of coordination and financial priority in most countries and at a global scale. The COVID-19 pandemic showed that global collaboration is possible to fight infectious disease and that joint working

can produce concrete public health benefits.

The approach of the second UN General Assembly (UNGA) High Level Meeting approaches serves as a reminder that the UK has historically played a leading role in driving the global agenda to fight AMR as a public health crisis in the making. It is imperative that the UK continues its leadership in AMR, both scientifically and politically, to ensure that the AMR agenda maintains its momentum, gains made to date are not lost and that the threat of AMR remains a global priority for policymakers and population alike.

#### Notes:

1. The theme of the 26 September 2024, UNGA High Level Meeting is “*Investing in the present and securing our future together: Accelerating multi-sectoral global, regional and national actions to address Antimicrobial Resistance.*”

2. CARB-X is the most significant funder of AMR research globally and is part funded by the UK Government’s Department of Health and Social Care (DHSC), through its Global Antimicrobial Resistance Innovation Fund (GAMRIF) (CARB-X, 2024).

3. The AMR Conference (<https://amr-conference.com/>) is part funded by UKRI and is annually attended by a delegation of UK companies supported through the UKRI’s Global Business Innovation Programme (GBIP) (<https://iuk.ktn-uk.org/opportunities/global-business-innovation-programme-in-switzerland-antimicrobial-resistance-amr/>).

4. GARDP is part funded by the UK Government’s Department of Health and Social Care (DHSC), through its Global Antimicrobial Resistance Innovation Fund (GAMRIF) with the latest investment being £2.5million in February 2024 (GARDP, 2024).

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## LORD WILLETTS TO SPEAK AT P&SC ANNUAL LUNCHEON 2024



We are delighted to announce that the Rt. Hon Lord Willetts FRS, President of the Resolution Foundation and Chair of the UK Space Agency will be the guest speaker at the Parliamentary & Scientific Committee’s Annual Luncheon, on Tuesday 5th November. This key event in the P&SC calendar is hosted by our President, Viscount Stansgate FRSB, and takes place in the Cholmondeley Room, House of Lords, from 12.15 to 14.30. Please contact [office@scienceinparliament.org.uk](mailto:office@scienceinparliament.org.uk) for further details.

David Willetts served as the Member of Parliament for Havant (1992-2015), as Minister for Universities and

Science (2010-2014) and previously worked at HM Treasury and the No. 10 Policy Unit.

Lord Willetts is a visiting Professor at King’s College London and Chair of the Foundation for Science and Technology. He is a member of the Board of Darktrace plc and is Chair of Innovate Cambridge.

Lord Willetts has written widely on economic and social policy. His book “A University Education” is published by Oxford University Press. A second edition of his book “The Pinch” on fairness between the generations was published in 2019.

# CONCRETE STEPS TO A GREENER PLANET: UK'S PIONEERING ROLE IN CEMENT INNOVATION



Jackson Kuzmik is a climate-tech analyst at Carbon Limiting Technologies



Prof Chris Rapley CBE MAE is Professor of Climate Science at UCL and member of the Board of the UK Clean Growth Fund

Reforming the cement and concrete industry may not be the most obvious priority in addressing climate change. Yet, the magnitude of its impact is enormous, and is commonly overlooked. Concrete is the most widely used substance on Earth, second only to water. Its production is responsible for nearly 10% of global carbon emissions – surpassing those from global aviation by more than twofold.

But the barriers to addressing this challenge are profound. Economically, the cement and concrete industry is highly commoditized, characterized by its ubiquity and reliance on abundant, low-cost resources, allowing cheap, localised production. The primary differentiator among manufacturers is not the product itself, but its cost.

Moreover, the construction sector, which drives cement demand, tends to be risk-averse, and rightly so. Recent examples such as the legacy of Reinforced Autoclaved Aerated Concrete (RAAC) in crumbling schools and hospitals underscore the dangers of low-performing alternative materials and processes. This has led to a conservative regulatory framework, which poses a barrier to the adoption of low-carbon concrete solutions. Globally, regulations and certifications mandate the use of specific, carbon-intensive ingredients in cement and concrete, focusing on prescriptive standards rather than performance outcomes.

Despite these challenges, a new generation of entrepreneurs is leading a quiet revolution in

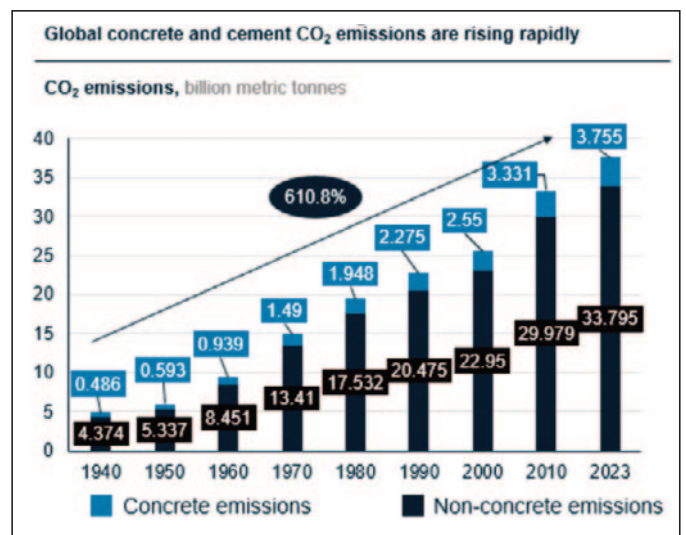


Figure 1: Concrete and cement emissions. Source: Carbon Limiting Technologies and the Clean Growth Fund

the cement and concrete industry. They are pioneering innovative processes, techniques, and materials that offer the promise of zero or even negative emissions, whilst maintaining or improving cost efficiency and performance. Remarkably, many of these innovators are thriving within the current market conditions, without the need for sweeping regulatory changes to achieve economic viability.

Even more promising is the fact that the UK is at the forefront of this transformation. With strategic interventions by

Parliament, the UK has the opportunity to secure a leadership position in this emerging market.

For example, a ground-breaking development comes from researchers at Cambridge University's Department of Engineering, who have discovered a method to recycle cement from demolished concrete buildings. They founded the startup Cambridge Electric Cement (CEC), which has recently received £2.25 million from private equity investment from UK venture capital firms, and national media

attention via the recent May article in the BBC, “UK breakthrough could slash emissions from cement.”

The beauty of their technology is that it can decarbonise cement and steel simultaneously.

When recycling steel, you have to run both steel and a substance called “flux” through the furnace. On the other end, you receive high-grade recycled steel and a byproduct material called “blast furnace slag.” What the chemists at CEC discovered is that if you use recycled cement building demolitions as the flux, the resulting slag is *chemically equivalent to Portland cement* and can be used as a 1:1 replacement of traditionally-produced cement: compliant with all the strict regulations and certifications that the industry employs.

The impact of that finding could be enormous. If scaled up, CEC’s cement production process could *significantly* reduce cement production emissions *whilst simultaneously producing recycled steel*.

CEC’s process additionally unlocks high value for steel manufacturers. Researchers have already estimated that current steel recycling rates could meet up to a quarter of the UK’s cement demand. As the use of electric arc furnaces increases globally, the potential for widespread adoption of electric cement grows, promising a substantial reduction in global cement emissions – exacerbated by the rapid decarbonisation of the grid, allowing arc furnaces to run on clean energy.

There are many other exciting examples in the UK. Cocoon (which also recently raised £4.2m in August), Seratech, and Karbonite are all making cementitious materials out of waste/byproducts from other industrial processes; BioZeroc

and Kenoteq have wholesale concrete replacements for certain use-cases; CarbonRe and Converge are using AI to make cement production and use more efficient. And the various startups in the space are not necessarily competitors, technologically at least – each one complements the other and has a role to play in the future.

of Beverley-Gower Jones OBE, are at the forefront of making sure British capital is exclusively reaching British innovation in order to drive decarbonisation. The thriving landscape of UK cement innovations proves its investment thesis is built on solid ground. Its sister company, Carbon Limiting Technologies (CLT), is helping make the

the product is commercially available in order to encourage investment into these startups. Buyers can only consider signing such an agreement if the innovations have extraordinary potential.

And they do. To fully grasp the significance of these novel interventions, one must first understand the scope of the issue and the nature of the solutions being developed. Concrete production involves four key components:

1. Cement (the binder)
2. Aggregates (rocks, gravel, sand, etc.)
3. Chemical additives (property enhancers)
4. An activator (typically water)

The concrete we use today primarily relies on Ordinary Portland Cement (OPC), which, although comprising just 9% of concrete by mass, accounts for approximately 90% of its total carbon emissions. OPC is a powdery substance, which, when mixed with water reacts chemically to bind the aggregates together to form an

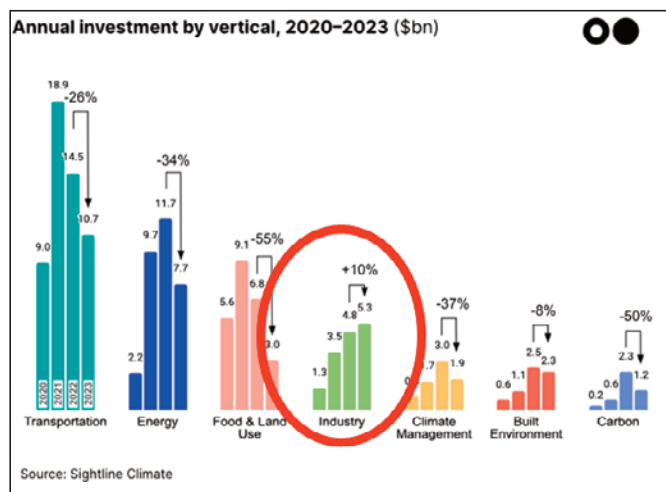


Figure 2: Global cleantech investment by vertical 2020-2023 (\$bn). Source: Sightline Climate

Their results are catching the eye of investors. “Industry” as an investment area (cement, steel, and similar foundation industries) is the only climate-tech category that saw an

economic case more appealing. In the case of cement, CLT is supporting Innovate UK’s development of an “Advanced Market Commitment” (AMC) for low-carbon cement. Like a

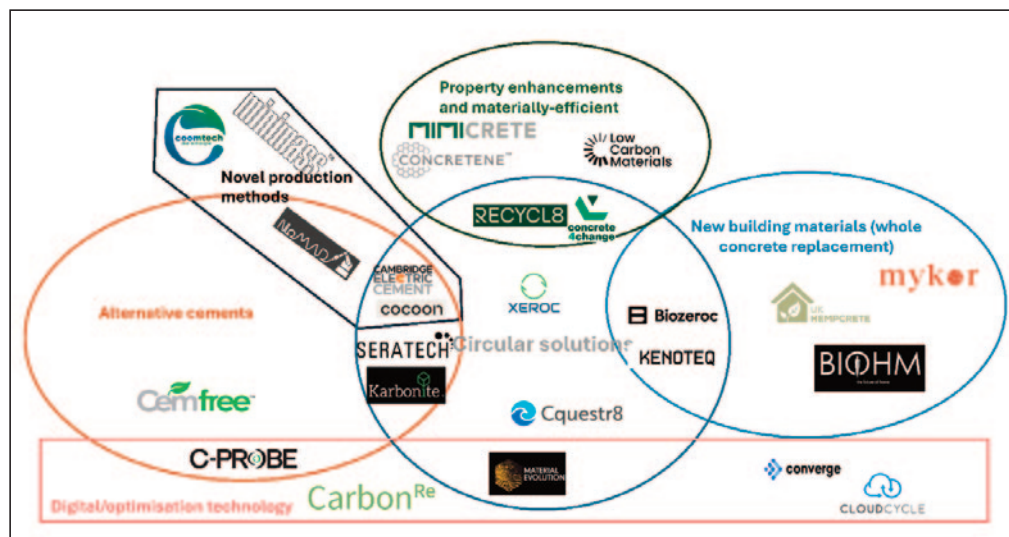


Figure 3: Landscape of UK cement and concrete innovations. Source: Carbon Limiting Technologies and the Clean Growth Fund

increase in investment in 2023. UK funds like the Clean Growth Fund, whose research underpins this article, under the leadership

common mechanism for funding vaccines, the AMC endeavours to obtain purchase agreements for low-carbon cement before

extraordinary building material. The carbon intensity of OPC arises from two main factors. First, the production process



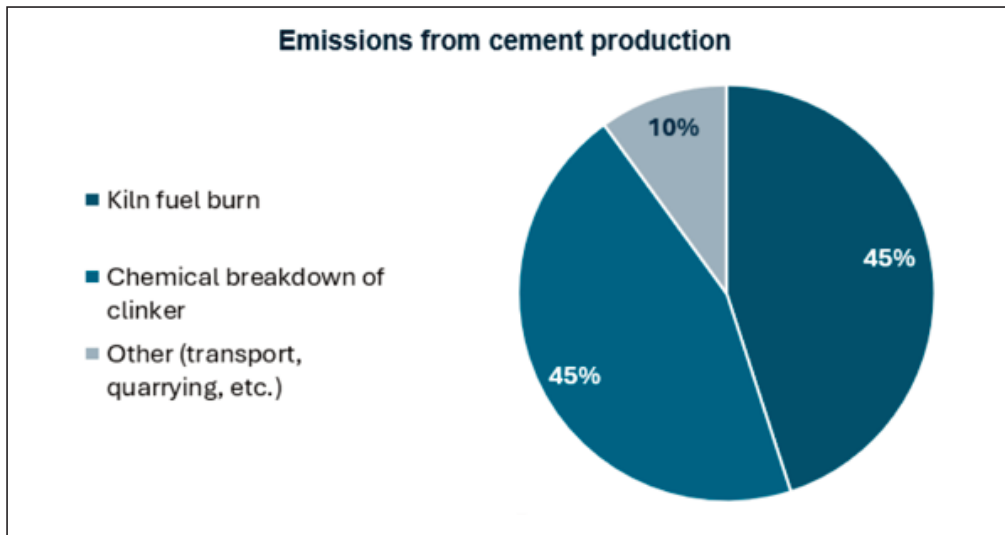


Figure 4: Emissions from cement production. Source: Chatham House

involves grinding limestone and other raw materials, then heating them in a kiln to a staggering 1,500 degrees Celsius, a highly energy-intensive process. The second factor is chemical; the breakdown of limestone in the kiln releases CO<sub>2</sub> as a by-product.

To address these emissions, innovators are exploring three primary avenues:

1. Producing cement with less energy
2. Using cement and/or concrete more efficiently
3. Substituting OPC with alternative materials or entirely new types of concrete

The innovations fall into six technological categories, as follows:

- A - Alternative cements:**  
new binders that do not produce CO<sub>2</sub> during production
- B - New production methods:**  
techniques that significantly reduce energy use
- C - New building materials:**  
(whole concrete replacement) alternatives to traditional concrete that do not rely on the same ingredients

**D - Property enhancement**  
additives that increase concrete's lifespan or its natural ability to sequester CO<sub>2</sub> as it hardens

**E - Digital Optimisation**  
software that optimizes production and use

**F - Circular solutions:**  
(re-use, recycling, CCU/CCS) innovative approaches to recycling, reusing, and managing cement and concrete waste

To capitalize on these innovations and transform the cement and concrete industry, with the UK taking a leading role, Parliament should consider the following strategic actions:

**1. Advocate for regulatory reform**

Transition to performance-based standards in place of prescriptive, ingredient-based regulations. This shift would lower the barrier to entry for new, sustainable materials, making it easier for them to gain certification and market acceptance.

**2. Implement public procurement policies**

Develop Green Procurement Guidelines that prioritize low-carbon materials in public construction projects. This would drive demand and incentivize the use of sustainable alternatives.

**3. Invest in commercial development**

Beyond supporting research and development, it is crucial to fund initiatives that advance commercialization. Programmes like Innovate UK and Carbon Limiting Technologies' Advanced Market Commitment can stimulate R&D by ensuring market demand for new products.

**4. Encourage collaboration and knowledge sharing**

Facilitate partnerships among innovators, investors, policymakers, insurers, and end-users. By bringing these stakeholders together, Parliament can help unblock the paths to implementation of new materials and processes.

To truly revolutionize the cement and concrete industry, it is essential for the House of Commons and the House of Lords, alongside industry, to adopt a forward-thinking approach. Cement should be seen not as a static commodity, but as a dynamic industry ripe with technological innovation. The market and the brightest minds in the UK have already started this transformation. However, without the right support, the journey ahead could be a marathon. Will the government do their part to help make it a sprint? ■

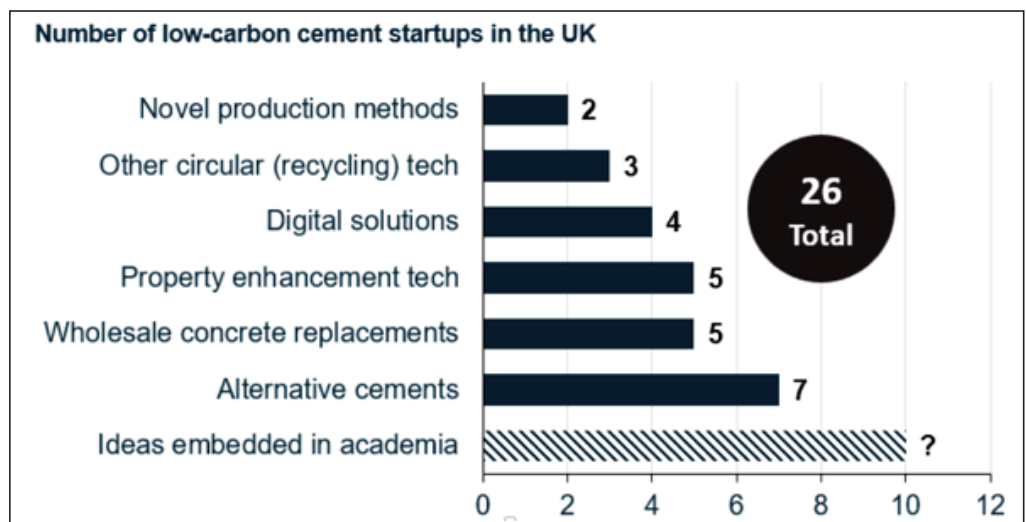


Figure 5: Number of UK cement innovators. Source: Carbon Limiting Technologies

# BUILDING AN ADVANCED MATERIALS INNOVATION HUB IN THE NORTH



Neil Eccles, Head of Innovation at Rochdale Development Agency

Ambitious sustainability targets demand that we reimagine the way goods are produced and consumed. Advanced materials are sustainable or recyclable alternatives to traditional materials that could allow industries to move towards net zero without compromising on performance and properties. The Centre of Expertise in Advanced Materials and Sustainability (CEAMS) was launched earlier this year as a consortium dedicated to driving the development and adoption of advanced materials in the UK. CEAMS serves as a central hub, connecting academia, research centres, and industry. It represents the first steps towards establishing a booming advanced materials hub in Greater Manchester, which will form part of a broader £100 million plan to grow innovation clusters across the UK.

## INTERNATIONAL INSIGHTS, APPLIED LOCALLY

CEAMS is a collaborative effort that aims to boost the adoption of sustainable materials by connecting industry with pioneering research and innovation resources. It aims to accelerate the materials advancements that are crucial for building a greener future, and foster a resilient economy that focuses on longevity, efficiency, and environmental responsibility.

The vision for CEAMS draws inspiration from successful models like Brainport in Eindhoven and Tknika in the Basque Country. Brainport Eindhoven has transformed a once-struggling region into a thriving tech and design hub, centred around a 'triple helix' model of collaboration between industry, education, and government. Brainport's success comes from its ability to bring together diverse stakeholders, from entrepreneurs to

multinational corporations. Tknika has similarly demonstrated that closely aligning education with industry needs can create a skilled workforce ready to drive innovation. Meanwhile, Germany's Mittelstand network of small and medium-sized enterprises (SMEs) forms the backbone of Germany's industrial economy. Known for their focus on niche markets, long-term thinking, and strong regional ties, Mittelstand companies are often world leaders in their specific sectors.

These examples demonstrate the power of place-based innovation and specialisation – how focusing on regional strengths can drive development and create high-value jobs. They also highlight how supportive policy frameworks can catalyse private sector investment and facilitate innovation. Greater Manchester has many of the necessary components to follow in these footsteps, but it needs to do a lot more to support the

spinning out and scaling up of companies with high potential. Central to this vision is Mayor Andy Burnham's ambitious plan for Atom Valley – a commitment to building a world-class advanced materials and manufacturing cluster in Bury, Oldham, and Rochdale. The Atom Valley initiative aims to transform these outer boroughs, repurposing green belt sites to support the growth and scale-up of high-potential companies.

By adapting international models to the unique context of Greater Manchester and the broader North West, CEAMS could become a powerful catalyst for regional development, as well as the national industrial strategy. The goal is to create a self-sustaining ecosystem of startups, established companies, and research institutions driving innovation in advanced materials and manufacturing. This aligns with the Mayor's manifesto goals of ensuring that economic

prosperity benefits many, not just a few, and shaping markets rather than merely serving them.

## DRIVING INNOVATION THROUGH COLLABORATION

CEAMS brings together leading institutions, including Rochdale Development Agency (RDA), Centre for Process Innovation (CPI), Henry Royce Institute, High Value Manufacturing Catapult (HVMC), Manufacturing Technology Centre (MTC), National Composites Centre (NCC), National Physical Laboratory (NPL), University of Manchester, and University of Sheffield's Advanced Manufacturing Research Centre. Each partner contributes unique strengths, from academic expertise and industry know-how to modern research facilities and specialist machinery.

A well-connected network of experts can overcome the hurdles that often slow down the adoption of advanced sustainable materials through knowledge exchange, resource sharing, and joint projects, allowing businesses to tap into the latest research and development breakthroughs. For example, the University of Manchester's expertise in graphene research complements the advanced manufacturing capabilities of MTC, while NPL's measurement capabilities ensure the reliability of new materials and processes. Rochdale Development Agency provides crucial local context and connections, so that innovations are grounded in regional needs and opportunities.

The impact of this approach can be seen in our recent work with Cygnet Texkimp in carbon fibre recycling. Carbon fibre has

widespread applications in aerospace, automotive, and other high-tech industries, but it is difficult to recycle because of its complex structure and varied streams of waste. Many in the industry are sceptical about recycling methods and whether recycled carbon fibre can match the quality of virgin materials. CEAMS connected Cygnet Texkimp with composites industry experts at the NCC, advanced materials researchers at the Henry Royce Institute, and the measurement capabilities of NPL to develop a comprehensive pathway for recycling carbon fibre and testing the quality of the resulting material.

Improving the carbon fibre recycling process means reduced costs and environmental impact for manufacturers, as well as increased market confidence in recycled materials. It also increases the UK's autonomy in critical materials and gives us a glimpse into a truly circular economy.

## THE ROLE OF SCIENCE IN SHAPING POLICY AND LEGISLATION

Having a consortium of experts on hand can be incredibly useful in shaping policies and legislation around advanced materials at both a local and national level. By serving as a bridge between academia, industry and government, they can provide evidence-based insights that ground policy decisions in scientific understanding and technological feasibility. This could begin to address the current dichotomy between national strategy and devolution by making sure that initiatives in materials science contribute to both local

economic growth and national competitiveness.

CEAMS has the potential to simultaneously drive the UK's regional development agenda, advance industrial strategy, and support sustainability goals. If we can leverage Greater Manchester's unique strengths in areas like graphene and sustainable materials as a springboard for a Mittelstand-like network of specialised SMEs, this will create high-value jobs, attract investment and talent to the region, and accelerate the transition to more sustainable industrial practices. From a broader perspective, this would also demonstrate the importance of a new long-term thinking culture among government, partner companies and institutions – one of stable and predictable funding for the research community and private sector that leads to conscientious innovation.

Specialist expertise becomes particularly valuable in cases where regulations push for materials to be revamped – for instance, the need for more sustainable fire-retardant furniture and building insulation materials. It can also play a role in shaping skills policies in order to prepare the workforce for future manufacturing challenges. Initiatives like CEAMS are a promising model for placing science at the heart of the solution to our industrial and environmental challenges.

## A PROMISING FUTURE FOR UK MATERIALS

CEAMS is already showing promise in supporting businesses in adopting advanced sustainable materials, unlocking new market opportunities, and mitigating environmental impact.

It is set to establish the beginnings of a successful advanced materials network in Greater Manchester, which will add to the region's rich materials history and cement its spot as a key innovation hub in the UK. It is also bringing in new private sector funding into the region – demonstrating that government backing of such initiatives can stimulate inward investment.

With a new parliament bringing new opportunities, there is a chance to make a real difference through funding and support for specialist consortiums and innovation hubs across the country – CEAMS and the broader Atom Valley initiatives are already demonstrating the impact that this could have. To fully capture the massive potential of advanced materials and become a global leader in the sector, devolved long-term funding is needed to continue building on these foundations for a supportive innovation ecosystem that delivers tangible impact.

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# HOUSE OF COMMONS LIBRARY



The House of Commons Library is an impartial research and information service for Members of Parliament of all parties and their staff. The Science and Environment Section (SES) is one of eight teams in the Research Service in the House of Commons Library.

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In recent months, SES has published and updated briefings on issues including:

## Research in Brief: Quick reads for the 2024 Parliament

The Library published this collection of short articles on important issues facing Parliament following the General Election. Science and environment topics covered include entries on AI in society, The UK energy system, What is Net Zero? and Are we on target for the environment?

## Economic regulation of the water industry

Research Briefing CBP 8931, published Tuesday, 20 August, 2024

This briefing paper provides an overview of the economic regulation of the water industry, with a focus on England and Wales. It provides an overview of the price review process that sets customer bills and water company service targets every 5-years. It includes a summary of the 2024 price review process to date.

In England and Wales, the water industry was privatised in 1989 and water supply is delivered by private water companies. In Scotland and Northern Ireland, publicly owned water companies are responsible for the water supply.

Most water and sewerage companies are regional monopolies, with dedicated infrastructure in each company's area. This means that household customers cannot switch their supplier and that competition is limited. To compensate for the lack of competition, the industry is subject to economic regulation to ensure that it delivers value for consumers and the environment.

## Infected Blood Inquiry: recommendations for recognition, healthcare and patient safety

Research Briefing CBP 10081, published Thursday, 22 August, 2024

The Infected Blood Inquiry made recommendations to improve patient care and safety, and strengthen the voice of patients in the healthcare system.

During the 1970s and 1980s, thousands of UK patients contracted HIV, hepatitis viruses, or both, from contaminated blood or blood products. The Infected Blood Inquiry, which investigated the use of contaminated blood products, made several recommendations focused on improving safety and patient care in its final report. This briefing examines these recommendations.

The inquiry's primary recommendation was that a compensation scheme for those "infected and affected" should be established immediately.

## Food waste in the UK

Research Briefing CBP 7552, published Friday, 12 April, 2024

This briefing covers key causes of food waste in the UK and actions to prevent food waste.

WRAP estimated that in 2021, total food waste in the UK amounted to 10.7 million tonnes (Mt). By weight, most food waste comes from households (60%), followed by farms (15%), manufacturing (13%) hospitality and food service (10%) and retail (2%).

The briefing examines the environmental impact of food waste, reduction targets and actions to tackle food waste, and food waste collection.

## Battery energy storage systems (BESS)

Research Briefing CBP-7621, published Wednesday, 24 April, 2024

This briefing covers battery energy storage systems (BESS), concerns about their safety and barriers to their deployment.

Battery energy storage systems (BESSs) use batteries, for example lithium-ion batteries, to store electricity at times when supply is higher than demand. They can then later release electricity when it is needed. BESSs are therefore important for “the replacement of fossil fuels with renewable energy”.

The briefing examines the permissions required for BESSs, concerns about their safety and how this is regulated, and barriers to their development.

## Pylons and upgrades to the national grid

Debate pack CDP 2024/0084, published Tuesday, 30 April, 2024

A debate pack published ahead of a Westminster Hall debate on pylons and upgrades to the national grid on Thursday 2 May 2024.

The UK Climate Change Act 2008 (2050 Amendment) target to be net zero in greenhouse gas emissions by 2050 will require significant increases in low carbon electricity generating infrastructure.

Each of the three transmission network operators in GB, National Grid ETS, SSEN and SP Energy Networks, are committed to delivering the recommendations set out in the Pathway to 2030 report. The report describes the major infrastructure projects either proposed or underway across Great Britain as part of upgrading the transmission network.

In addition to requirements for new electricity transmission infrastructure, developers of all types of low-carbon energy infrastructure have reported long lead times for connection to the GB electricity transmission or distribution networks.

This briefing describes the current transmission network, demand on the system and planned upgrades. It also sets out the planning frameworks across GB and proposals to compensate those affected by developments.

## Floating offshore wind and Allocation Round 6 of the Contracts for Difference scheme

Debate pack CDP 2024/0108, published Wednesday, 22 May, 2024

A debate pack published ahead of a Westminster Hall debate on

Thursday 23 May 2024 on Floating offshore wind and Allocation Round 6 of the Contracts for Difference scheme.

A floating wind turbine is an offshore wind turbine built on a floating platform, rather than on the seabed. Floating wind farms, made up of a group of floating wind turbines, can extend the range of marine locations where offshore wind can be deployed and take advantage of wind conditions that tend to be more favourable. The government have set a target to install up to 5 gigawatts of floating wind in the UK by 2030.

The government’s main support mechanism for commercial-scale low carbon electricity generation, including floating wind farms, is the Contracts for Difference (CfD) scheme. CfD contracts are awarded at yearly auctions, or allocation rounds, with the sixth allocation round (AR6) currently underway. Projects awarded CfD contracts are guaranteed a fixed ‘strike price’ for any electricity they generate.

## Debate on making Britain a clean energy superpower

Debate pack CDP 2024/0110, published Thursday, 25 July, 2024

A debate pack published ahead of a general debate on Making Britain a clean energy superpower in the Commons Chamber on 26 July 2024.

The UK’s energy system supplies its electricity, transport, heating and industrial needs. Energy policies focus on delivering three main objectives for the system: affordability, security of supply and sustainability.

“Clean” energy tends to refer to low-carbon energy technologies which are mainly used for generating electricity. The role of electricity is expected to increase with the increasing adoption of technologies such as heat pumps for heating and electric vehicles in transport.

The Labour Government, in its 2024 election manifesto, committed to making the UK a “clean energy superpower”. This was one of five “missions to rebuild Britain” and include policies such as launching a publicly-owned energy company (GB Energy), a National Wealth Fund, and a Warm Homes Plan.

## Debate on provision of cavity wall insulation under government grants

Debate pack 2024/0068, published Monday, 25 March, 2024

A debate pack published ahead of a Westminster Hall debate on provision of cavity wall insulation under government grants on 26 March.

The UK Government funds the installation of cavity wall insulation (CWI) with grants and also requires energy suppliers to provide insulation and energy efficient measures (mandated schemes). Most of the schemes are targeted at lower income households living in less energy efficient properties. Some schemes are taxpayer funded, others are delivered by energy suppliers and funded through a levy on energy bills.

The government has estimated that 14.8 million homes across Great Britain had cavity wall insulation at the end of 2022; 71% of homes with cavity walls.

The government has published guidance for householders who suspect they have had faulty cavity wall insulation installed at their properties and there are quality assurance schemes for government

mandated or funded installations and agencies providing guarantees for CWI.

There is no government compensation scheme for problems with CWI.

### **Debate on the Flood Recovery Framework**

Debate pack 2024/0072, published Wednesday, 10 April, 2024

A debate pack published ahead of a Westminster Hall debate on 17 April on the Flood Recovery Framework.

The Flood Recovery Framework is a central government scheme to support households and businesses in cases of severe flooding in England. It was established in 2017, and is the primary route for providing “swift, responsible financial support packages” to households and businesses impacted by severe flooding in England.

It is activated at Ministerial discretion in response to specific flood events, and as set out in the government’s Flood Recovery Framework guidance for local authorities in England, “it will be for ministers to determine when this support is made available and the eligibility criteria.”

This pack contains details of FRF funding and recent activations of the Framework, as well as recent PQs and links to further reading.

### **Artificial intelligence: A reading list**

Research Briefing CBP 10003, published Wednesday, 17 April, 2024

This briefing provides a selection of reading on artificial intelligence, including UK Government policy.

Artificial intelligence (AI) can take many different forms and there is no single, universally agreed, definition. The term is frequently used as a shorthand to refer to technologies that perform the types of cognitive functions typically associated with humans, including reasoning, learning and solving problems.

The UK does not have any AI-specific regulation or legislation covering the technology. Instead, AI is regulated in the context in which it is used, through existing legal frameworks, such as financial services legislation.

Some regulators, however, have oversight of the development, implementation, and use of AI more broadly. For example, the Information Commissioner’s Office (the UK’s independent body established to uphold information rights) has guidance on its website covering AI and data protection and explaining decisions made with AI.

The government has started developing a more comprehensive regulatory framework for AI. This has included publishing strategy documents and a white paper on AI.

### **Debate on ratification of the Global Ocean Treaty**

Debate pack 2024/0079, published Friday, 19 April, 2024

A debate pack published ahead of a Westminster Hall debate on 25 April on ratification of the Global Ocean Treaty. The subject for this debate was chosen by the Backbench Business Committee.

The Global Ocean Treaty aims to establish a legal mechanism for marine conservation in international waters, as well as afford other

protections to shared marine resources and the marine environment. This debate focuses on the ratification of the Treaty.

It was agreed by United Nations negotiators on 6 March 2023, following over almost ten years of negotiations. It has yet to be ratified by the required number of countries needed to enter into force.

This pack contains details of the Global Ocean Treaty negotiations and next steps, as well as recent Parliamentary material and links to further reading.

### **Debate on biodiversity loss**

Debate pack CDP 2024/0101, published Tuesday, 14 May, 2024

A debate pack published ahead of a Westminster Hall debate on 15 May on biodiversity loss.

The biosphere, upon which human life on the planet depends, is being altered to an unparalleled degree across the world according to Global Biodiversity Outlook 5 published in 2020. The report concluded that “nature is declining globally at rates unprecedented in human history and the rate of species extinctions is accelerating” with one million species under threat.

The five identified drivers for this biodiversity loss by the UN panel of scientific advisors are in order of importance: changes in land and sea use, climate change, pollution, direct exploitation of natural resources and the impact of invasive species.

This global biodiversity loss is also reflected in the state of nature in the UK. The UK has been highlighted as having some of the lowest biodiversity in Europe and the Western world. Researchers have concluded “while countries such as Canada and Finland have 89.3 and 88.6% of their biodiversity left intact, the UK only has 50.3% remaining.”

This pack contains information about UK international obligations and targets, biodiversity measures and targets including the State of Nature report, and farming, as well as recent Parliamentary material, news items and further reading.

### **The law on assisted suicide**

Research Briefing CBP 4857, published Thursday, 25 April, 2024

This briefing explains the law on assisted suicide in England and Wales. It examines recent parliamentary activity, developments in other legal jurisdictions, human rights challenges, and stakeholders’ views.

Warning: This briefing discusses issues around suicide which some readers may find distressing.

On 29 April 2024, the Commons debated an e-petition calling on the Government to allocate parliamentary time for a debate and vote on assisted dying. The petition was created by The Daily Express newspaper, which is running a campaign called “Give us our last rights”. The campaign is supported by Dignity in Dying and Dame Esther Rantzen.

There is no consensus on which terminology to use when debating the issue of whether people should be legally permitted to seek assistance with ending their lives. A range of terms are used, principally ‘assisted suicide’ and ‘assisted dying’, and the choice of term often reflects underlying views on the debate.

This paper focuses on the existing criminal law (in England and Wales) on assisting suicide, as set out in section 2(1) of the Suicide Act 1961. It also examines calls to change the law to allow terminally ill people to end their lives by self-administering life ending drugs that have been prescribed by a medical professional. The paper does not cover euthanasia, nor does it cover the legal and ethical aspects of end-of-life care such as the withdrawal or refusal of life-sustaining treatment or the administration of pain-relief.

The title of this paper – Assisted suicide – has been chosen as a legal term to reflect the wording of the section 2(1) criminal offence. The use of this term is not intended to endorse or reflect any particular stance on the debate about changing the law.

This paper also includes an overview of selected stakeholder views and the legal position in other jurisdictions.

### **Pet Abduction Bill 2023-24**

Research Briefing CBP 9929, published Thursday, 09 May, 2024

The Pet Abduction Bill is a private members' bill introduced into parliament by Anna Firth (Con) with the support of the government. The government supported the Bill and published Explanatory Notes and a Delegated Powers Memorandum alongside it.

There was no legislation aimed at addressing pet theft specifically. Animals fell under the definition of property in legislation, and as such pet theft was dealt with under the Theft Act 1968. Campaigners had called for stronger legislation that reflects the emotional value of pets to their owners and the distress associated with their theft.

The Pet Abduction Bill created two new criminal offences of dog abduction and cat abduction in England and Northern Ireland. These would carry a maximum prison sentence of five years. It would also provide powers to extend the legislation to cover other pets if necessary.

Second Reading of the Bill in the House of Commons took place on 19 January 2024. Committee Stage of the Bill took place 31 January 2024.

Remaining stages of the Bill in the House of Commons took place on 19th April 2024 where Bill was passed unamended. Second reading of the Bill in the House of Lords took place on 10 May 2024.

The Bill received Royal Assent on 24 May 2024.

### **Dogs (Protection of Livestock) (Amendment) Bill 2023-24**

Research Briefing CBP 9949, published Wednesday, 15 May, 2024

The Dogs (Protection of Livestock) (Amendment) Bill 2023-24 was introduced by Dr Therese Coffey MP on 11 December 2023. Remaining stages of the bill in the House of Commons took place on 17 May 2024, but the bill fell before going through its Lords stages.

The Dogs (Protection of Livestock) (Amendment) Bill was a Private Members' Presentation Bill, with government support, introduced by Dr Thérèse Coffey (Con) in the House of Commons on 11 January 2024. Explanatory Notes have been provided by the Department for Environment, Food and Rural Affairs (Defra) alongside the Bill.

Livestock worrying by dogs is currently covered by the Dogs (Protection of Livestock) Act 1953 (as amended)

### **Biodiversity loss: The UK's international obligations**

Insight article, published Thursday, 11 July, 2024

UK progress towards many of its biodiversity targets has been slow, with reducing pollution and restoring degraded ecosystems proving especially difficult.

This Insight looks at UK commitments to reducing biodiversity loss, within the context of the international Convention on Biological Diversity. In England, the Environment Act 2021 includes legally binding targets for the government that will help the UK to meet its international commitments.

The new Labour government has set nature recovery as one of the five priorities for the Department for Environment, Food and Rural Affairs (Defra). It has also stated that it intends to honour international agreements on biodiversity and that it will update the current Environment Improvement Plan.

### **Animal Welfare (Livestock Exports) Bill 2023-24**

Research Briefing 9912, published Monday, 22 July, 2024

The Animal Welfare (Livestock Exports) Act 2024 received Royal Assent on 20 May 2024 (prior to the General Election). It makes it an offence to export livestock from or through Great Britain for slaughter outside the British Islands.

It was introduced by the previous government to the House of Commons on 4 December 2023 as a bill to make provision to prohibit the export of certain livestock from Great Britain for slaughter outside the British Islands. Second reading took place on 18 December 2023 and committee stage, consideration and third reading took place on 15 January 2024. The Bill was passed unamended by the Commons.

### **New approaches to farm funding in England**

Insight, published Tuesday, 28 May, 2024

New funding schemes aim to balance food production with protecting the environment, and are expected to be fully rolled out by 2027.

Following the UK's departure from the EU and its common agricultural policy (a system of farm subsidies and other programmes), the government is introducing the most significant changes since the 1940s in how it supports farmers financially.

This Insight explains the changes, which aim to support food production and improve the environment, and how they have been received by farmers, environmental groups and political parties at a time of rising pressures on farm costs and consumer budgets.

### **How do farming schemes in Wales and England compare?**

Research Briefing CBP 10062, published Wednesday, 24 July, 2024

How do Welsh and English farming schemes compare? This guest briefing by a House of Commons Library researcher was published by Senedd Research to explore the key similarities and differences of new farm support schemes.

Leaving the EU in 2020 meant the UK could find new ways to

support farmers financially after decades under EU Common Agricultural Policy (CAP) rules.

Agriculture is a devolved matter: each nation is taking its own approach, at its own pace. New and developing Welsh and English farm support schemes share the aim of promoting sustainable farming practices, but through different mechanisms and incentives. Both the UK Government and the Welsh Government say their new approaches recognise that producing food and protecting the environment go hand in hand.

### **Tobacco and Vapes Bill**

Research Briefing CBP 9992, published Wednesday, 10 April, 2024

This Bill would have prohibited the sale of tobacco to people born on or after 1 January 2009, and enable product requirements to be imposed in connection with tobacco, vapes and other products.

The Tobacco and Vapes Bill 2023-24 was introduced to fulfil a series of government proposals to create a 'smokefree generation' and reduce the appeal and availability of vapes to young people.

These proposals were set out in the previous government's policy paper; *Stopping the start: our new plan to create a smokefree generation*.

The Bill was introduced to the Commons on 20 March 2024, and had its second reading on 16 April 2024.

This briefing examines the provisions in the Bill and what they would have done, although it does not discuss clauses with only a minor or technical effect. Further Library research is available on our tobacco and vaping hub.

### **Debate on the Covid-19 pandemic response and trends in excess deaths**

Debate pack CDP 2024/0071, published Monday, 15 April, 2024

A debate pack published ahead of a general debate on the Covid-19 pandemic response and trends in excess deaths on 18 April in the Commons Chamber.

Excess deaths are typically measured as the difference between the observed number of deaths within a period compared with the five-year average.

Mortality data published over the last four years shows a general increase in excess deaths. For the quarter ending September 2023, the number of deaths in England and Wales was 2.1% above the five-year average.

The Library briefing, *Trends in excess deaths*, provides further discussion.

In May 2021, the then Prime Minister, Boris Johnson, announced that the UK Government would establish an independent public inquiry into the Covid-19 pandemic.

The terms of reference to the Inquiry set out that the Inquiry would examine, consider and report on preparations and the response to the pandemic in England, Wales, Scotland and Northern Ireland.

### **What is the proposed WHO Pandemic Preparedness Treaty?**

Research Briefing CBP 9550, published Thursday, 16 May, 2024

The WHO is negotiating a treaty on pandemic preparedness. The

briefing outlines what has been proposed, how it relates to the International Health Regulations, where negotiations are up to, and what comes next.

In March 2021, a group of world leaders, including then UK Prime Minister Boris Johnson, announced an initiative for a new treaty on pandemic preparedness and response. This initiative was taken to the World Health Organization (WHO) and has been negotiated, drafted, and debated by a newly-established Intergovernmental Negotiation Body.

### **Climate change adaptation and resilience in the UK**

Research Briefing CBP 9969, published Wednesday, 27 March, 2024

This briefing explains the targets for climate change adaptation in the UK, the current policy approach, and an overview of progress.

Climate change adaptation refers to the actions required to manage the effects of unavoidable expected climate change. Mitigation refers to actions to prevent or reduce greenhouse gas emissions to address the underlying causes of climate change.

The United Nations Framework Convention on Climate Change (UNFCCC) defines adaptation as "adjustments in ecological, social or economic systems" in response to actual and expected climate change.

This briefing provides an overview of the legislation, targets and governance that underpin adaptation in the UK, the current mechanisms and policy approach, and an overview of progress. It also sets out current adaptation action across key areas, including stakeholder commentary on this progress.

### **A new precedent for climate change in human rights law**

Insight, published Wednesday, 01 May, 2024

The European Court of Human Rights ruled against the Swiss Government, creating a precedent that might encourage future climate litigation.

In April 2024, the European Court of Human Rights (ECtHR) ruled that the Swiss Government's climate policies violated human rights.

The judgment said that the right to a private and family life meant that states are obliged to protect their citizens from the "serious adverse effects" of climate change.

This Insight covers what evidence was used, how human rights may have been violated, and implications of the judgment on future legal action.

### **Sewerage connections for new housing developments in England**

Constituency casework, published Thursday, 16 May, 2024

Information about water and sewerage services for proposed and new housing developments, covering planning permission, regulations for new builds and options for drainage connections, as well as sources of help for constituents.

This casework article provides information about water and sewerage services for proposed and new housing developments. It covers planning permission, regulations for new builds and options for drainage connections, and what constituents can do if they are concerned about a drainage connection.



## Sewage discharges

Research Briefing CBP 10027, published Friday, 24 May, 2024

This briefing sets out information on sewage discharges. It focuses on England. It covers what sewage discharges are, why these happen, legislation and targets, and an overview of progress.

Sewage discharges are the release of raw, untreated sewage into watercourses, such as rivers. These discharges often take place through storm overflow valves, designed to release water from the sewer network when the volume of water is too great for it.

Some use of storm overflows is permitted, to avoid the sewer network becoming overwhelmed and risking sewage backing up into homes and businesses. However, it has been alleged that many water companies are using storm overflows far more regularly than they ought to.

All UK political parties have expressed a desire to decrease the volume of sewage entering the UK's watercourses, but several factors (including the design of the sewage network, the regulatory process, and the enforcement capacity of environmental regulators) make this difficult to achieve.

## The UK and the US\$100 billion climate finance goal

Research Briefing CBP 9999, published Thursday, 11 July, 2024

In 2022 industrialised countries achieved a 2009 pledge to provide US\$100 billion annually to low income states to help them respond to climate change.

This briefing explains what international climate finance (ICF) is, progress on the US\$100 billion goal, UK Government actions, and the potential successor to the goal, which is expected to be in place from 2025.

## Medicines shortages

Research Briefing CBP 9997, published Wednesday, 01 May, 2024

Pharmacies in the UK dispense millions of prescription items each year. Since 2021 there have been reports of increasing supply problems affecting medicines. Recent media coverage has highlighted shortages of medicines used to treat diabetes, attention deficit hyperactivity disorder (ADHD) and epilepsy, as well as hormone replacement therapy (HRT) and others.

This briefing provides information on the causes and consequences of medicines shortages in the UK and internationally, and the UK Government's approach to address supply problems.

## Antimicrobial resistance

Research Briefing CBP 8141, published Friday, 10 May, 2024

Antimicrobial resistance (AMR) is a significant threat to public health. This briefing provides information on the causes and implications of the development and spread of AMR and sets out UK and international action to address it.

Antimicrobial resistance (AMR) happens when antimicrobial medicines are no longer effective in killing or slowing the growth of microorganisms that cause disease. This makes infections harder to treat and increases the risk that diseases will spread.

Antimicrobial medicines include antibiotics, antivirals, antifungals and antiparasitics. AMR affects all four categories of antimicrobials.

The development and spread of AMR are accelerated by the inappropriate use of medicines (for example, prescribing antibiotics to treat a viral infection), use of low-quality medicines and poor infection control. The widespread use of antimicrobials in agriculture has also been implicated, and accumulating evidence suggests that resistance that develops in farmed animals or in the natural environment can spread to humans.

Besides humans, AMR affects animal health and the wider environment, and has implications for food security, environmental wellbeing and socio-economic development. In March 2017, the World Bank Group estimated that the effects of AMR could reduce annual global gross domestic product by between 1.1% and 3.8% by 2050.

## Hormone pregnancy tests

Research Briefing CBP 10079, published Thursday, 15 August, 2024

Pregnancy tests that involved taking tablets containing hormones were used from the late 1950s until the 1970s in the UK. The use of these medicines has been linked to birth abnormalities but the evidence is disputed.

Hormone pregnancy tests, such as Primodos, were widely used in the UK from the late 1950s until the 1970s. These pregnancy tests involved taking tablets containing synthetic hormones to see if they would induce bleeding (like a period). If no bleeding occurred, the test was positive.

From the late 1950s onwards, clinicians and researchers raised concerns about a potential link between mothers' use of hormone pregnancy tests and children being born with congenital abnormalities. Although the evidence was not considered conclusive, the Committee on Safety of Medicines (which advised the UK medicines licencing authority at the time) issued alerts in 1975 and 1977 advising that hormone pregnancy tests should no longer be used. However, hormone pregnancy tests continued to be used in the UK after this date.

In July 2020, the report of the Independent Medicines and Medical Devices Safety Review, First Do No Harm, concluded that hormone pregnancy tests should not have been available from 1967 onwards. The review found that regulatory action on hormone pregnancy tests was inadequate and that medicines regulators had failed to prevent the continued use of tests after safety concerns were raised.

## Call-in of planning applications (England)

Research Briefing CBP 00930, published Thursday, 04 April, 2024

This briefing sets out the Secretary of State's powers in England to 'call-in' planning applications and 'recover' planning appeals. It also covers the planning powers of the Mayor of London.

Under section 77 of the Town and Country Planning Act 1990, the Secretary of State for Levelling Up, Housing and Communities can 'call-in' any planning application for their own determination. This means the Secretary of State, rather than the local planning authority (LPA), will decide the outcome of the application.

The Secretary of State can call-in a planning application at any time until the LPA has formally issued its decision on the application.

In theory, the Secretary of State can call-in a planning application for any reason (until the LPA has formally issued its decision on the application). In practice, very few applications are called-in every year. Between 2010/11 and 2022/23, the Secretary of State called-in 198 planning applications in total.

Cases that may be called-in include those that may conflict with national policies or those that could have significant effects beyond their immediate locality. Each case is considered on its individual merits.

Anyone can ask for an application to be called-in. The request does not have to be made by an MP. The final decision on whether to call-in an application rests with the Secretary of State.

### **Planning appeals (England)**

Research Briefing 6790, published Thursday, 04 April, 2024

This briefing provides information about planning appeals in England. It also sets out other routes of redress for people unhappy with planning decisions.

There is no third-party right of appeal. This means neighbours or other third parties who object to a planning application cannot appeal that decision. Only applicants (and their representatives) can appeal a planning decision.

Applicants can appeal if a local planning authority (LPA) refused planning permission or if the LPA did not determine an application within statutory time limits or if the LPA granted planning permission but subject to 'unreasonable' conditions. Further information on the grounds for appeal is set out in the briefing.

Most appeals are handled by the Planning Inspectorate, an executive agency of the Department for Levelling Up, Housing and Communities (DLUHC). However, the Secretary of State has the power to determine an appeal instead of allowing a planning inspector to make the decision. This is called a 'recovered' appeal.

### **Fire safety in houses and flats**

Research Briefing CBP 9770, published Thursday, 02 May, 2024

In October 2023, new fire safety requirements for blocks of flats took effect in England. They are part of the government response to the Grenfell Tower fire.

The fire safety of houses and blocks of flats is governed by different regimes at different points in time:

During design and construction, requirements for the fire safety of buildings are set by the Building Act 1984 and the Building Regulations 2010. New buildings must be designed and constructed to limit the spread of fire and to help occupants escape in the event of a fire.

Once the building is occupied, the building's owner or manager becomes the 'responsible person' for fire safety under the Fire Safety Order 2005. They have to carry out fire risk assessments and, if necessary, put safety measures in place. The Order applies only to the communal areas of blocks of flats and houses in multiple occupation, not to individual flats or houses.

Building regulations and fire safety are devolved matters. This briefing focuses on England; for further information about fire safety laws in the devolved administrations, see section 7 of this briefing.

### **Gypsies and Travellers: Planning provisions in England**

Research Briefing SN07005, published Wednesday, 08 May, 2024

This briefing sets out how local authorities should plan for Gypsy and Traveller sites and what permissions Gypsy and Traveller sites need.

The government's planning policies for Gypsy and Traveller sites (areas where Gypsies and Travellers can station caravans and mobile homes), are set out in its planning policy for Traveller sites (first published in 2012 and updated in 2015 and December 2023). Local planning authorities must prepare their local plans (in which they set out their policies for the development and land use in their area) in line with the policy. The policy is also a 'material consideration' in planning decisions.

The policy states that each local planning authority should assess the need for sites to accommodate Gypsies and Travellers in its area. If it identifies a local need, a local planning authority should set targets for the number of Gypsy and Traveller sites and identify land suitable for these sites.

If local planning authorities are unable to demonstrate a five-year supply of specific, deliverable sites, the government states that they should grant planning permission to sites that come forward unless the land is protected.

### **Fire safety rules for blocks of flats since the Grenfell Tower fire (England)**

Constituency casework, published Tuesday, 14 May, 2024

Following the Grenfell Tower fire in 2017, the government introduced new fire safety rules, including new rules for high-rise blocks of flats that are at least 18 metres or seven storeys high. The government also created a new body, the Building Safety Regulator (BSR), to enforce these rules.

The new rules took effect between October 2023 and April 2024.

### **Planning for solar farms**

Research Briefing CBP 7434, published Monday, 20 May, 2024

This briefing covers planning policy for solar farms in England and the devolved administrations and commentary on the use of agricultural land for solar farms.

The government set a legally binding target to reduce the UK's greenhouse gas emissions by 100% by 2050, compared with 1990 levels. This is known as the 'net zero target'. To meet this target, the government has set the aim of "a fully decarbonised, reliable and low-cost power system by 2035".

The government said a fully decarbonised power system would be "composed predominantly of wind and solar". It aims to achieve 70 gigawatt (GW) of solar power by 2035 (up from 15.8 GW as of March 2024).

Solar farms usually require planning permission. The size of a solar farm will determine which body decides the application.

### **Planning enforcement (England)**

Research Briefing SN01579, published Thursday, 23 May, 2024

This briefing describes the powers of local planning authorities in England to enforce planning law. It also discusses recent changes to these powers.

Planning permission from the local planning authority is usually needed to undertake development (that is, to carry out building works and/or to 'materially' change how a property is used).

Failure to obtain planning permission where it is required or to adhere to conditions attached to planning permission constitutes a 'planning breach'.

A local planning authority is not required to take enforcement action if it discovers planning breach. It may invite the individual or developer to submit a retrospective planning application.

If local planning authorities decide to take enforcement action, they have a range of enforcement powers they can use to respond to planning breaches.

For example, a local planning authority can use an enforcement notice to require a developer to address a planning breach; this might involve stopping works or removing a building from land.

There are time limits on enforcement action. A local planning authority can take enforcement action within ten years of when a breach occurred.

### **Revocation of planning permission**

Research Briefing SN00905, published Monday, 08 July, 2024

This briefing provides information on the rarely-used powers of local planning authorities and the Secretary of State to revoke planning permission.

Section 97 of the Town and Country Planning Act 1990 gives local planning authorities in England and Wales the power to revoke or modify planning permission. The Secretary of State also has the power to revoke or modify planning permission under section 100 of the 1990 Act.

Planning authorities in Scotland and councils in Northern Ireland have similar powers to revoke or modify planning permission. Scottish Ministers and the Department for Infrastructure in Northern Ireland also have powers to revoke or modify planning permission.

The Town and Country Planning Act 1990 states that local planning authorities and the Secretary of State can revoke or modify planning permission if they consider it "expedient" to do so. It does not set out under which circumstances it may be "expedient" to revoke planning permission or set restrictions on the use of these powers.

### **Planning for nationally significant infrastructure projects**

Research Briefing SN06881, published Monday, 08 July, 2024

This briefing sets out the decision-making rules for nationally significant infrastructure projects. They require a type of consent called development consent.

Major infrastructure projects relating to energy, transport, water and waste are classed as 'nationally significant infrastructure projects' (NSIPs). Under the Planning Act 2008, they require 'development consent' from the relevant Secretary of State.

The NSIP regime applies primarily to major infrastructure projects in England and to a limited extent in Wales.

The threshold above which major infrastructure projects are considered NSIPs is set out in part 3 of the Planning Act 2008. For example, onshore generating stations are classed as NSIPs if they have a capacity over 50 megawatts.

Since 2013, business and commercial projects can also opt-in to the NSIP regime if the Secretary of State decides they are of 'national significance'.

The Planning Inspectorate will examine, and the Secretary of State will decide, applications for DCOs in line with national policy statements. National policy statements set out the government's objectives for NSIPs relating to energy, transport, water and waste.

### **Building regulations and safety**

Research Briefing CBP 8482, published Monday, 08 July, 2024

This briefing discusses building regulations and standards for building safety as well as the government's response to the Grenfell Tower fire.

Building regulations set standards for construction and refurbishment work in England. The Grenfell Tower fire in June 2017 led to changes to the rules and processes governing building safety.

In response, the government passed the Building Safety Act 2022. The 2022 Act created new rules for the construction, refurbishment and occupation of high-rise residential buildings (that are 18 or more metres high or have seven or more storeys). The new rules took effect between October 2023 and April 2024.



## Housing and net zero

Research Briefing CBP 8830, published Monday, 08 July, 2024

This briefing considers the approach to housing, energy efficiency and net zero, providing an overview of government policy and commentary on these issues.

Residential buildings are a significant source of carbon emissions in the UK. Reducing carbon emissions from new and existing homes is therefore part of strategies to meet the UK's net zero target.

The government has set a legally binding target to reduce the UK's net emissions by 100% by 2050 compared with 1990 levels. This is known as the 'net zero target'.

In 2022, emissions from residential buildings accounted for a fifth (20%) of greenhouse gas emissions in the UK. The Climate Change Committee (CCC), the government's advisory body, said the UK will not meet its emissions targets "without near complete decarbonisation of the housing stock".

### Developer contributions

Research Briefing CBP 7200, published Wednesday, 10 July, 2024

This briefing explains how local planning authorities in England can secure developer contributions: through section 106 agreements and the community infrastructure levy.

Local planning authorities (LPAs) have two ways to secure contributions from developers to mitigate the impact of new development on local infrastructure and to deliver affordable housing:

LPAs can negotiate section 106 agreements with developers, requiring them to deliver certain 'planning obligations'. The specifics of a section 106 agreement and the obligations set out within it are negotiable.

LPAs can also choose to (but are not required to) impose a community infrastructure levy (CIL) on development in their area. Developers must pay the CIL in those areas where it is in force (subject to exemptions).

### Cybersecurity in the UK

Research Briefing CBP 9821, published Wednesday, 08 May, 2024

This briefing provides an overview of cybersecurity in the UK. It explains the nature of the cyber threat, including how cyber attacks work. It describes the policy and regulatory frameworks, as well as areas of reform such as 'ethical hacking'.

Cybersecurity is the practice of protecting IT systems, devices, and the data they hold from unauthorised access and interference (known as cyber attacks).

This briefing focuses on policy and legislative efforts to improve the UK's cybersecurity. It does not discuss cyber in the context of military operations.

### Getting better broadband

Constituency casework, published Wednesday, 08 May, 2024

This article addresses some frequently asked questions about access to full fibre broadband in the UK.

Full fibre, also known as 'fibre-to-the-premises' (FTTP), is the next generation of broadband. It is capable of 'gigabit' download speeds, meaning speeds of at least 1,000 megabits per second (Mbps), or 1 gigabit per second (Gbps).

Full fibre is an upgrade over the previous generation of 'part-fibre' broadband, known as 'fibre-to-the-cabinet' (FTTC), which is capable of speeds of around 30 to 80 Mbps.

Some telecoms companies have, in the past, advertised FTTC as 'fibre broadband'. Ofcom, the regulator, no longer allows this as consumers might mistakenly believe they are purchasing full fibre.

### Broadband in flats: The urban digital divide

Insight, published Wednesday, 15 May, 2024

Residents in urban flats often face poor broadband services. Some in the industry have argued that broadband companies should be given easier access to flats.

Discussions on access to broadband typically focus on the urban-rural divide, as rural parts of the UK often have poorer connectivity. However, there are pockets of poor broadband provision in many UK towns and cities, primarily in areas with lots of buildings that contain multiple residential properties, from converted houses to large blocks of flats.

To improve access to broadband, the government has a target for 85% of UK premises to have access to gigabit broadband by the end of 2025. Gigabit broadband refers to any technology capable of download speeds of 1,000 megabits per second. This is compared with around 30 to 80 megabits per second for older-generation broadband.

This Insight explains why these urban areas may have slow broadband and the proposals to change the law to address this issue.

### The withdrawal of landlines and switch to digital calls

Research Briefing CBP 9471, published Thursday, 23 May, 2024

This briefing addresses frequently asked questions about the switch of traditional landline phones to digital, Voice over Internet Protocol (VOIP) services.

Over the next few years, landline telephone services in the UK will switch to a fully digital network. The existing network, called the Public Switched Telephone Network (PSTN), will be withdrawn. The PSTN is an aging network that is becoming harder and more expensive to maintain. Calls will be carried over the broadband network instead.

The withdrawal of the PSTN is industry-led. It is not the direct result of government policy. Decisions on migrating customers are made by the companies that operate and provide services on the network. For example, BT's new home phone service for digital calls is called Digital Voice. ■



# PARLIAMENTARY OFFICE OF SCIENCE AND TECHNOLOGY (POST)

## AUTUMN 2024

Oliver Bennett MBE and Yasmin McNeil

The Parliamentary Office of Science and Technology (POST) works to bring the best available research evidence to bear on the legislative process and scrutiny of Government.

This update provides information on a major new project to enhance the use of evidence in parliament, the Thematic Research Leads, and lists recent and ongoing research projects that stakeholders are invited to contribute to.

### Parliamentary Thematic Research Leads

Over 2023, POST and ESRC piloted a new role in UK Parliament: the Thematic Research Lead (TRL).

Based on the concept of Chief Scientific Advisers, TRLs are mid-career academics who bring their impartial expertise, extensive policy knowledge and strong network of research connections to a variety of teams in and out of parliament. They work for three days each week in parliament, while continuing their role in their own academic institution.

Evidence suggests that the first 3 pilot TRLs made a huge positive impact. As a result, over 2024-26, parliament will partner with UKRI to expand parliament's network of TRLs across a wider range of 8 academic disciplines and policy areas.

The 8 new TRLs will join parliament in September 2024. They are:

- AI and Digital – Dr Varuna De Silva, Loughborough University
- Arts and Humanities – Dr Helen McCabe, University of Nottingham
- Business, Economics and Trade – Dr Jane Parry, University of Southampton
- Climate and Environment – Dr Andrew Russell, Queen Mary University London
- Crime and Justice – Dr Ruth Lamont, University of Manchester
- Health – Dr David Strain, University of Exeter
- International Affairs and National Security – Dr Leslie-Anne Duvic-Paoli, King's College London
- Transport – Dr Louise Reardon, University of Birmingham

The new TRLs will work with a wide range of staff from across POST, the House of Commons Library and select committee teams to act as a bridge between Parliament and the research community, significantly enhancing the use of high-quality research evidence in scrutiny and debate.

The TRLs will conduct three primary activities:

- provide strategic support for the production and delivery of research evidence for parliament, within a broad policy area
- deliver activities to support the development of a research and innovation landscape that facilitates and encourages knowledge exchange between parliament and the research community
- participate in a network of Thematic Research Leads to share intelligence and insights across policy areas

Parliament's 3 pilot TRLs took up their position in January 2023 and remained in these ESRC-funded roles until Summer 2024. Select the links to find out more about their roles as TRLs:

- Professor Tamsin Edwards, Thematic Research Lead on Climate and Environment (and Professor in Climate Change, King's College London)
- Professor Kristen A Harkness, Thematic Research Lead on International Affairs and National Security (and Senior Lecturer and Director of the Institute for the Study of War and Strategy, University of St Andrews)
- Professor Rick Whitaker, Thematic Research Lead on Parliament, Public Administration and Constitution (and Professor in Politics, University of Leicester)

## RECENTLY PUBLISHED RESEARCH WORK

POST research is published on our website. POST research produced since March 2024 includes:

- Trust in News Providers
- Enhanced rock weathering: Potential UK greenhouse gas removal
- Digital disengagement and impacts on exclusion
- Automated vehicles
- Reducing plastic waste
- What is the metaverse and what impacts will it have for society?

### Ongoing and future projects

Over the coming months, POST will work on a range of projects, including:

- Public health impacts of 20mph speed limits and zones
- Personalised medicines: Inherited blood diseases
- North Sea Decommissioning
- Collation, use and potential misuse of biometric data
- Housing insecurity in the private rented sector – social and community impacts
- Support for neurodivergent children and young people

POST will announce a new round of research projects in October 2024. Stakeholders are encouraged to contact POST if they would like to engage with this research.

Please subscribe on our website to receive alerts about these projects and our other work.

## THE POST BOARD

The POST Board oversees POST's objectives, outputs and future work programme. It meets quarterly. Following the election, Members from the House of Commons will be appointed over the coming months.

### Officers

- Chair: To be announced
- Vice-Chair: Professor the Lord Winston, FMedSci, FRSA, FRCP, FRCOG, FREng

### House of Commons Members

- To be announced (x5)

### House of Lords Members

- Baroness Brown of Cambridge
- Lord Haskel
- Lord Ravensdale

### Representatives from the research community

- Professor Elizabeth Fisher, FMedSci
- Paul Martynenko, FBCS
- Professor Sir Bernard Silverman, FRS, FACSS
- Professor Susan Owens

### Representatives from parliamentary teams

- Oliver Bennett MBE, Head of POST
- Grant Hill-Cawthorne, House of Commons Librarian and Managing Director of Research & Information
- Ariella Huff, Select Committee Team, House of Commons
- Xameerah Malik, Head of Science and Environment Section, House of Commons Library

- Amy Creese, Clerk of Select Committees, House of Lords
- Oliver Bennett MBE **Head of POST**

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## HOUSE OF COMMONS SELECT COMMITTEES

At the time of going to press MPs were in the process of electing the Chairs of the Select Committees in the new Parliament.

We will provide a full list of the Chairs and Members of the respective Committees, concerned with STEM, and their Inquiries,

plus those of the House of Lords Science and Technology Committee, in the Winter edition of Science in Parliament.

Leigh Jeffes, Editor.

### APRIL DISCUSSION MEETING, IN PARTNERSHIP WITH THE SOCIETY OF CHEMICAL INDUSTRY



L-R: **Viscount Stansgate**, President, P&SC; **Dr Natasha Boulding**, Founder and CEO of Low Carbon Materials; **Sharon Todd**, CEO, SCI; **Liz Rowsell** OBE, Corporate R&D Director, Johnson Matthey plc; **Daphne Vlastari**, Head of Communications and Government Relations UK & Ireland BASF and **Stephen Metcalfe MP**, Chair, P&SC.

### STEM FOR BRITAIN 2024 WESTMINSTER MEDAL WINNER



L-R: **Stephen Metcalfe MP**; **Viscount Stansgate**; **Sharon Todd**, CEO, SCI (Sponsor of the Westminster Medal); **Kyle Greenland**, Imperial College London, Westminster Medal Winner 2024; **Sue Wharton**, STEM for BRITAIN and **Professor Harry Kelly**, Programme Director GSK, University of Strathclyde.

### STEM FOR BRITAIN 2024 GOLD WINNERS



L-R: **Viscount Stansgate**; **Maciej Walerowski**, University of Southampton, Chemistry Gold; **Anna Weatherburn**, Durham University, Engineering Gold; **Kyle Greenland**, Imperial College London, Biosciences Gold; **Cristina Ruiz Villena**, National Centre for Earth Observation, University of Leicester, Physics Gold; **Daniel Gardham**, University of Surrey, Maths Gold and **Stephen Metcalfe MP**.

# SCIENCE DIRECTORY

## UK Research and Innovation

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Big challenges demand big thinkers - those who can unlock the answers and further our understanding of the important issues of our time. Our work encompasses everything from the physical, biological and social sciences, to innovation, engineering, medicine, the environment and the cultural impact of the arts and humanities. In all of these areas, our role is to bring together the people who can innovate and change the world for the better. We work with the government to invest over £7 billion a year in research and innovation by partnering with academia and industry to make the impossible, possible. Through the UK's nine leading academic and industrial funding councils, we create knowledge with impact.



Website: [www.ahrc.ukri.org](http://www.ahrc.ukri.org)

AHRC funds outstanding original research across the whole range of the arts and humanities. This research provides economic, social and cultural benefits to the UK, and contributes to the culture and welfare of societies around the globe.



Website: [www.bbsrc.ukri.org](http://www.bbsrc.ukri.org)

BBSRC invests in world-class bioscience research and training. This research is helping society to meet major challenges, including food security, green energy and healthier, longer lives and underpinning important UK economic sectors, such as farming, food, industrial biotechnology and pharmaceuticals.



Website: [www.esrc.ukri.org](http://www.esrc.ukri.org)

ESRC is the UK's largest funder of research on the social and economic questions facing us today. This research shapes public policy and contributes to making the economy more competitive, as well as giving people a better understanding of 21st century society.



Website: [www.epsrc.ukri.org](http://www.epsrc.ukri.org)

EPSRC invests in world-leading research and postgraduate training across the engineering and physical sciences. This research builds the knowledge and skills base needed to address scientific and technological challenges and provides a platform for future UK prosperity by contributing to a healthy, connected, resilient, productive nation.



Website: [www.ukri.org/councils/innovate-uk/](http://www.ukri.org/councils/innovate-uk/)

Innovate UK drives productivity and economic growth by supporting businesses to develop and realise the potential of new ideas, including those from the UK's world-class research base. They connect businesses to the partners, customers and investors that can help them turn these ideas into commercially successful products and services, and business growth.



Website: [www.mrc.ukri.org](http://www.mrc.ukri.org)

MRC is at the forefront of scientific discovery to improve human health. Its scientists tackle some of the greatest health problems facing humanity in the 21st century, from the rising tide of chronic diseases associated with ageing to the threats posed by rapidly mutating micro-organisms.



Website: [www.nerc.ukri.org](http://www.nerc.ukri.org)

NERC is the driving force of investment in environmental science. Its leading research, skills and infrastructure help solve major issues and bring benefits to the UK, such as affordable clean energy, air pollution, and resilience of our infrastructure.



Website: [www.re.ukri.org](http://www.re.ukri.org)

Research England creates and sustains the conditions for a healthy and dynamic research and knowledge exchange system in English universities. Working to understand their strategies, capabilities and capacity; supporting and challenging universities to create new knowledge, strengthen the economy, and enrich society.



Website: [www.stfc.ukri.org](http://www.stfc.ukri.org)

STFC is a world-leading multi-disciplinary science organisation. Its research seeks to understand the Universe from the largest astronomical scales to the tiniest constituents of matter, and creates impact on a very tangible, human scale.

# SCIENCE DIRECTORY



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AIRTO, the Association of Innovation, Research and Technology Organisations, comprises approximately sixty principal organisations operating in the UK's Innovation, Research and Technology (IRT) sector. The IRT sector has a combined turnover of £6.9Bn, employs over 57,000 people and contributes £34Bn to UK GVA. AIRTO's members work at the interface between academia and industry, for both private and public sector clients. Members include independent Research and Technology Organisations, Catapult Centres, Public Sector Research Establishments, National Laboratories, some university Technology Transfer Offices and some privately held innovation companies.

## Applied Microbiology International

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Applied Microbiology International believes that global challenges need to be solved by global, interdisciplinary experts who apply their diverse experience and unique voices to achieve a common goal. Because of this, we're a truly inclusive, international organisation. With a strong focus on influencing international policy, we are organised around seven goals which align with core UN Sustainable Development Goals and encourage partnership between industry and academia to increase our impact. At Applied Microbiology International we publish the leading industry magazine, *The Microbiologist*, and in partnership with Wiley and Oxford University Press, we publish six internationally acclaimed journals.



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For over 70 years, AWE has supported the UK Government's nuclear defence strategy and Continuous At Sea Deterrence. On behalf of the Ministry of Defence, AWE manufactures, maintains and develops the UK's nuclear warheads, and applies its unique expertise to support nuclear threat reduction and to protect national security. The company provides guidance to UK military and police counter-terrorism teams, as well as emergency response in the event of nuclear or radiological incidents.



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

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



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 Twitter: @BESPolicy

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

## British In Vitro Diagnostics Association (BIVDA)

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



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

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



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BSAC is a learned society whose members are among the world's leading infectious disease physicians, pharmacists, microbiologists, and nurses.

With more than 45 years of leadership in antibiotic research and education, BSAC is dedicated to saving lives by fighting infection. It does this by supporting a global network of experts via workshops, conferences, evidence-based guidelines, e-learning courses, and its own high-impact international journal.

BSAC also provides national surveillance and susceptibility testing programmes, an outpatient parenteral antimicrobial therapy (OPAT) initiative, research and development grants, and the secretariat for the All-Party Parliamentary Group on Antibiotics.

BSAC has members in 40 nations and active learners in more than 135 countries.



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The British Society for Immunology is the leading UK charity representing scientists and clinicians who study the immune system in humans and animals. As a membership organisation, we act as a focal hub for the immunology community, supporting and empowering immunologists working in academic, industry and clinical settings to drive forward scientific discovery and application. We aim to harness the knowledge generated by our membership to ensure society is aware of and can gain from the health benefits that immunology research can deliver.



# SCIENCE DIRECTORY



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The British Society of Animal Science (BSAS), the principal body for animal science in the UK, was established in 1944. We work globally with members and partners to shape the future of animal science, supporting the advancement of responsible, environmentally and economically sustainable animal production, addressing issues such as the role of animal science in resolving the world's food crisis. BSAS disseminates research findings to ensure practical and beneficial application of positive outcomes to include livestock, animal health and welfare, the care of equine, companion, and zoo animals.



**BRITISH SOCIETY  
OF SOIL SCIENCE**

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The British Society of Soil Science (BSSS) was founded in 1947 and is an established international membership organisation and charity committed to the study of soil in its widest aspects. The society brings together those working within academia, practitioners implementing soil science in industry and all those working with, or with an interest in soils.

We promote research and education, both academically and in practice, and build collaborative partnerships to help safeguard our soil for the future. This includes hosting the World Congress of Soil Science 2022 in Glasgow, where those with an interest in soil science can meet to discuss the critical global issues relating to soil.



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

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

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

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

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

**Cavendish  
Laboratory**



**UNIVERSITY OF  
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The Cavendish Laboratory houses the Department of Physics of the University of Cambridge.

The research programme covers the breadth of contemporary physics

**Extreme Universe:** Astrophysics, cosmology and high energy physics

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

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

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

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



**Chartered Institute  
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Our vision is integrated design to improve life, wellbeing and performance through science, engineering, technology and psychology. The Institute is one of the largest in the world representing the discipline and profession of Human Factors and Ergonomics. We have sector groups in most industries from defence to aviation and pharmaceuticals that provide expert advice to industry and government. We accredit university courses and consultancy practices and work closely with allied learned societies.



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

**CLIFTON SCIENTIFIC  
Trust**

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Website: [www.clifton-scientific.org](http://www.clifton-scientific.org)

We bring school students and their teachers

- to work closely with scientists and engineers
  - to experience science as a creative, questioning, team exploration
  - to add real-life meaning and motivation, from primary to post-16
  - internationally to build global awareness and experience science as a cultural bridge
  - to build transferable skills for employability and citizenship
- Two powerful Exemplars**

• Post-16; our unique **UK-Japan Young Scientist Workshop Programme** hosted in universities in England and Japan since 2001

• Primary; our local **Meet-a-Medic Programme** since 2005  
Clifton Scientific Trust Ltd is registered charity in England and Wales 1086933



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

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



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The Francis Crick Institute is an independent charity, established to be a UK flagship for discovery research in biomedicine.

The Crick's mission is discovery without boundaries. We don't limit the direction our research takes. We want to understand more about how living things work to help improve treatment, diagnosis and prevention of human disease, and generate economic opportunities for the UK.

In our institute more than 2,000 staff and students use their wide-ranging knowledge and expertise to work across disciplines and explore biology at all levels, from molecules through cells to entire organisms.

# SCIENCE DIRECTORY



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



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



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

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



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GAMBICA is the voice of the laboratory technology, instrumentation, control and automation industries, providing influence, knowledge and community. We offer members a common platform for voicing their opinions and representing their common interests to a range of stakeholders. GAMBICA seeks to spread best-practice and be thought leaders in our sectors.



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The Geological Society of London is the UK's national society for geoscience, providing support to 12,000 Fellows (members) worldwide.

The Fellowship encompasses those working in industry, academia and government, with a wide range of expertise on policy-relevant science, and the Society is a leading communicator of this science to government bodies and other non-technical audiences.

The Society aims to be an inclusive and thriving Earth science community advancing knowledge, addressing global challenges, and inspiring future generations.



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**Advancing knowledge and setting standards in biomedical science**

With over 20,000 members in 61 countries, the Institute of Biomedical Science (IBMS) is the leading professional body for scientists, support staff and students in the field of biomedical science.

Since 1912 we have been dedicated to the promotion, development and delivery of excellence in biomedical science within all aspects of healthcare, and to providing the highest standards of service to patients and the public.

By supporting our members in their practice, we set quality standards for the profession through training, education, assessments, examinations and continuous professional development.



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We are the UK's leading professional body for those involved in all aspects of food science and technology. We are an internationally respected independent membership body, supporting food professionals through knowledge sharing and professional recognition.

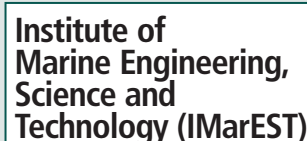
Our core aim is the advancement of food science and technology based on impartial science and knowledge sharing.

Our membership comprises individuals from a wide range of backgrounds, from students to experts, working across a wide range of disciplines within the sector.



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



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

# SCIENCE DIRECTORY

## Institute of Measurement and Control



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

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

## IOP Institute of Physics

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The Institute of Physics (IOP) is the professional body and learned society for physics in the UK and Ireland. The IOP's mission is to raise public awareness and understanding of physics, inspire people to develop their knowledge, understanding and enjoyment of physics and support the development of a diverse and inclusive physics community. As a charity, the IOP seeks to ensure that physics delivers on its exceptional potential to benefit society.



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Physicists, engineers and technologists play vital roles in delivering our healthcare. The Institute of Physics and Engineering in Medicine (IPEM) is the professional organisation that represents this diverse workforce. We are a charity with more than 4,600 members drawn from healthcare, academia and industry.

Our Mission is Improving Health through Physics and Engineering in Medicine. Our vision is one in which professionalism drives improvements in diagnosis, treatment and care, transforming the lives of patients.

Our members, the professional community of medical physicists, biomedical engineers and clinical technologists working in hospitals, academia and industry around the world are the people who make it happen. We work to support them through professional development, community and leadership services and initiatives. IPEM is licensed by the Science Council to award CSci, RSci and RSciTech, and by the Engineering Council to award CEng, IEng and EngTech.



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The Institution of Chemical Engineers (IChemE) is the UK based and internationally recognised qualifying body and learned society for chemical, biochemical and process engineers.

We advance chemical engineering's contribution for the benefit of society, facilitate the development of chemical engineering professionals across a wide range of sectors including energy, water, food and health, and provide connections to a powerful network of 30,000 members in more than 100 countries.



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



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LGC is a leading global life science tools company, providing genomics and quality assurance solutions into high growth application areas within human healthcare and applied market segments. Our core purpose is Science for a Safer World.

Our 180 years of scientific heritage, combined with a focus on innovation and value-enhancing acquisitions, has enabled us to build a highly valued product portfolio, and to closely collaborate with our customers, partners and the global scientific community.

As the UK Government Chemist [www.gov.uk/government/organisations/government-chemist](http://www.gov.uk/government/organisations/government-chemist), LGC acts as the referee analyst and advises Government and the wider analytical community on analytical measurement matters for policy, standards and regulation.

LGC is also the UK's National Measurement Laboratory for chemical and bio-measurement, finding solutions to fundamental and emerging measurement challenges, driving innovation, productivity and economic growth.



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L'Oréal employs more than 3,800 researchers world-wide and dedicates over €877 million each year to research and innovation in the field of healthy skin and hair. The company supports women in science research through the L'Oréal UNESCO For Women In Science Programme and engages young people with science through the L'Oréal Young Scientist Centre at the Royal Institution. L'Oréal also collaborates with a vast number of institutions in the UK and globally.



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

*A Forum for Natural History*

## Marine Biological Association



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

# SCIENCE DIRECTORY



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



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



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The Microbiology Society is a membership charity for scientists interested in microbes, their effects and their practical uses. It has a worldwide membership based in universities, industry, hospitals, research institutes, schools, and other organisations.

Our members have a unique depth and breadth of knowledge about the discipline. The Society's role is to help unlock and harness the potential of that knowledge.

Our principal goal is to strengthen our culture of being a community-driven Society by amplifying our members' voices, wherever they are in the world, and empowering them to embed the benefits of microbiology within wider society.



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



Advancing the science of nature

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

We use our unique collection and unrivalled expertise to tackle the biggest challenges facing the world today.

We are leaders in the scientific understanding of the origin of our planet, life on it and can predict the impact of future change.

We study the diversity of life and the delicate balance of ecosystems to ensure the survival of our planet.

We help enable food security, eradicate disease and manage resource scarcity.

We inspire people to engage with science to solve major societal challenges.



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



UNITED KINGDOM • CHINA • MALAYSIA

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



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The Nutrition Society, formed in 1941, is a diverse community with the independence and courage to challenge, question and progress the field of nutrition. Through a progressive approach that champions collaboration and breaking down research silos, we welcome members from around the world, regardless of their level of expertise. They must however have a genuine interest in pushing forward the field of nutrition for the benefit of people, animals while balancing the health of our planet too.



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As the largest network of physiologists in Europe, with academic journals of global reach, we continue our 140-year tradition of being at the forefront of the life sciences.

We bring together scientists from over 60 countries, and our Members have included numerous Nobel Prize winners from Ivan Pavlov to John O'Keefe.

# SCIENCE DIRECTORY



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Prospect is an independent, thriving and forward-looking trade union with over 120,000 members across the private and public sectors and a diverse range of occupations. We represent scientists, technologists and other professions in the civil service, research councils and private sector.

Prospect's collective voice champions the interests of the engineering and scientific community to key opinion-formers and policy makers. With negotiating rights with over 300 employers, we seek to secure a better life at work by putting members' pay, conditions and careers first.

## QUADRAM INSTITUTE



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The £75m Quadram Institute opened in 2019 and is focused on fundamental and translational research into the interfaces between the gut microbiome, food, and human health. The Quadram Institute combines leading-edge bioscience capabilities with NHS endoscopy, clinical trials and biobank facilities. The Quadram Institute is a partnership between the Norfolk and Norwich University Hospital, University of East Anglia, Quadram Institute Bioscience and BBSRC.



## Royal Academy of Engineering

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



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

Kew's strategic priorities for science are:

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

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



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



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



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

## Society for Underwater Technology



Society for Underwater Technology  
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E Mail: [jane.hinton@sut.org](mailto:jane.hinton@sut.org)

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

## Society of Chemical Industry



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

We deliver our charitable objective by:

- Supporting the commercial application of science into industry
- Tackling global challenges across Agrifood, Energy, Environment, Health and Materials

# SCIENCE DIRECTORY

## Society of Cosmetic Scientists



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

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



## THE SOCIETY FOR RADIOLOGICAL PROTECTION

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The Society for Radiological Protection is the principal independent professional body for radiation protection in the UK. Its members operate in the fields of medicine, the nuclear power cycle and other industries, research, and teaching. We offer a profession-wide view to regulators and are involved in training and educational outreach. We ensure that professional standards are maintained at the highest levels.



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The **UK Innovation & Science Seed Fund** is a leading patient capital investor with more than £330 million private investment leveraged to date. The Fund works to build technology companies from the earliest stage by working closely with its partners led by STFC, BBSRC, NERC and Dstl, with the National Research and Innovation Campuses they support, and with entrepreneurial science-led teams. UK Innovation & Science Seed Fund is also closely aligned with the Catapults and InnovateUK, helping to commercialise key technological advances in industrial biotech, agricultural technology, healthcare, medicine, clean energy, materials, artificial intelligence, software and space.



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



## University of Essex

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

## Universities Federation for Animal Welfare



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Website: [www.ufaw.org.uk](http://www.ufaw.org.uk)  
Registered in England Charity No: 207996

The Universities Federation for Animal Welfare (UFAW) is an international independent scientific and educational animal welfare charity and membership society.

UFAW's vision is a world where the welfare of all animals affected by humans is maximised through a scientific understanding of their needs and how to meet them. We promote an evidence-based approach to animal welfare by funding scientific research, helping develop the next generation of animal welfare scientists and sharing animal welfare science knowledge with both experts and the wider public.



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

Industrial membership provides access to innovative problem-solving from one of the world's foremost independent research and technology organisations.

Non-Corporate services include membership and registration, education, training and certification for internationally recognised professional development and personnel competence assurance.

TWI provides Members and stakeholders with authoritative and impartial expert advice, knowhow and safety assurance through engineering, materials and joining technologies.

# SCIENCE DIARY

## PARLIAMENTARY AND SCIENTIFIC COMMITTEE – ALL-PARTY PARLIAMENTARY GROUP

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[www.scienceinparliament.org.uk](http://www.scienceinparliament.org.uk)  
Follow us on X @ParlSciCom and Instagram @parlscicom

## FORTHCOMING DISCUSSION AND OTHER MEETINGS

Tuesday 15th October 2024

### Discussion Meeting on Re-Use, Renew and Replace

In partnership with the Institute of Corrosion  
5.00pm to 6.45pm, Palace of Westminster  
Chairman's Reception 7.00pm to 7.30pm,  
One Parliament Street

Tuesday 5th November 2024

### Annual Luncheon

Cholmondeley Room, House of Lords  
12.15pm to 2.30pm  
Guest Speaker: The Rt. Hon  
Lord Willetts FRS

Tuesday 12th November

### Discussion Meeting

In partnership with The Nutrition Society  
5.00pm to 6.45pm, Palace of Westminster  
Chairman's Reception 7.00pm to 7.30pm,  
One Parliament Street

Tuesday 3rd December

### Discussion Meeting

In partnership with the Royal Society of Chemistry  
5.00pm to 6.45pm, Palace of Westminster  
Chairman's Reception 7.00pm to 7.30pm,  
One Parliament Street

Tuesday 14th January 2025

### Discussion Meeting

In partnership with The Physiological Society  
5.00pm to 6.45pm, Palace of Westminster  
Chairman's Reception 7.00pm to 7.30pm,  
One Parliament Street

## ROYAL SOCIETY OF BIOLOGY

For further details please contact  
Karen Patel: [events@rsb.org](mailto:events@rsb.org)

## ROYAL SOCIETY OF CHEMISTRY

Monday 7th October 2024

### Science and Stormont

Parliament Buildings, Stormont, Belfast  
12.45pm to 7.30pm  
For further details please contact  
[events@rsc.org](mailto:events@rsc.org)

## THE ROYAL SOCIETY

Details of all events can be found on the  
events calendar at [events@royalsociety.org](mailto:events@royalsociety.org)  
For scientific meetings queries:  
[scientificmeetings@royalsociety.org](mailto:scientificmeetings@royalsociety.org)

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# The Parliamentary & Scientific Committee's STEM for BRITAIN 2025 takes place on Tuesday 11th March

in the Attlee Suite, Portcullis House,  
House of Commons.

Applications are now open from early-career research scientists, engineers, technologists and mathematicians who wish to exhibit posters in one of the following areas:

- Biological and Biomedical Sciences
- Chemistry
- Engineering
- Mathematics
- Physics

The closing date for applications is Monday 25th November 2024.

A wide range of important scientific, engineering and mathematics institutions and organisations are lending their support to this event, including the Royal Society of Biology, the Institute of Physics, The Physiological Society, the Royal Society of Chemistry, the Royal Academy of Engineering, the Council for the Mathematical Sciences, Dyson, the Institute of Biomedical Science, the Clay Mathematics Institute, the Nutrition Society, British In Vitro Diagnostics Association, the Heilbronn Institute, United Kingdom Research and Innovation, the Biochemical Society, AWE, and the Society of Chemical Industry.

This reflects the importance we all attach to the encouragement of researchers at this stage in their careers. Prizes will be awarded for the posters presented in each discipline which best communicates high level science, engineering or mathematics to a lay audience.

The Westminster Medal in memory of the late Dr Eric Wharton, who did so much to establish SET for Britain as a regular event in the Parliamentary calendar, will be awarded at a separate P&SC event in Parliament, following online judging. Full details of the competition and exhibition including the application form will be on the STEM for Britain website:

[www.stemforbritain.org.uk](http://www.stemforbritain.org.uk)



UK Research  
and Innovation



dyson

IOP Institute of Physics

