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A BRIGHT FUTURE

FUTURE READY: The role of research-intensive universities in an innovation-led Industrial Strategy

A BRIGHT FUTURE

RUSSELL GROUP


Credit: Imperial

Our vision is for an innovation-led Industrial Strategy where universities can work in partnership with business, central, devolved and local governments to create inclusive, long-term growth for all nations and regions of the UK.

By driving breakthroughs in fields such as clean energy, AI, life sciences and creative industries, our research-intensive universities are delivering the advances and skills critical for our future economy and society. We are doing this with businesses, the NHS and other key partners in ways that benefit communities right across the country and give the UK a real competitive edge internationally.

Putting universities at the centre of the Industrial Strategy will harness the strength of the higher education sector to transform our economy and public services – helping to build a more resilient UK.

FOREWORD

The challenges the new government faces are clear. Chronic underinvestment in infrastructure and utilities. Transport infrastructure that costs more but delivers less than equivalent projects in other advanced economies. Planning rules and regulations that restrict rather than stimulate economic development. The case for thoughtful and effective industrial policy, in the context of a wider plan for growth, has rarely been stronger.

In this context, the new government's ambition to develop a new Industrial Strategy for the UK is welcome and has the potential to be transformational both in driving confidence for new investment and delivering sustainable economic growth.

The experience of the UK and other major developed economies in successfully developing and then delivering Industrial Strategy is mixed. Although recent attempts have been hampered by changes in political leadership, it is not just changes in the political weather that have hindered the UK's attempts to chart a new course. What can we do differently this time to maximise our chances of success?

In my view, three core challenges matter more than most: **time**, **investment** and **partnership**.

Credit: University of Warwick

First, do not try and do everything all at once. It is tempting to simply focus on seeking economic gains in the next financial year. This is unrealistic and favours superficial improvements rather than long-term substantive gains. A longer perspective is needed: beyond the length of the current Parliament and well into the 2030s and beyond.

Rather than seek to define the skills that the economy of tomorrow will need, or the technologies that might give the UK a cutting edge, a longer-term view requires robust and rigorous systems thinking. Which institutions will deliver the skills required for tomorrow's industries? What is needed to build a culture of growth across sectors? How can we ensure that the UK's research ecosystem is both responsive to, and helps foster, demand for innovation? Developing and sustaining the right institutions is imperative.

Second, ensure that resources match ambitions. Charting a new economic course for the UK will not be cheap, and if the Industrial Strategy is to succeed it will require investment. Some investment will need to come from the public purse, specifically where the risks are higher and the returns are longer-term – but much of the rest can come from the private sector if the right conditions, incentives and signalling are in place.

Third, build and sustain a growth coalition. No one single component of the UK's economic, social and governance ecosystem can develop and deliver a successful Industrial Strategy on its own. Partnership will be key. It will mean bringing business, universities, public and third sector bodies, and local, regional and national governments together towards shared aims. Tapping into academic and business expertise alongside each other. Balancing the needs of existing and new sectors while delivering against the core strategy missions.

The Russell Group will return to some of these issues in a subsequent report that will draw on business expertise to examine what universities can do to boost their impact, and what government actions might help. Here, we set out some examples of how research-intensive universities across the UK are already working in a range of partnerships to deliver the research, skills and innovation that will be vital for a successful Industrial Strategy. This paper focuses on the government's four missions, as set out in their 2023 strategy.

The key message I would like readers to take away is that universities such as those in the Russell Group are key drivers of economic growth and have the potential to be major delivery partners for a new and transformational Industrial Strategy. We are ready to do more: we want to work with government, the public and third sectors, business and others to make this a genuine success for the country.

Stuart Croft
Vice-Chancellor and President, University of Warwick
Chair, Russell Group Industrial Strategy expert panel

THE ROLE OF RESEARCH-INTENSIVE UNIVERSITIES IN AN INNOVATION-LED INDUSTRIAL STRATEGY

The government has set out the framework for an Industrial Strategy based around four missions: building a resilient economy, leading the UK digital revolution, delivering health and social care for the future, and putting the UK at the cutting edge of clean energy.

In the process, government is aiming to tackle major challenges such as those associated with climate change, the ageing population and the economic and social transformation that we are likely to see as AI becomes ubiquitous.

To succeed, it will need to renew the UK's focus on high-level skills and enhance our ability to develop and harness new technologies effectively in critical areas of the economy – in turn, creating lasting wealth for people and businesses.

In each of these areas – **digital**, **health**, **resilience** and **clean energy** – universities have a fundamental role to play in driving our national prosperity. They provide a bridge between public investment in education and research, and private innovation with the potential to transform our economy and society. From the development of the groundbreaking National Centre for Ageing at **Newcastle University** to the **University of Sheffield** hosting the UK's only centre for the certification of Sustainable Aviation Fuels, our research-intensive universities are delivering real and sustained impact across the Industrial Strategy missions in every area of the country. This success has been based on close collaboration and long-term relationships, supported by steady investment in R&D, infrastructure and skills.

This report sets out some of the ways our universities are already working in partnership with business, the public and third sectors, and government to transform our economy, boost services like the NHS and build a bright future for the UK.

Harnessing the full capabilities of universities will help incentivise more private investment into R&D, create more high-growth spinout companies, provide a high-quality skills pipeline for industry and the public sector, and leverage their global reach to attract new investment into UK regions and nations. What would this mean for people and families? In a nutshell: more opportunities, better jobs and higher quality public services supported by a dynamic, more productive economy.

To maximise the impact research-intensive universities can have, working with their industry and public and other partners, we recommend government considers the following priorities in designing and implementing the Industrial Strategy:

1. Pursuing an approach that **strikes a balance between mission and sector-based strategy**. A mission-based approach will ensure the benefits of the Industrial Strategy can be felt across the whole economy, enabling the participation of a broader range of partners, maximising economic spillovers from public investment and benefiting a wider range of communities across the country. By also making clear which sectors will support delivery of the different missions, government can give the private sector confidence to invest in the UK.
2. Ensuring the Industrial Strategy considers how to **build a thriving economy for the UK into the 2030s and beyond**. Whilst achieving economic growth in the short-term will be imperative to improving people's lives, long-term thinking and investment is vital to delivering sustained UK growth and prosperity now and into the future.
3. Introducing formal mechanisms to draw on **university sector and academic expertise to inform the direction and implementation of the Industrial Strategy.** This should include ensuring the work of the Industrial Strategy Council has academic expertise at its heart, alongside business, key research funders and customers – the latter including public sector users such as the NHS and MoD who may use their significant procurement funds to pull through innovation.
4. **Creating the right environment to build new public-private partnerships** and attract investment to the UK by backing critical research and innovation infrastructure, supporting a pipeline of discovery research and talent, and cutting red tape to make it easier to scale new sector and regional innovation activities throughout the UK.

DELIVERING HEALTH AND SOCIAL CARE FOR THE FUTURE

Partnerships driven by research-intensive universities with the NHS, business and local authorities are helping create new and innovative treatments and technologies, build strong health and social care ecosystems in all parts of the UK and support the pipeline of skills needed to transform our national health and care services. Together we can boost standards in our health and social care services and build a more resilient economy with health and wellbeing at its core.

Turning research into cutting-edge health and social care innovation

Medical expertise and research from research-intensive universities helped deliver breakthroughs like the Oxford-AstraZeneca Covid-19 vaccine, and other novel therapies, diagnostics and med-tech advances that saved thousands of lives during the pandemic. This success was built on decades of investment in discovery-led, globally excellent research, and robust partnerships between our universities, government, industry and the NHS.

The strength of research-intensive universities in life sciences represents a competitive advantage for the UK, with UK university research accounting for nearly 12% of global medical life science academic citations in 2023. In social care, six Russell Group universities are core partners in the NIHR-funded School for Social Care Research, which commissions and conducts R&D on topics such as the potential of data science to improve the detection of post-stroke dementia and supporting unpaid carers.

Research-intensive universities are helping innovators create businesses to turn this research excellence into new drugs, treatments and medical technologies that are giving NHS clinicians better tools to treat patients, helping people live independent, healthy lives and supporting economic growth.

As highlighted by Lord Darzi in his report on the state of the NHS, research and innovation can make the NHS more sustainable. Targeted support through the Industrial Strategy has the potential to boost university efforts to develop strong and enduring relationships between the NHS and R&D sector.

University of Bristol spinout Ziylo, which developed a novel treatment for diabetes, saw one of the largest UK spinout exits after being acquired by Novo Nordisk for £623m. This enabled the founder to re-invest into the Bristol spinout ecosystem, starting Science Creates, an incubation space for the next generation of deep tech spinouts.

Deeper collaboration between the NHS and researchers will be a key aspect of a mission-led Industrial Strategy, and government should also seek opportunities to pull innovative ideas into use through new approaches to public procurement in NHS and social care services. This would build on successful vaccine investments during the pandemic and could help secure new foreign direct investment (FDI) from overseas businesses and funding bodies to attract and anchor key research partners in the UK.

Anchors for health and social care ecosystems across the UK

Collaborations with local and regional partners on targeted health challenges – often those faced by their local communities – have helped our universities build clusters around areas of R&D expertise that then attract additional commercial investment. The result is a positive for both community health and wellbeing and for local economic growth.

The universities of **Warwick** and **Birmingham**, for example, are partners in the West Midlands Health Technology Innovation Accelerator. This new initiative is supporting the West Midlands Plan for Growth by creating a cluster of commercial activity around new medical and healthcare technologies in partnership with local NHS clinicians.

Supported through investment from DSIT, Innovate UK and the West Midlands Combined Authority, the project unites 20 partners across academia, industry and the NHS including University Hospitals Birmingham NHS Trust, and leading specialist development company Bruntwood SciTech. The accelerator provides companies with access to services and expertise that are essential in critically developing health technologies and is expected to stimulate £80m of private investment by 2027. This growing innovation cluster will be strengthened by a new HealthTech Campus being built as part of the £3.2bn regeneration project at Arden Cross led by the University of Warwick in collaboration with the WMCA.

58%
of UK university spinout value has been created by health startups

Credit: Science Creates

Building a resilient NHS and social care workforce

Research-intensive universities are helping drive up standards and build a future UK health and social care workforce by training:

- **4 out of 5** new UK doctors and dentists
- **18,000** student nurses and midwives
- **4,200** clinical academics (FTE)
- **40,000** student technicians, pharmacists, pathologists and allied health professionals.

Dedicated people are at the heart of the NHS and the resilience of UK health and social care systems. Getting workforce planning right is crucial to ensure we have the doctors, nurses, allied health professionals and professional services staff the health service needs to support patients. It is also fundamental to protecting the pipeline of UK clinical research talent required to deliver new treatments and technologies that can drive innovation and growth as well as save lives.

Universities are collaborating with government, the NHS and others to expand opportunities for medical education into new regions to help address staffing gaps which have made it difficult for people in some areas to access healthcare.

Imperial has partnered with the University of Cumbria to establish the Pears Cumbria School of Medicine. The 4-year graduate entry programme with a bespoke curriculum informed by research will help address many of Cumbria's unique health challenges, including low NHS recruitment rates. With the University of Cumbria already having well-established programmes for nursing, midwifery and paramedics, the new partnership is opening up more opportunities to study medicine in the North West.

Industrial Strategy in practice: Newcastle University

Meeting the needs of an ageing population is one of the biggest long-term challenges facing UK health and social care. Developing treatments, new products to support independent living and enhancing care services requires sustained collaboration between universities, the NHS, industry and local populations. Russell Group universities are finding new ways to use research and innovation expertise to support the sector in their regions.

Newcastle University is leading the way in this field at the National Innovation Centre for Ageing (NICA). Established through a collaboration with the university and UK government, NICA enables businesses to harness opportunities related to the longevity economy through human experience, ethics, data, collaboration, emerging technologies and innovative business models.

Research and insights obtained through VOICE, a digital network and community embedded within NICA, helps businesses engage with and understand the needs of older consumers. This is part of a data-driven approach to business development and longevity product development described as "Ageing Intelligence".

In addition, NICA works to deliver export-led growth in new and growing international markets with initiatives including the UK-China Healthy Ageing Project. This was a UK Government funded 3-year programme which established a healthy ageing accelerator focussed on helping 40 innovative businesses explore commercial opportunities in China for products which support healthy longevity.

Building on this success, the university is developing the UK's first Health Innovation Neighbourhood (HIN) on the former site of the Newcastle General Hospital. The £500m investment is part of a joint venture with Genr8 Kajima Regeneration Ltd, in partnership with the Newcastle NHS trust, the North East Combined Authority, city council and Northumbria University.

Drawing on Newcastle's world-leading research and innovation, HIN aims to reshape approaches to preventative healthcare, reduce inequalities, and provide a model for holistic community wellbeing, future global health practice and neighbourhood place-making. It will also deliver high-value job and lifelong learning opportunities, 100,000 sqft of NHS and other health-related facilities, and 1,250 new homes.

LEADING THE UK DIGITAL REVOLUTION

Research-intensive universities will play a core role in the growing UK digital ecosystem to enable data driven growth, support public services and enhance public trust in new technologies. Through collaboration with businesses, the public sector and government we can harness the power of data for public good and help the UK enhance its position as a significant global player in AI and other digital technologies.

Digitally driven economic growth

Through multidisciplinary expertise and a pipeline of academic talent, universities have helped secure the UK's rank as fourth in the world for its research and innovation in AI, a field which McKinsey estimates has the potential to deliver additional global economic activity of around $13 trillion by 2030.

Russell Group universities have notable research and innovation partnerships with industry leaders, including Microsoft Research, OpenAI, Google DeepMind, Google Health, Amazon, NVIDIA, Samsung, IBM and Cisco in areas as diverse as machine learning, medical imaging, computer vision, robotics, ethics, and joint PhD programmes and internships.

AI university spinouts secured

£230m

of investment in 2023, making up nearly 10% of UK high-growth AI companies

University AI expertise is already being leveraged to drive economic growth by companies such as Synthesia, a startup co-founded by a **University College London (UCL)** academic that developed technology which allows users to create AI-generated videos by typing text. The company raised $90m in series C funding in 2023 reaching "unicorn" status, with a market value of more than $1bn.

Further progress in AI, data science and related fields will require public investment in sovereign research and innovation capabilities, including supercomputing capacity for AI and simulation. Investment in facilities of this sort will facilitate interoperability of data across social care, education and the NHS to enhance public services. It will also support the growth of digital clusters, building on the work research-intensive universities and their partners are already doing to boost innovation and growth.

The **University of Edinburgh**, for example, is a key delivery partner for Data Driven Innovation, a £661m investment and innovation programme that is the largest part of the £1.5bn Edinburgh and South-East Scotland City Region Deal.

Funded in partnership with the UK and Scottish Governments, the university hosts five data innovation hubs including the Edinburgh International Data Facility (EIDF), a computing and storage facility for the secure and trustworthy analysis of datasets. The hubs are supporting multidisciplinary research and partnerships using data to drive advances in 10 industrial sectors such as health and social care, financial services and agritech.

Putting data and AI at the centre of Industrial Strategy missions

In health, AI and data science tools developed by research-intensive university partnerships with the NHS are giving clinicians new ways to monitor patients and predict future health conditions. **University of Nottingham** spinout Blueskeye AI has developed facial and voice recognition technology to help recognise and predict depression in pregnant women and new mums and is working with Nottinghamshire NHS trusts on clinical trials. **King's College London** researchers partnered with **UCL** and the National Hospital for Neurology and Neurosurgery to use machine learning technology to develop EpiNav, which creates a detailed 3D map of the human brain to guide surgical interventions.

In clean energy, data science and AI-enabled R&D is giving us different ways to understand and tackle complex challenges associated with net zero including the decarbonisation of the financial services sector. The UK Centre for Greening Finance and Investment (CGFI) has just opened an innovation hub at Nexus in the **University of Leeds**. This hub will connect academic experts working on green data science and AI with the financial services sector to support its decarbonisation, as well as provide early-stage business incubation for startups in this space. This work makes the UK a global leader in the field.

The UK is top five globally for research into AI technologies such as data analytics, machine learning and natural language processing

Enhancing public trust in new technologies

Enhancing trust in new AI and data science tools is critical to maximising the difference they can make to economic growth and UK public services. Getting this right will require work to equip people with the skills they need to understand AI and use it safely, and a robust regulatory framework which delivers security without stifling innovation.

Last year, the **Russell Group** produced a set of principles for the responsible use of AI in education. Developed in partnership with experts, the principles recognise the opportunities and risks of generative AI and commit our universities to helping students and staff become leaders in an increasingly AI-enabled world.

Work led by research-intensive universities is combining technical expertise with insights from psychology, ethics and the arts and humanities, helping enhance our understanding of the potential implications of AI for society and individuals and supporting the UK's global leadership role in AI safety.

The **University of Southampton** is heading up the Responsible AI UK (RAi UK) consortium, a UKRI-funded initiative leading the way in making the UK the number one place for research and leadership around safe and responsible use of AI. RAi UK is delivering collaborative research projects with partners ranging from the Met Police, Sage and the Digital Catapult to solve challenges and deliver best practice on how to design, evaluate, regulate and operate AI systems in areas like healthcare, net zero and future mobility.

Credit: Durham University

QUEEN'S UNIVERSITY BELFAST

Industrial Strategy in practice: Queen's University Belfast

To achieve a safe digital future, collaborative innovation between industry and academia must keep pace with new technologies like AI and quantum. Russell Group universities are finding new ways to use research and innovation expertise to support the sector in their regions.

Queen's University Belfast is home to the Centre for Secure Information Technologies (CSIT). Funded by the Engineering and Physical Sciences Research Council (EPSRC) and Innovate UK, CSIT combines research excellence with translation and innovation driven by collaboration with industry, academia and the public sector.

The CSIT commercial and engineering team has delivered more than 100 rapid response projects with a range of SMEs and startup businesses, and collaborates with partners including BAE Systems, Cisco, Citi, IBM, Intel and Rolls Royce. CSIT's role in the ecosystem has helped to create approximately 2,750 jobs in the sector with the ambition to grow this to 5,000 as well as attracting 100 high tech FDI and start-up companies.

In 2023, it was announced a new cyber-AI hub would be built at CSIT, joint funded through £11m from the UK government, £3.3m from EPSRC and £4.6m from project partners. The hub hosts a consortium of eight R&D intensive cyber security businesses investing in AI-based security technologies that will drive growth in their companies and benefit the NI economy.

PUTTING THE UK AT THE CUTTING EDGE OF CLEAN ENERGY

Achieving the government's missions to deliver clean power by 2030, boost energy independence and tackle climate change will require close collaboration between industry, academia and government to develop new technologies and solutions. Research-intensive universities are ready to support these objectives as we deliver breakthroughs in clean power and green tech, develop a pipeline of green skills and contribute to the decarbonisation of industry.

162
active university cleantech spinouts located across the UK in January 2024

Working in partnership to deliver breakthroughs in clean power

Innovative technologies along with novel services and solutions that encourage change will play a core role in delivering clean power by 2030 and a net zero nation by 2050. Research-intensive universities are already supporting the next generation of UK clean energy entrepreneurs and engaging in wide-ranging collaborations with industry to develop new innovations and grow UK green exports.

The **University of Oxford** and Ørsted led a joint industry research project in collaboration with **Imperial**, University College Dublin and industry leaders, including SSE, ScottishPower Renewables and EDF, to improve engineering design for the 'monopile' foundations that support offshore wind turbines – reducing costs to enable the economic scale up of wind energy.

Researchers working on the Pile Soil Analysis (PISA) project built new computational models specific to the design of wind turbines which more accurately predict the size of monopiles needed for different locations. This has allowed industry partners to reduce the amount of steel in wind turbine foundations by around 30%, enabling the use of much larger turbines and the rapid scale-up of the design and installation of new sites.

Universities are also undertaking important social sciences research which will help us understand how the UK can create conditions that support wider business engagement in clean energy and net zero technologies.

Working with the Energy Systems Catapult, **London School of Economics** Just Transition Finance Lab conducted an applied research project with Westminster City Council and Cumberland Unitary Authority to enhance the investment readiness of identified local net zero projects. This involved assessing investor appetite for the proposed projects and developing strategies to attract both public and private capital. It also advanced potential new innovative investment models, such as community-owned equity shares and Pay-As-You-Save (PAYS) retrofit programmes.

Activities like these have often been enabled by targeted, sustained investment from universities through funding streams such as quality-related "QR" research funding, Research Excellence Grant "REG" funding in Scotland, and the Higher Education Innovation Fund (HEIF). Alongside government spending, this has helped crowd in finance from business and supported the development of clean growth clusters around the UK.

Supporting a pipeline of green skills

Across the UK, research-intensive universities are rising to meet the challenge of a green skills gap: providing targeted courses for business to enhance their capabilities as well as more traditional undergraduate and postgraduate courses to support the net zero skills pipeline. Our universities are also giving businesses access to research talent and infrastructure that is helping develop new green energy solutions, driving export-led growth.

The **University of Exeter** is home to the UK's top five most influential climate scientists, and over 1500 research and education specialists working on Green Future Solutions, an initiative which connects climate experts with businesses looking to decarbonise and transform their business to thrive in the green economy. The Green Future Solutions team at Exeter worked with Capgemini Invent to develop and deliver a sustainability solutions leadership development programme for 500 people at the company. These people became 'sustainability champions' and are driving programmes to embed green thinking across the business.

Decarbonising industry

Clean energy is not only about how we power homes and factories, but also about how we develop new fuels and technologies to meet the energy needs of sectors such as aviation, shipping and manufacturing. Industries like these have a crucial role to play in driving regional and national economic growth, but also make a significant contribution towards UK carbon emissions.

The **University of Sheffield's** Innovation District is home to the Sustainable Aviation Fuels (SAF) Innovation Centre, which offers partners from industry such as Boeing and Virgin Atlantic access to the university's researchers and facilities to decarbonise aviation. Early successes for the centre include the launch of Flight100, a joint project led by Virgin Atlantic in partnership with the university which saw the first commercial flight across the Atlantic powered by 100% SAF. Boeing's involvement in the SAF Innovation Centre builds on the company's longstanding relationship with Sheffield as a founding member of the university's Advanced Manufacturing Research Centre (AMRC). AMRC, which opened in 2001, transformed the former Orgreave coking plant into a world-class advanced manufacturing facility which a recent economic impact report showed has brought more than £260m of private investment to South Yorkshire.

The research and innovation work backed through the SAF Innovation Centre will support the government's proposed SAF Bill as well as plans for phased increases in the use of SAF from January 2025.

To build on the progress which has already been made and to ensure green growth can be at the heart of new local growth plans, sustained investment from government, universities and other partners backed by joined up policy thinking will be crucial.

Long-term decisions to drive further industrial decarbonisation with university support should include stable incentives for investment and innovation through the tax system and work to crowd in private investment through the National Wealth Fund (NWF), alongside non-funding related measures such as the removal of planning barriers for grid connectivity.

UNIVERSITY OF BIRMINGHAM

Industrial Strategy in practice: University of Birmingham

Teams working on new clean energy technologies can face challenges in accessing suitable development facilities. Investor uncertainty over recent breakthroughs also means there can be difficulties accessing funding to support business growth. Research-intensive universities are working with funders, government, combined authorities and other partners to address these challenges and support cleantech innovators as they develop new green solutions and bring them to market.

The **University of Birmingham (UoB)** has invested more than £3m of quality-related "QR" research funding in Tyseley Energy Park (TEP), a new facility that in partnership with industry and government is helping research and shape the ways in which Birmingham and the West Midlands region develops infrastructure for renewable heat and power, energy storage, clean transport fuels and advanced waste processing.

UoB is also providing incubation space at TEP and targeted packages of support to help new businesses drive the commercialisation of innovative energy products and services. Backed by HSBC UK, it is also host to the Climate Innovation Platform which is helping de-risk innovation and providing access to test and demonstration facilities for new green breakthroughs.

Other partners involved in the establishment of TEP included Veolia, National Grid, Birmingham City Council, the West Midlands Combined Authority and Siemens. Facilities available at TEP include the UK's first multi-fuel, open access low and zero carbon refuelling station.

European Investment Bank research found more than 80% of companies consider skills shortages to be a barrier to their net zero projects

Credit: Imperial

BUILDING A RESILIENT ECONOMY

Research-intensive universities are at the centre of efforts to build a stronger, more resilient economy. We are working with partners across the UK to protect supply chains, help the public and private sector respond to emerging challenges, create anchors for sustainable growth and hubs for new businesses to thrive.

Responding to emerging challenges

University R&D is transforming the way government, councils, public services and businesses are able to identify and respond effectively to new and future risks. Research is helping inform political and industry leaders on the potential impact of everything from geopolitical shifts, which could threaten critical UK imports and financial resilience, to the impact of climate change on agriculture and other major domestic industries.

Research supported through the **University of York**-led BioYorkshire cluster is helping drive innovation in fields such as sustainable crop production and engineering biology, increasing our understanding of the UK food system and helping policymakers design interventions to boost resilience to future shocks. Researchers have partnered with Yorkshire farmers and food businesses to help tackle food insecurity in the UK, a challenge which impacts on health, educational attainment and social wellbeing. The project is expected to create 4,000 new jobs, drive economic growth, and enable North Yorkshire to become one of the first regions in the UK to be carbon negative.

Collaborative work done within research-intensive universities in the social sciences is also helping policymakers understand economic risk and resilience. Research undertaken at **Queen Mary University of London** has filled critical gaps in international financial law exposed after the 2008 financial crash. Work on central banking and financial regulation has been the basis for legal and regulatory changes which have helped the Bank of England, HMT, IMF and European Central Bank enhance international financial resilience.

Russell Group universities attracted

£1bn

of FDI to the UK for R&D activity in 2022/23

Credit: University of Nottingham

During the pandemic, researchers from **Durham University** partnered with groups such as the CBI and FSB to provide free support for companies facing unprecedented supply chain challenges, helping to build their resilience and protect them against potential future shocks. For example, the Durham team worked with one company based in the North East to propose the development of a smart on-demand manufacturing platform. This platform could connect national UK capabilities of both conventional manufacturing and 3D printing to deliver critical medical components meeting UK regulatory standards, and which can be traced across the entire supply chain.

Anchors for stronger growth across the UK

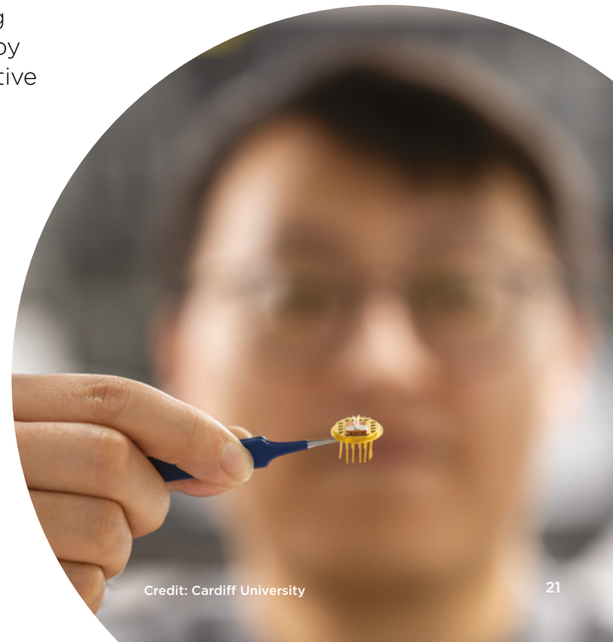
Supporting growth in every nation and region is crucial to enhancing the UK's economic resilience.

Strategic backing through national funding bodies and government initiatives such as the Connecting Capability Fund has helped research-intensive universities develop new facilities and research programmes across the country, attracting billions of pounds of investment and encouraging businesses to work with UK partners.

The **University of Liverpool's** collaborative research with Unilever between 2007 and 2017 delivered breakthroughs in materials science which have generated global sales of new consumer products worth more than €500 million per year from 2018 onwards. This success led to the company making a £25m investment into the Materials Innovation Factory (MIF), Unilever's largest single investment in academic R&D. The MIF has also received a £8.8m EPSRC prosperity partnership to develop sustainable global chemical supply chains. The academic anchor keeps Unilever's R&D activity in the UK and has attracted further industry partners to Liverpool to benefit from the innovative ecosystem.

In Wales, **Cardiff University** worked with commercial partner IQE plc on the development of a Compound Semiconductor Centre that is boosting sovereign capabilities in a critical technology area. This £24m joint venture is at the centre of a growing compound semiconductor cluster which has been backed by UK government investment through the Strength in Places fund.

Research-intensive universities' role in attracting investment into all parts of the UK is catalysed by their global reach and participation in collaborative research programmes such as Horizon Europe. These links can lay the ground for new bilateral and multilateral agreements with EU states and other trusted partners around the globe and enhance joint working on topics such as research security and resilience – in turn helping boost UK economic security by developing capabilities to counter new and evolving threats from hostile states.



Credit: Cardiff University

Creating hubs for thriving new businesses

As set out in the recent Start-Up Review, university spinouts can directly drive economic growth and productivity gains. Research-intensive universities are already supporting the growth of both the infrastructure and investment ecosystem for spinouts. Government can further incentivise this activity by funding university commercialisation through programmes such as the Higher Education Innovation Fund (HEIF) and by supporting university partnerships with combined authorities and others which are providing facilities, growth capital and assistance for early-stage businesses. HEIF, for example, offers a proven return on investment of 12:1 for every pound received by large research-intensive universities.

Research-intensive universities are creating vital business incubation space for high-growth companies. The Graphene Engineering Innovation Centre (GEIC) at the **University of Manchester** is funded through QR, Innovate UK, the Greater Manchester Combined Authority and industry sources and works to test and optimise new graphene concepts for delivery to market. Businesses working to develop new applications for graphene in sectors such as construction and energy are being supported by the GEIC team. For example, Manchester university spinout HalioGEN power is based at the GEIC which will enable them to take their lithium-free energy storage technology from lab to market.

Research-intensive universities have also been foundational in attracting investment to translate research into new high tech spinout firms through university founded funds. Cambridge Innovation Capital has catalysed investment into **University of Cambridge** spinouts, with the university seeing a 178% increase in companies surviving after three years since its formation. Elsewhere, Northern Gritstone, Midlands Mindforge and Set Squared are seeking to close the investment gap in the UK's regions, supporting the next generation of high-growth businesses.

Credit: Graphene Engineering Innovation Centre, University of Manchester

Industrial Strategy in practice: University of Glasgow

Collaboration between research-intensive universities, government and businesses is crucial to strengthening UK capabilities in new technologies with the potential to boost the resilience of the industrial base and build secure and diverse domestic supply chains.

The Critical Technologies Accelerator (CTA), a **University of Glasgow** programme, aims to strengthen Scotland's manufacturing base by developing semiconductor, photonics and quantum technologies essential for achieving net zero and regional economic development.

The 2-year pilot was launched in Spring 2023, supported by UK government innovation accelerator funding to the Glasgow city region. It was designed to show how a shared resource of highly-skilled engineers could work in partnership with industrial R&D teams and local supply chains to accelerate the development of five emerging technologies identified by industry with risk profiles and technical challenges beyond the scope of individual companies.

Operating from the James Watt Nanofabrication Centre (JWNC), a world-renowned centre of excellence in research and translation, the CTA's 12-person team of design, test, and manufacturing engineers enables industry partners to deliver innovative miniaturised and scaled products that open new markets. Projects include an integrated silicon photonics platform that could enhance fibre connectivity to homes and businesses, reducing telecoms network energy.

Research-intensive universities are key delivery partners for the Industrial Strategy, working with government, industry, public and third sector partners to help transform our economy.

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University of Birmingham
University of Bristol
University of Cambridge
Cardiff University
Durham University
University of Edinburgh
University of Exeter
University of Glasgow
Imperial
King's College London
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London School of Economics and Political Science
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