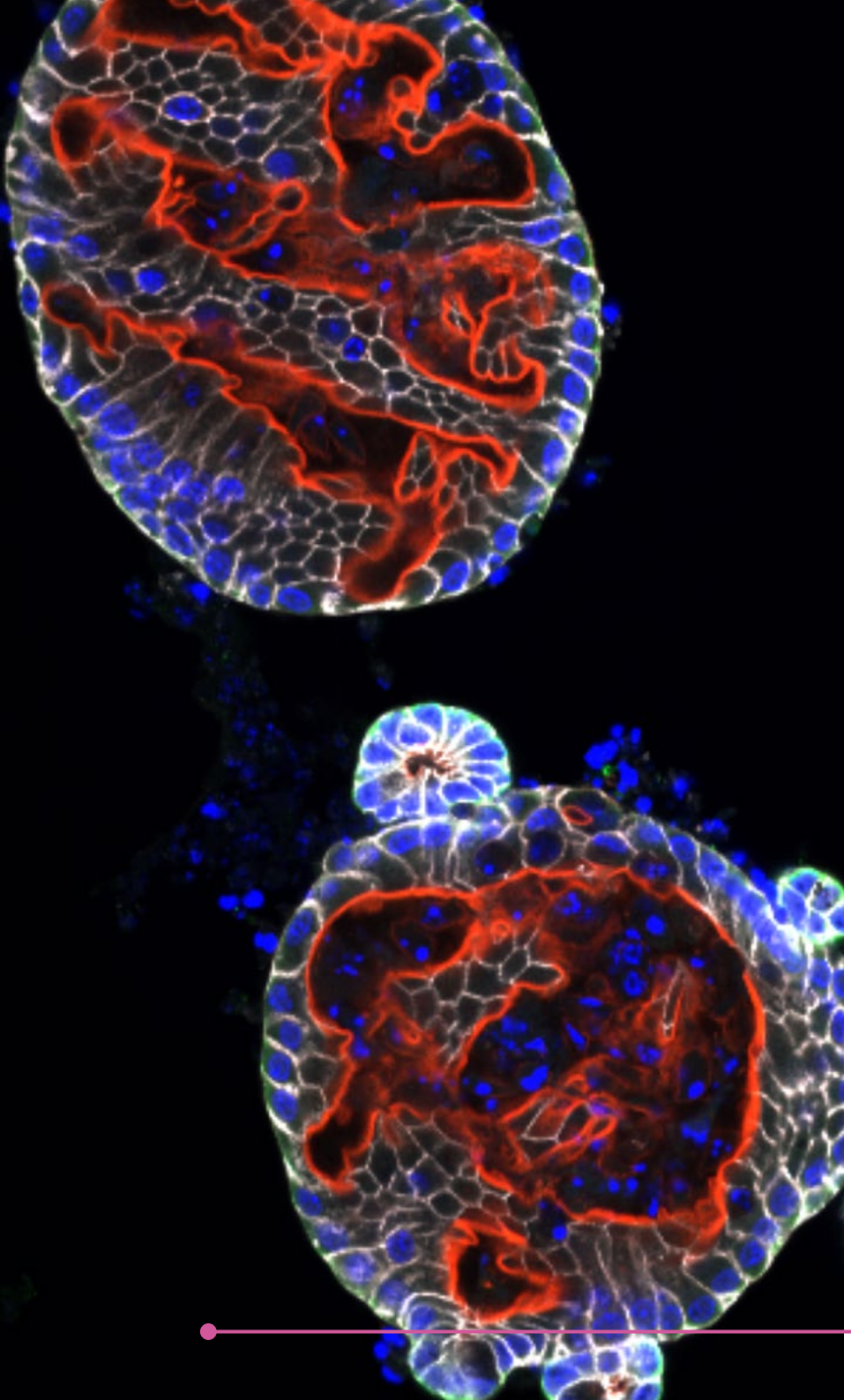
Biotechnology and Biological Sciences Research Council

Strategic Delivery Plan

2022–2025



Contents

Professor Melanie Welham *(Executive Chair, BBSRC)*

Foreword

New tools, technologies and approaches continue to revolutionise bioscience research, driving breakthrough discoveries into the complex and dynamic processes that govern life, and catalysing game-changing innovations.

In the coming years, rapid advances in bioscience discovery and innovation will be essential for driving the changes needed to maintain the health and wellbeing of people and animals, and to protect and transform our economy, society and environment. For example, a deep understanding of biological systems will be central to addressing the challenges of increasing healthy life expectancy or establishing cleaner, greener industries in a more circular economy, and it is hard to imagine a net zero future without bio-based solutions and technologies being central.

As part of UKRI, the Biotechnology and Biological Sciences Research Council (BBSRC) is pivotal to the UK's position at the forefront of the 'bio-revolution'. We will drive innovation and impact by providing leadership, maintaining the health of bioscience disciplines and nurturing people, technologies and partnerships.

Our Strategic Delivery Plan sets out the actions we will take over the next three years in support of our long-term vision and ambitions for UK bioscience, in the context of our 2022–23 to 2024–25 budget allocation and UKRI's first five-year strategy (2022–27). Our Plan highlights how we will respond and contribute to the delivery of key government strategies, including the Innovation Strategy, R&D People and Culture Strategy, Integrated Review, Net Zero Strategy, National Food Strategy and the Life Sciences Vision.

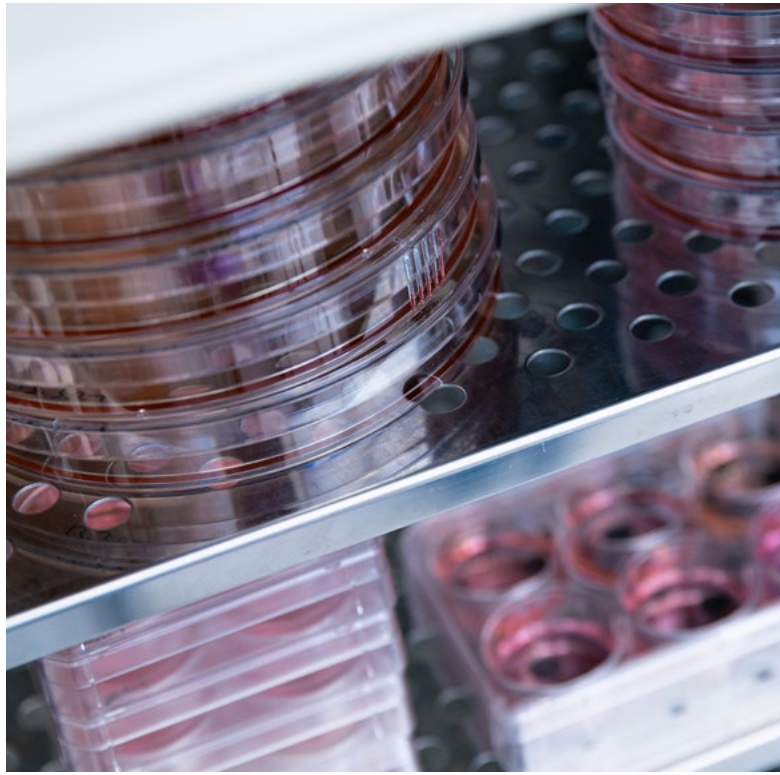
The role that the UK bioscience community played in the global response to the COVID-19 pandemic, from rapid genome sequencing to track the emergence and spread of new variants, to the development of vaccines, illustrates the profound importance of bioscience research and innovation. The speed with which the bioscience community, alongside other disciplines, was able to mobilise highlights the importance of long-term investment in the fundamental research, skilled people and national facilities that are at the heart of BBSRC's strategic approach to UK bioscience.

BBSRC is of course not the only funder of UK bioscience; there are significant public, private and third-sector funders, domestically and globally, with whom we must work to ensure joined up and synergistic approaches. Furthermore, bioscience is inherently interdisciplinary; breakthrough discoveries often occur at the interfaces with other disciplines, and BBSRC-funded bioscience frequently provides the foundations for more applied research or impacts across the remits of other funders.

When I took up the role of BBSRC Executive Chair, one of my priorities was for BBSRC to build strong partnerships as an open and collegiate Council. Collaboration continues to be central to our plans, and I look forward to working across UKRI and with our many partners and stakeholders across the wider research and innovation system in delivering our shared ambitions.

Professor Melanie Welham
Executive Chair, BBSRC

September 2022



In the coming years, rapid advances in bioscience discovery and innovation will be essential for driving the changes needed to maintain the health and wellbeing of people and animals, and to protect and transform our economy, society and environment.

What we will achieve

Ground-breaking discoveries in biology, from the structure of DNA to the processes by which cells divide and replicate, have had wide-ranging and long-term impacts for citizens across the UK and the world. Today, advances in bioscience and biotechnology have the potential to contribute 'bio-based' solutions to some of the biggest problems facing society, from food and nutrition security, climate change to infectious disease and an ageing population.

Discovery and innovation in the biosciences are also key to the UK's ability to compete in multi-billion-pound industries, such as agri-food and pharmaceuticals, and to seize opportunities for UK leadership in emerging / high-growth market sectors including bio-based advanced manufacturing and realising the transformative potential of engineering biology across multiple sectors.

The UK is recognised as a world-leader in bioscience and an international partner of choice, attracting inward investment and globally mobile businesses, and creating opportunities for economic growth and jobs in all UK regions and nations, including rural economies.

But to remain world-leading and capture UK strategic advantage in the face of global competition, the UK must navigate the opportunities from technological advances (e.g. genome editing, artificial intelligence), new ways of working including interdisciplinary and team science, and an increasing shift towards more data-intensive approaches.

As part of UKRI, BBSRC is a major convenor, investor, and catalyst of the UK's world-leading bioscience endeavour. We invest in the talented people, infrastructures, research, innovation, and partnerships needed for UK bioscience to thrive, maintaining the health of bioscience disciplines, and driving impacts for society, the economy and the environment.

We support excellent research that reveals new insights into the functioning of microbes, plants, animals and humans, at scales ranging from molecules to populations. Our unique remit enables us to bring together different communities and sectors, e.g. acting as a nexus for interdisciplinary research that links agriculture (crops and livestock), food, diet, nutrition, and health to plant-based bio-materials, food security, environmental sustainability, and biodiversity, as a highly interconnected system.

This delivery plan articulates how we will work towards our vision, contribute to delivery of the UKRI Strategy, and support the government's ambitions for the UK as a science powerhouse and innovation nation. It sets out our long-term (five-year plus) ambitions for UK bioscience and biotechnology, together with the specific actions we will take over the next three years to enhance the UK's global reputation in bioscience and enable bio-based solutions to strategic challenges.

Leveraging our leadership role and key position within the UK and global bioscience landscape, we will convene partnerships that connect funders, academics, businesses, policymakers to develop and deliver interventions in more coordinated and efficient ways. We will remain agile and responsive to new ideas and emerging challenges through active horizon-scanning, ensuring that stakeholder perspectives and priorities are reflected in our strategic decision making.

Our vision is to advance the frontiers of biology and drive towards a healthy, prosperous, and sustainable future.

Our purpose

BBSRC supports research, innovation, people, infrastructures and partnerships to advance the frontiers of biology and drive towards a healthy, prosperous, and sustainable future.

Our principles for change – we will embed the principles of diversity, resilience, connectivity and engagement across all our work, to drive change and create the conditions for an outstanding research and innovation system

Our strategic objectives provide the framework for how we will achieve our vision and realise our principles, through world-class:

People and careers

Attracting, retaining and developing a highly skilled, diverse and mobile bioscience workforce through a long-term, systemic approach to people and talent that recognises the value of the whole team, and fosters an open and positive research and innovation culture.

Places

Strengthening clusters, national capabilities and institutes, research and innovation campuses and infrastructures across the UK, and partnering internationally, to enable world-leading bioscience, and its transition into economic and societal benefits.

Ideas

Keeping the UK at the leading-edge of bioscience discovery by supporting people and teams to pursue great ideas and promoting research that advances our understanding of the fundamental 'rules of life'.

Innovation

Driving innovation, translation and enterprise in UK bioscience, working with Innovate UK, business, investors, and regional partners to build collaborations and creating the conditions for increased private sector investment in R&D.

Impacts

Enhancing UK leadership in transformative technologies, and delivering bio-based solutions in:

- sustainable agriculture and food
- advanced manufacturing and clean growth
- an integrated understanding of health.

Supported by **a world-class organisation** – delivering efficiently and effectively as part of UKRI, embedding equality, diversity and inclusion (EDI) and catalysing change through evidence and engagement.

Objective 1: World-class people and careers

Attracting, retaining and developing a highly skilled, diverse, mobile bioscience workforce is essential for the health and vibrancy of UK biosciences. A key part of BBSRC's role within UKRI is to maintain and enhance UK strengths in bioscience research and innovation by supporting the necessary scientific, technical, entrepreneurial, and professional skills and capabilities, with an open and positive research culture, that allows everyone to thrive.

1.1: People and talent

As part of UKRI, our long-term, systemic approach to people and talent will focus on supporting high-impact researchers and innovators, considering the needs of the individual and the wider discipline, under four themes:

- Capacity and Capability in Core Bioscience Disciplines: a critical mass and appropriate balance of researchers, innovators, technicians, data scientists and professional support staff within the core bioscience disciplines.
- Continuing Professional Development: equipping people with the right research, innovation, technical and leadership skills over the course of their career to enable them to operate effectively and ethically in a changing professional environment.
- Research and Innovation Teams: diverse and inclusive teams with the right balance of skills and roles to deliver on complex multi disciplinary, cross-sector and international research and innovation challenges and advance the frontiers of bioscience knowledge.
- Research and Innovation Culture: *see 1.2*

Access to excellent doctoral training in the biosciences is a high priority for BBSRC. As part of UKRI's collective approach to talent funding and work to develop the new deal for postgraduate research, we will evolve our doctoral training programmes to harmonise and simplify them and share good practice from our current investments.

The role of the whole team is vital to research. As a supporter of the Researcher Development Concordat and Technician Commitment, we will continue to improve engagement with, and support of, these communities. Early career researchers will be supported in transitioning towards their future, through targeted mobility funding, access to entrepreneurial support and future fellowships programmes.

We will enable cross-discipline, cross-sector, and international mobility, recognising the importance of knowledge exchange for research, skills, and careers development.

We will:

- invest at least £45 million per year in doctoral studentships through our Doctoral and Collaborative Training Partnerships, providing skilled people for research, industry, and the wider economy.
- identify and instigate targeted training investments, investing up to £5 million per year to support new, strategic and interdisciplinary approaches to bioscience.
- maintain excellent training experiences and increase the diversity of people participating in BBSRC-funded programmes by collaborating with our training investment partners to monitor and evaluate outcomes and support co-development of initiatives.
- support early career researchers at key transition stages, investing at least £7 million per year in our Discovery Fellowships, and through UKRI's collective approach to talent.
- pilot ways to embed sector, disciplinary and international porosity and mobility for all people funded through our research, innovation, talent, and international investments, including continued support for Daphne Jackson Trust fellowships for returners to research.
- evaluate the inclusion of workforce development plans in our Prosperity Partnership programme *(see 4.1)* to support the development of high performing teams.

Case studies

Embedding an entrepreneurial culture

The Quadram Institute, a leading centre for food and health research and innovation, strategically-supported by BBSRC, has taken steps to boost innovation skills in its early career researchers. Through workshops exploring the foundations of innovation and entrepreneurship together with mentoring around personal goals, the training has been led by early career researchers. The group's 'Ten Simple Rules' for using entrepreneurship skills to improve research careers and culture have been shared with the wider research and innovation community through publication in open access journal PLOS Computational Biology.

1.2: Research and innovation culture

Our systemic approach includes working across UKRI and the wider sector to create a research and innovation culture that enables the UK to attract and retain top global and domestic talent, a key ambition of the government's R&D People and Culture strategy.

Diversity is essential not only in ensuring that the sector is attractive to globally-mobile, highly skilled people as a welcoming career destination, but also for maximising creativity, innovation and productivity within high performing research and innovation teams. Within the context of the UKRI Equality, Diversity, and Inclusion (EDI) strategy, BBSRC will develop ways to support culture change and embed EDI in bioscience research and innovation. *(see 6.1)*.

We will also work with the community to explore and realise the benefits from more open and collaborative approaches to bioscience, including data-sharing, and making the outputs from the research we fund publicly accessible.

We will:

- promote recognition for the diverse contributions to research and innovation made by all constituents of the workforce e.g. by introducing the Resume for Researchers and Innovators (R4RI) across key investments.
- work with BBSRC strategically-funded institutes to develop and promote best practice in research and innovation culture through our new Institute Strategy.
- support the interdisciplinary equality, diversity and inclusion (EDI) caucus, working across UKRI, to provide evidence that informs EDI policy and practice in the research and innovation system.
- monitor the impact of UKRI's Open Access policy on the biosciences and renew our investment in *Europe PubMed Central* for the deposition of bioscience research papers.
- embed good data-sharing practices through our programmes and investments, to ensure that biological data is findable, accessible, interoperable, and reuseable (the 'FAIR' data principles), including through the establishment of BioFAIR, a community-led virtual infrastructure which will enhance the sharing, management, and reuse of life sciences data.

Case studies

Improving access to doctoral training

Through our training partnerships programme, BBSRC has supported the Nottingham Doctoral Training Partnership to develop AMPlify – a programme which offers applicants from Black backgrounds the opportunity to engage in mentoring and support during the application process. Alongside broader EDI interventions focused on marketing, application, and interview processes, AMPlify has contributed to an increase in the proportion of the 2021 'home candidate' cohort who identify as coming from an ethnic minority (excluding white minorities) background to 23.7%, compared to less than 6% from 2012–19.

Objective 2: World-class places

BBSRC investments in bioscience infrastructures, specialist institutes and Research and Innovation Campuses across the UK have established critical national capabilities and innovation clusters to support the ongoing impact and growth of UK bioscience.

Our strategic investments in institutes and campuses will continue to drive collaboration, connect local communities, secure regional partners and private investment to create shared prosperity, contributing to the government's Innovation and Levelling up strategies, and pioneering environmentally sustainable approaches to infrastructure. We will develop a greater understanding of the impact of BBSRC funding on 'place' and ensure our funding is delivered in an accessible and inclusive framework, working with others across UKRI's portfolio of institutes and campuses to establish new process and programme tools to maximise positive local outcomes.

2.1: Innovation places: Institutes and campuses

BBSRC invests strategically in eight specialist research institutes throughout the UK. These institutes provide national capability, in the form of a critical mass of world-leading expertise and long-term programmes of research in strategically important areas, delivering bio-based solutions to global challenges and addressing national strategies in sustainable agriculture, food, nutrition, and health.

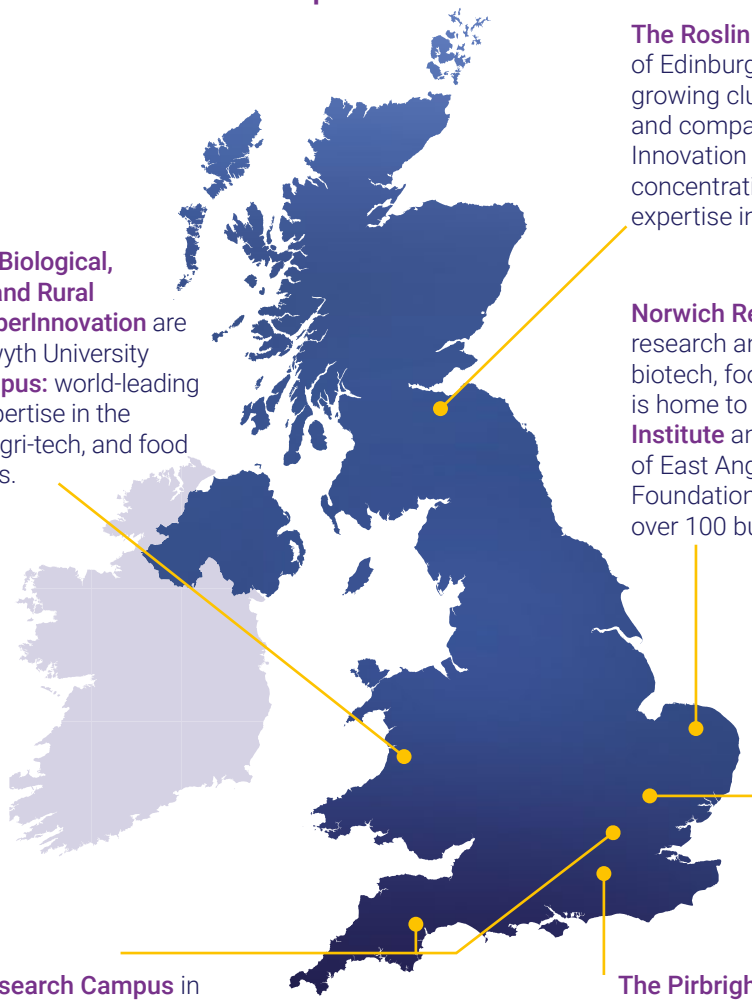
Our Institute Strategy sets out our vision and approach to working in partnership with the institutes across three pillars of Capability, Connectivity, and Culture. Together we will seek to ensure institutes are recognised globally as accessible, integrated, and sustainable national capabilities delivering excellent, strategically relevant research and innovation with wide-ranging social and economic impact, and deep connections to a range of stakeholders locally, nationally, and internationally.

The institutes are anchors of bioscience capability, around which we have worked with partners to establish five Research and Innovation Campuses. The campuses offer unique environments where companies can access and collaborate with specialist facilities and research expertise, thereby fostering early-stage innovation, attracting private investment and accelerating excellent research into tangible social and economic benefits. Collectively they directly support over 4100 jobs, and host more than 200 companies that have raised over £1.2 billion private investment to date[1]. Through evolution of these existing bioscience innovation clusters, and creation of new clusters in line with emerging market opportunities, we will identify and stimulate new bioscience 'innovation zones' in areas such as the North of England and South West England, driving UK economic growth with regional and local benefits.

We will:

- through the Institute Assessment Exercise 2022, initiate the next cycle of major strategic research programmes at our eight strategically-supported institutes, investing over £400 million over the next five years.
- accelerate capability to develop and test novel vaccines for livestock diseases by establishing a new £40 million Veterinary Vaccine Manufacturing and Innovation Centre at The Pirbright Institute working with the Foreign, Commonwealth and Development Office (FCDO) and the Bill and Melinda Gates Foundation.
- support the creation of integrated innovation environments within and across the BBSRC institute portfolio through development of collaborative opportunities, sharing best practice, encouraging an entrepreneurial culture, and enabling connectivity to the wider research and innovation landscape.
- develop new targeted funding mechanisms to boost innovation activity across and between BBSRC-funded national research and innovation campuses, enabling the development of wider collaboration opportunities, including with other UKRI-supported infrastructures.
- maximise the impact of clusters of bioscience strength by supporting each of the campuses' individual growth and development strategies, leveraging local, regional, and national public funding, and drawing in private investment where appropriate.
- support bioscience innovation as part of a coordinated enterprise system by building on lessons learned from pilot accelerators and developing a strategy for a national bioscience accelerator programme.

Map of BBSRC strategically-supported institutes and Research and Innovation Campuses



The Roslin Institute is part of the University of Edinburgh's **Easter Bush Campus**: a growing cluster of bioscience organisations and companies located in the Roslin Innovation Centre, representing the largest concentration of animal science and related expertise in Europe.

The **Institute of Biological, Environmental and Rural Sciences** and **AberInnovation** are part of Aberystwyth University **Gogerddan campus:** world-leading facilities and expertise in the biotechnology, agri-tech, and food and drink sectors.

Norwich Research Park: a critical mass of research and innovation in agri-tech, industrial biotech, food, health and genomics. The park is home to the **John Innes Centre, Quadram Institute** and **Earlham Institute**, University of East Anglia, University Hospitals NHS Foundation Trust, Sainsbury Laboratory and over 100 businesses.

Babraham Research Campus: co-locates the **Babraham Institute** and over 60 early stage and growing life science companies. The campus is part of the Cambridge life science cluster.

Rothamsted Research Campus in Harpenden, delivers cutting edge research and innovation in agricultural science and technologies. **Rothamsted Research** also includes the **North Wyke Farm Platform** in Devon.

The Pirbright Institute is a world leading centre for prevention and control of viral diseases of animals, including those that spread to people.

Case studies

Supporting start-up and scale-up in the life science sector

The Babraham Research Campus' Accelerate@Babraham programme has supported bioscience start-up company MicrofluidX, to develop a new bioprocessing platform for cell and gene therapy. It tackles the problems of process control, scalability, and cost associated with cell bioprocessing.

"Being associated with the Babraham Research Campus has improved our visibility within the UK ecosystem, which has enabled us to gain traction with commercial partners and investors, structure our staff and facilities, and develop a market-led IP strategy to address a valuable patient need. Following the programme, we raised £1.4 million in a seed funding round led by UKI2S."
Dr Antoine Espinet, Founder & CEO of MicroFluidX

2.2: Infrastructure

We must ensure that UK bioscientists can access cutting-edge, sustainable research and innovation infrastructures. These range from essential bioinformatics and biological resources, such as databases and biological collections, to state-of-the-art instrumentation and facilities, including high-throughput 'omics platforms, farm scale/in-field infrastructures and advanced bioimaging technologies.

Informed by a new BBSRC Infrastructure Strategy and the UKRI infrastructure roadmap, we will work across UKRI and with international partners to establish and enable access to infrastructures, including multidisciplinary infrastructures operated by other UKRI Councils (e.g. Diamond Light Source), that meet the needs of UK bioscience, as well as facilitating data-sharing between disciplines. In addition, we will develop approaches to support the sustainable operation of equipment, facilities, and resources, including associated specialist technical support.

Linking researchers and users through infrastructure, whether virtual, local, national, or international, is crucial to the competitiveness of UK bioscience. BBSRC will lead for the UK in the coordination, development, and delivery of relevant transnational research and innovation infrastructures for bioscience, connecting infrastructures across disciplines, nationally and internationally, and between academia and industry.

We will:

- publish a BBSRC Infrastructure Strategy which informs our approach to infrastructure investment and priorities.
- invest over £60 million, alongside Wellcome Trust, in the first phase of expansion of technical and physical infrastructure at the European Molecular Biology Laboratory's UK Outstation, the European Bioinformatics Institute (EMBL-EBI), and progress the business case for a second phase investment of over £80 million.
- progress the development of national capabilities and new and existing UK nodes for infrastructures on the European Strategy Forum on Research Infrastructures (ESFRI) Roadmap, such as ELIXIR (bioinformatics), Euro-BioImaging and EMPHASIS (plant and crop phenotyping).
- ensure researchers and innovators have access to essential equipment, investing at least £13 million per year through our 'ALERT' programme.
- deliver the John Innes Centre and The Sainsbury Laboratory Next Generation Infrastructure programme *(see highlight)*.

John Innes Centre and The Sainsbury Laboratory Next Generation Infrastructure programme

BBSRC is working with regional, national and charitable partners to deliver the John Innes Centre and The Sainsbury Laboratory Next Generation Infrastructure programme. £317.7 million from the UKRI Infrastructure Fund (subject to business case) as part of an approximate £390 million total investment will establish a global interdisciplinary hub for plant and microbial sciences that is energy self-sufficient and carbon net zero.

The hub will integrate capabilities for plant genetics, genomics, pathology, and phenotyping alongside field trial facilities. This will enable research that addresses global challenges including genetic crop improvement strategies, reducing greenhouse gas emissions, and understanding plant-microbe interactions to develop clinical treatments to improve human health.

2.3 International partnerships

BBSRC investments benefit from international cooperation and coordination, including leveraging resource, combining approaches to global challenges, international horizon-scanning, or ensuring the UK gains from skills, data, infrastructure, and novel approaches in other countries. Our international programme aligns to ambitions set out in the government's Integrated Review, Innovation Strategy, and forthcoming UKRI International Strategic Framework.

International collaborations in science and technology advance the UK's global reputation and influence. We will engage and invest in key strategic bilateral and multilateral international relationships to strengthen bioscience research and innovation, working with both research-intensive and low- and middle-income countries. We will build on our strong track record with funding agencies and organisations in Europe and globally, to ensure that the UK is a partner of choice for bioscience research and innovation, and international programmes and policies continue to offer benefit to the UK.

We will:

- stimulate global collaborations to advance bioscience discovery and innovation through scaleup and diversification of our international funding partnerships.
- sustain and expand global collaborative programmes that are central to bioscience including those addressing UN Sustainable Development Goals, strengthening ties with Europe through emerging opportunities, and with countries across the world.
- enhance bottom-up collaboration with prioritised research-intensive nations and seek new opportunities in translation and innovation, building on our Lead Agency Agreements with the USA and Brazil and other bi-/trilateral agreements.
- with the Medical Research Council (MRC), the Science and Technology Facilities Council (STFC) and Department for Business, Energy, and Industrial Strategy (BEIS), support UK participation in the Human Frontier Science Program, European Molecular Biology Organisation and EMBL Indicative Scheme to ensure UK researchers can access the joint research and mobility opportunities provided by these international initiatives.

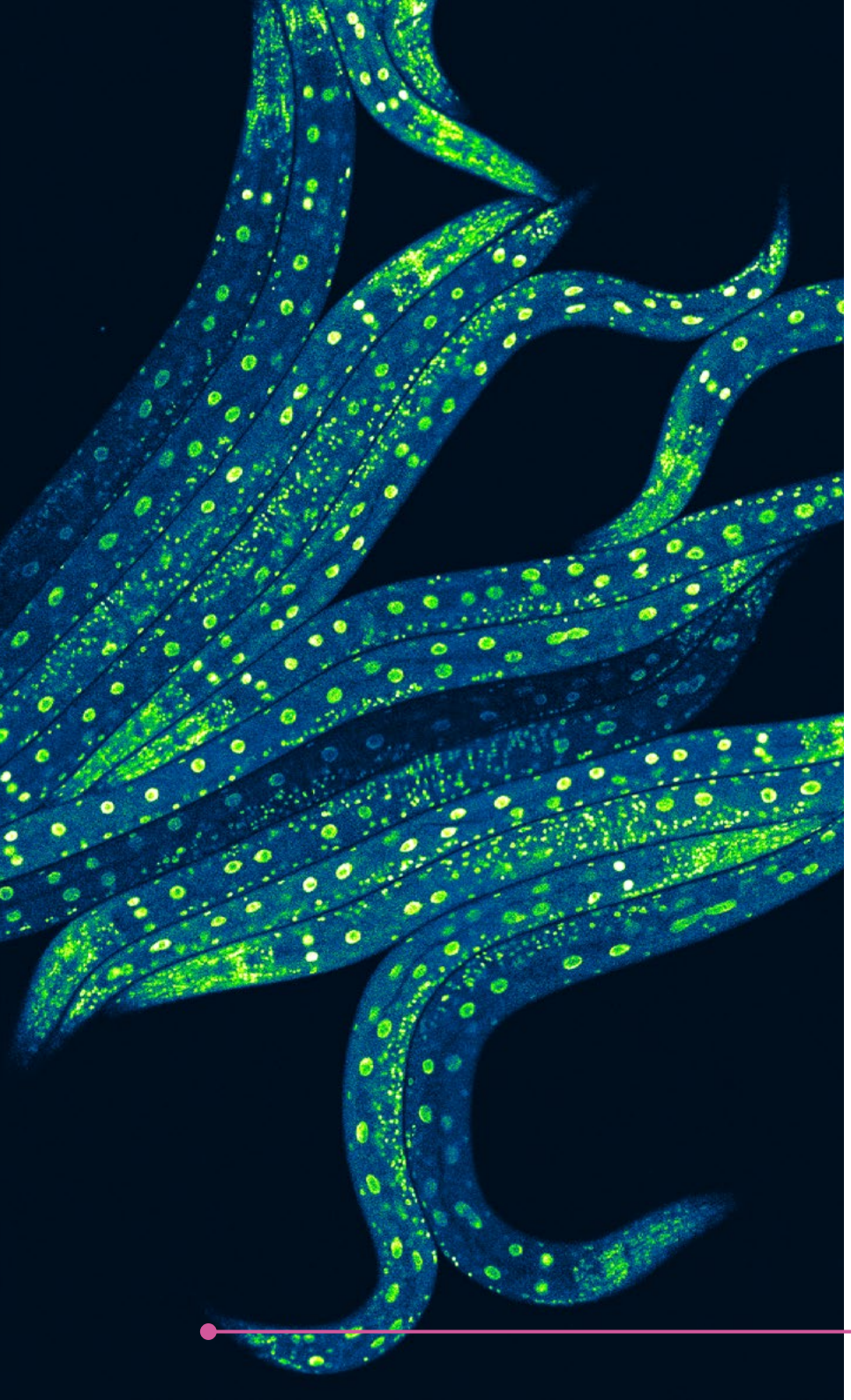
Case studies

Collaboration to feed the world in a changing climate

Wheat provides 20% of total calories consumed by humans daily worldwide. The International Wheat Yield Partnership brings together public and private research organisations from around the world with the goal of increasing wheat genetic yield potential by 50% by 2035. With BBSRC as the UK partner, IWYP provides germplasm, knowledge, and tools to breeding programs around the world to achieve gains in farmers' fields. This is achieved by combining wheat genomics discoveries made around the world and tests them against elite lines in the field.

The outcomes so far:

- 298 new wheat crosses, 320 available wheat lines and four wheat varieties; the best new wheat lines had over 6% higher grain yield compared to elite varieties.
- 40 UK scientists have joined a network of over 150 researchers across 14 countries.
- 57 UK-based early career researchers have received training through the network.



Objective 3: World-class ideas

The UK's excellence in bioscience is founded on the creativity of our research and innovation community. BBSRC invests in research to deliver new knowledge and to sustain and grow our national capability across the breadth of bioscience disciplines. In doing so, we promote multidisciplinary collaboration to enhance bioscience discovery, whilst also remaining responsive to emerging needs and opportunity.

3.1: Bioscience discovery

BBSRC is committed to providing researchers from any background or career stage the freedom to pursue promising ideas and conduct excellent bioscience. This investigator-driven approach extends across our portfolio, contributing to a culture that values and encourages scientific curiosity and creativity. Through open and flexible routes to support the continuous stream of innovative ideas arising from the research community, alongside our investments in fellowships to develop the next generation of bioscience researchers and innovators *(see 1.1)*, we maintain a vibrant and resilient research base across bioscience disciplines and communities. This ensures the UK has the long-term breadth and depth in bioscience capability needed to respond to current and future challenges.

As research, innovation and our world are continually changing, new opportunities and challenges for bioscience to play a key role emerge. Through active horizon-scanning that engages across the bioscience community, UKRI, government partners, the wider research and innovation sector and society, we will remain agile and responsive to emerging research areas and catalyse fresh ways to deliver knowledge and innovation.

We will:

- support a diverse range of high-quality ideas through our flagship responsive mode programme, investing over £150 million per year in world-class investigator-driven research projects.
- establish a programme of dynamic 'spotlights' within responsive mode that targets key opportunity areas.
- work across UKRI to catalyse ideas that span disciplinary boundaries, including supporting development of a UKRI interdisciplinary responsive mode pilot.
- engage with stakeholders to identify, develop, promote, and invest in emerging research areas and training at the cutting-edge of bioscience, including through BBSRC's Council and advisory structures, big ideas pipeline and broader programme of horizon-scanning.

3.2: Understanding the rules of life

Advancing our fundamental understanding of living systems is at the heart of bioscience research and innovation. BBSRC is committed to supporting excellent research that delivers new knowledge about key biological principles and mechanisms that operate across different organisms, at scales ranging from molecules to populations. Whilst this is a significant scientific challenge given the great complexity and diversity of life that has arisen through evolution, but it will ultimately allow us to accurately predict and harness biology, unlocking its full potential to benefit society in areas such as agriculture, health, biotechnology, and the green economy.

The rapid progress in our understanding of these basic 'rules of life' is being driven by new technologies, by collaboration across bioscience disciplines and other fields such as the physical sciences and engineering, and by increasingly sophisticated approaches to analysing and integrating data. We will encourage researchers to bring these elements together to pursue bold, creative, and innovative questions at the forefront of contemporary bioscience.

World class plant science

BBSRC is a major player in maintaining the health of key bioscience disciplines. This is particularly important in areas where there are relatively few other funders.

For example, BBSRC is the primary funder of plant science research in the UK, investing more than £388 million between 2008–09 and 2018–19[2] and supporting over 420 plant science studentships. Investment includes support for research in universities, national capabilities in plant and crop science such as IBERS in Wales, the John Innes Centre and Rothamsted Research in England, and resources such as the Nottingham Arabidopsis Stock Centre.

Through continued support, and by contributing to the ambitious goals of the ten-year green roadmap for UK plant sciences, BBSRC will help fulfil the huge potential of plant science to benefit society.

We will:

- invest annually in a portfolio of *Strategic Longer and Larger* (sLoLa) awards – large-scale, multidisciplinary projects that support teams to tackle significant fundamental questions in bioscience.
- catalyse adventurous early-stage research that could lead to breakthrough discoveries that reshape our understanding of the rules of life, progressing a £4 million pilot call in 2022.
- support collaborative projects between UK and US researchers to advance the frontier of biological discovery, through our lead agency scheme with the US National Science Foundation.

Case studies

A role for non-coding DNA in biodiversity

Genomics has created unprecedented opportunities to understand the genetic mechanisms of evolution. The BBSRC-supported Earlham Institute, with the University of East Anglia and Wisconsin Institute of Discovery, have been studying how cichlid fish have adapted to a variety of ecological conditions, creating a diverse array of well over 2,000 species within only 10 million years from common ancestors in the East African Rift lakes.

Researchers found this spike in biodiversity could be explained by fine-scale 'genetic rewiring' of non-coding DNA that regulate gene activity. If similar processes govern adaptations to tolerate high temperatures or water salinity, this knowledge could inform breeding programmes in farmed fish like Tilapia, with potential impact for improving food security in a changing environment.

Gene drives to fight antimicrobial resistance

Understanding fundamental biological mechanisms provides important insights into our world and can reveal opportunities to tackle problems in novel ways. Dr Stineke Van Houte from the University of Exeter is shedding light on the evolutionary battle between the CRISPR-Cas bacterial immune system and the viruses that infect them.

Building on her BBSRC Discovery Fellowship, which showed how CRISPR-Cas9 gene drives could remove antibiotic resistance genes from microbial populations, Dr Van Houte and her group continue to investigate how this evolutionary arms race and others like it might be exploited to refine the next generation of gene editing techniques.

Objective 4: World-class innovation

BBSRC has a pivotal role in delivering the government's Innovation Strategy by providing the leadership and smart connections that will incentivise and support bioscientists to be enterprising, and connect entrepreneurs with bioscientists, building on discoveries through innovation.

Innovation through bioscience research can take many forms, be achieved through multiple, non-linear pathways, and involve a range of partners and enablers as part of a connected ecosystem. People are at the centre of this system, driving enterprise and building a diverse and productive workforce that attracts inward investment and anchors businesses in the UK. Our systems-based support for bioscience innovation reflects this complexity.

4.1: Enabling innovation and working with business

Our ambition is to drive and accelerate innovation. We will deliver societal benefit and impact through supporting researchers, innovators, and businesses in translating fundamental understanding of biological systems. We will work in partnership with Innovate UK and more broadly across UKRI, businesses, and innovation organisations regionally, nationally, and globally, to deliver system-wide changes. This will enable a more connected innovation ecosystem and a culture that supports and values enterprise and delivers the UK government's ambition for the UK to be an innovation nation, boosting productivity and accelerating growth to build an environment that allows bioscience innovation to flourish.

In addition to our successful schemes supporting collaborative research between academia and business, such as LINK and Industrial Partnering Awards, we will work directly with businesses to increase public and private investment in R&D across the UK, by investing in longer, strategic collaborative R&D partnerships between businesses and researchers. We will engage businesses in co-investing, co-designing, and co-delivering new pre-competitive collaborative R&D programmes with academic researchers to address shared innovation challenges, and to enable the development of long-term partnerships.

Indicators such as strong business demand due to economic challenges, emerging market opportunities, and/or policy and regulatory drivers for the UK will help guide our strategic engagement and investment with businesses.

We will:

- work and co-invest at least £11 million with Innovate UK, government and the research and innovation community to establish the Diet and Health Open Innovation Research Club helping to inform and support national strategy and policy.
- working with Innovate UK, jointly invest at least £20 million in capacity building, research, innovation and business-led commercialisation to help develop alternative, more sustainable protein sources.
- catalyse collaboration with industry to achieve breakthrough innovation in biofilm science and technology, co-investing up to £7.5 million over five years with Innovate UK to implement Phase Two of the National Biofilms Innovation Centre.
- develop and launch a strategic investment of up to £14 million with Innovate UK and the Engineering and Physical Sciences Research Council (EPSRC) to enable businesses, academic researchers and other stakeholders to catalyse and expand research, innovation, and commercialisation in sustainable biomanufacturing across the UK.
- establish an £11 million BBSRC Prosperity Partnership pilot to enable the development and growth of long-term, strategic collaborative partnerships between businesses and academic researchers in bioscience and biotechnology.
- invest at least £6 million in research and innovation-driven solutions to tackle endemic diseases in livestock, in collaboration with businesses, Department for Environment, Food and Rural Affairs (Defra), and the devolved administrations.
- strategically partner with Innovate UK to explore and create a future programme of collaboration and co-investment in mutual priority areas, with an initial focus on microbial communities.

National Biofilms Innovation Centre

The National Biofilms Innovation Centre is the largest knowledge exchange consortium of its kind, catalysing collaboration with industry in the study of biofilms to achieve breakthrough innovation across diverse industries and sectors. In less than five years the centre has attracted £26 million of additional public and private funding.

The centre is part of the UK Biofilms Programme, in which BBSRC and Innovate UK have jointly invested more than £20 million over several years, leveraging millions of pounds of private sector investment in R&D. This is one example of how BBSRC and Innovate UK work closely together and with businesses to support innovation in UK bioscience, build connections across the innovation ecosystem and stimulate private sector co-investment.

4.2: Translation, enterprise, and venture activities

Realising economic and societal benefit from the ideas, knowledge, technologies, skills and capabilities derived from bioscience research is complex and multi-dimensional. Fulfilling this requires a deep, sector-specific understanding of market-need, regulation, and diverse routes to applications.

Working with Innovate UK, investment leaders and partners across the sector, we will support the development of cohesive frameworks for innovation – including, for example, the UKRI Commercialisation Funding Framework – that create the conditions for successful translation of research outcomes into real-world and commercial impacts, and to support the emergence of new companies with the maximum opportunity to succeed.

We will take a systems-wide approach by developing the people, talent, and culture to foster and incentivise bioscience innovation with a market-driven, customer-led mindset. This includes embedding innovation and enterprise skills within the bioscience research and innovation system (see 1.2), supporting people to refine commercial opportunities, develop understanding of market offering and timelines, create robust business models and secure early-stage investment.

We will:

- boost progression of bioscience discoveries into pioneering policies, products, processes, and services through support for translation and follow-on funding.
- identify and share good practice in management and deployment of Impact Acceleration Accounts (IAAs), developing the BBSRC IAA offering as part of the UKRI approach, and to increase regional and multidisciplinary collaboration and connectivity.
- partner with and grow the UK Innovation and Science Seed fund (UKI2S) alongside Defence Science and Technology Laboratory (Dstl), STFC and the Natural Environment Research Council (NERC) and work with Innovate UK to draw the wider investment community.
- develop the enterprise and entrepreneurial skills and capability of the academic research base by establishing a bioscience Innovation to Commercialise of University Research (ICURe) pilot, working with Innovate UK and external partners.
- develop a cohort of bioscience investors to create the widest circle of influence and investment opportunity for innovators, exploring mechanisms to connect bioscientists and investors, developing regional investor networks and showcasing bioscience opportunities.

Case studies

Supporting great ideas at every step

NanoSyrinx is a discovery-stage biotechnology company based at the University of Warwick. The team are using synthetic biology approaches to develop targeted drug delivery of therapeutic proteins and peptides, into the interiors of cells. This novel approach uses naturally occurring protein ‘nanosyringes’ to improve efficacy, safety, and cost.

Professor Nicholas Waterfield and Research Fellow Dr Alexia Hapeshi founded NanoSyrinx, building on previous research of Dr Joseph Healey. They benefited from the PreCURe and ICURe programmes, BBSRC Pathfinder, and BBSRC Follow on Funding, launching in 2020 with backing that included UKI2S Fund. In July 2021, they raised a further £6.2 million of private seed financing to continue developing the platform.

Objective 5: World-class impacts

Bioscience offers significant opportunities to provide solutions to challenges facing society, whilst simultaneously driving innovation and growth in the technologies, and industries of the future. We will support the development of the ideas, skills and capabilities needed to address these challenges, and work with users to ensure effective translation to new products, processes, and policies.

Our priorities will contribute to delivery of UKRI strategic themes, National Science Technology Council (NSTC) priorities, and government strategies for Innovation, Life Sciences, Food, Agriculture, and the Environment. We will work across UKRI and with government departments and devolved administrations, practitioners, charities, Non-governmental organisations (NGOs), industry, and international partners to enable the responsible development of bio-based solutions, and to catalyse coordinated, interdisciplinary approaches to these complex and long-term socio-economic challenges.

Alongside universities, our strategically supported institutes play a vital role in addressing these challenges through long-term research programmes, training, and provision of national capabilities *(see 2.1)*.

5.1: Transformative technologies

Technologies are vital in advancing bioscience research and innovation, accelerating the pace of discovery, providing new opportunities for business and innovative ways to tackle health, environmental and productivity challenges.

We will drive the emergence and adoption of transformative bioscience technologies, including those identified as priorities in the government's Innovation Strategy, such as engineering biology, artificial intelligence (AI) and bioinformatics and genomics, reflecting the key role of bioscience technologies in providing strategic advantage for future national prosperity.

Our support for the development and application of new technologies will expand the toolkit of cutting-edge genetic, omics, imaging, sensing, data-science and biophysical technologies. We will work closely with EPSRC, MRC, NERC, STFC and Innovate UK to drive convergence and integration between the biosciences, engineering, and physical sciences, and accelerate translation. Bioscience is increasingly data-rich, and we will support the development of computational and mathematical approaches to derive maximum value from complex data, whilst enhancing the standardisation, interoperability, and reproducibility of bioscience research.

We will:

- lead, on behalf of UKRI and government partners, the development of a National Engineering Biology Programme, to consolidate and grow the UK's global leadership in engineering biology.
- publish BBSRC's Review of Technology Development for the Biosciences and implement actions with an initial focus on Basic Technologies.
- support capacity building and development of digital and data skills in the biosciences, building on BBSRC's Review of Data-Intensive Bioscience.
- invest in technology development, software, and resources through our £9.5 million per year Tools and Resources fund.
- increase capability at the interface between AI and bioscience, investing an initial £1 million in an interdisciplinary community research network, growing bioscience connectivity with The Alan Turing Institute, and contributing to the UKRI AI programme including AI Centres for Doctoral Training.
- explore opportunities to build on the UK's strengths in genomics and bioinformatics to accelerate the responsible development of new biotechnologies.

Case studies

Using electrical signals to control gene expression

The ability to precisely control gene expression is crucial for the application of engineering biology.

BBSRC-supported research led by a team at Imperial College London have created an improved method for turning genes on and off using electrical signals. The new method allows gene expression to be precisely altered by supplying and removing electrons. It offers a powerful new tool within the field of electrogenetics – using electricity to control cell processes and systems. The tool has the potential to help control biomedical implants in the body or reactions in large 'bioreactors' that produce a range of useful biomolecules.

5.2: Sustainable agriculture and food

Agricultural and food systems play a critical role in the biggest challenges facing humanity such as feeding a growing population providing livelihoods, protecting the environment, and addressing climate change. There is an urgent need to transform UK and global agri-food systems to mitigate, adapt and build resilience to climate change, decarbonise[3], reverse biodiversity decline[4], and improve animal welfare, whilst delivering positive nutritional, health and environmental[5] outcomes.

As the main public funder of agri-food research in the UK, including long-term programmes at our strategically-supported institutes, we will support research that deepens our biological understanding of soils, crops and farmed animals (including aquaculture), taking a system-based approach at multiple scales (lab-field-farm-landscape) to have real-world impact. We will drive development of novel and disruptive ideas, technologies and approaches (e.g. 'omics, engineering biology, controlled environment farming, phenotyping, genome editing, AI, digital twins) and build capability and skills vital now and in the future.

Our ambition is to ensure the UK's strengths in bioscience have an impact on global food and nutrition security, and drive innovation and policy to a deliver sustainable, productive, diverse, resilient, and healthy agri-food system.

We will:

- provide strategic leadership to support delivery of agri-food components of the UK Net Zero strategy, UKRI 'Building a Green Future' programme and international commitments made at COP26 e.g. the Agriculture Innovation Mission for Climate.
- with EPSRC, NERC and the Economic and Social Research Council (ESRC) deliver the UK-wide Net Zero Agri-food Network Plus – an interdisciplinary multi-stakeholder community and feasibility projects to explore how sector transformation towards net zero can be most effectively catalysed.
- deliver the Molecules to Landscape programme with NERC – a shared agri-environment research agenda to build interdisciplinary capability across molecular, data, agricultural and environmental sciences.
- scope future funding programmes addressing key challenges in agriculture and food, including soil health, animal health and welfare, climate smart agriculture / breeding, plant health and food loss, working across UKRI, and with partners in academia and business.
- enhance coordination and collaboration on food research by working across UKRI, government departments and devolved administrations, including delivery of the £47.5 million 'Transforming UK Food Systems' programme, evaluation of the multi-partner Global Food Security programme, and a 'deep dive analysis' of the UKRI Food Portfolio.

Case studies

New non-invasive test uses AI to detect Bovine TB in milk

Bovine tuberculosis (bTB) impacts the health of dairy cow herds globally and costs the UK around £175 million annually. Current tests for the disease are time and labour intensive and risk missing an infected animal.

With funding from BBSRC and Defra, researchers at Scotland's Rural College have developed a new, non-invasive method that uses AI and infrared spectrometry to detect bTB in milk. Using routinely collected milk samples means the tool is low cost and gives farmers information much faster. Faster decisions mean better health and welfare and reductions in the wider costs of bTB.

Project partners included: NVIDIA Corporation, National Milk Records, the Animal and Plant Health Agency, and the British Cattle Movement Service.

5.3: Advanced manufacturing and clean growth

Bio-based solutions can transform a wide range of businesses and supply chains covering chemicals, pharmaceuticals, healthcare, energy, materials, fashion, remediation, and construction industries. Bio-based processes can also reduce reliance on fossil chemical feedstocks and fossil-fuel derived processes, significantly reducing carbon emissions as well as performing vital environmental remediation.

BBSRC's investments, in partnership with EPSRC, Innovate UK and others, have established an extensive academic and business community in this area. We will continue to work with national and international partners to promote the use of bio-based solutions in advanced manufacturing, including greater use of residues in a more circular (bio)economy by creating value from waste.

We will encourage whole-systems approaches, including life-cycle analyses that consider the range, efficiency, and cost-effectiveness of bio-based technologies, and facilitate the emergence of new business models for bio-based manufacture and bio-based services.

These activities will contribute to the UK Net Zero Strategy and UKRI 'Building a Green Future' strategic theme, as well as supporting global strategies to mitigate climate change.

We will:

- deliver the £31.5 million Greenhouse Gas Removal programme to assess sustainable routes for large-scale removal of greenhouse gases from the atmosphere, working with NERC, other UKRI Councils, BEIS and Defra.
- scope future funding programmes on the circular economy featuring sustainable fashion, technology-relevant metal recovery, and plastic waste, working across UKRI, and with partners in academia and business.
- on behalf of BEIS, lead the UK input into the initial phases of the global Mission Innovation: Integrated Biorefineries programme, working with Innovate UK and EPSRC; this will also provide advice to BEIS and Defra to inform the UK Biomass Strategy.

Case studies

Holiferm turns greentech breakthrough into growing business

BBSRC and EPSRC invested £11 million to fund six unique collaborative networks in Phase 2 of the Networks in Industrial Biotechnology and Bioenergy, helping researchers and companies to collaborate and build connections.

The networks helped University of Manchester spin-out company Holiferm to take the development of an eco-cleaning ingredient from prototype to production. The company developed a novel method for making a key ingredient of everyday household products, which avoids the use of fossil fuel-based feedstocks. The resulting ingredient is biodegradable and low in ecotoxicity – opening pathways to major global markets.

Holiferm continues to grow, with a strategic agreement with one of the world's biggest chemical producers and opening its first commercial plant.

5.4: Integrated understanding of health

A deep, integrated understanding of the fundamental biological mechanisms of healthy systems across the life course is critical to improving human and animal health and wellbeing. By understanding and better exploiting the foundations for promoting and maintaining the resilience of physical and mental health, rather than overreliance on post-hoc interventions to alleviate poor health, there is the potential to deliver significant long-term socio-economic benefits through extending 'health span' for all.

Alongside other UKRI Councils, including MRC, and charitable funders such as the Wellcome Trust, BBSRC has a key role in health research and innovation, supporting the generation of new knowledge and bio-based solutions and championing the added value of integrated 'one health' approaches to areas such as infectious diseases and nutrition security.

Working across UK and international research policy and funding landscapes, and within the context of the Health, Ageing and Wellbeing and Tackling Infections UKRI strategic themes, BBSRC will support bioscience research in partnership with other disciplines that will help to address UK and global health challenges and underpin delivery of the government's Life Sciences Vision.

Tackling infections

The cost of infections to society can be enormous. In addition to the loss of human lives and impacts on health and wellbeing, the cost of the COVID-19 pandemic is estimated at between $8.1 and $15.8 trillion globally[6]. If antimicrobial resistance (AMR) remains unchecked estimates are of a cumulative economic impact of around $100 trillion lost from global GDP by 2050[7].

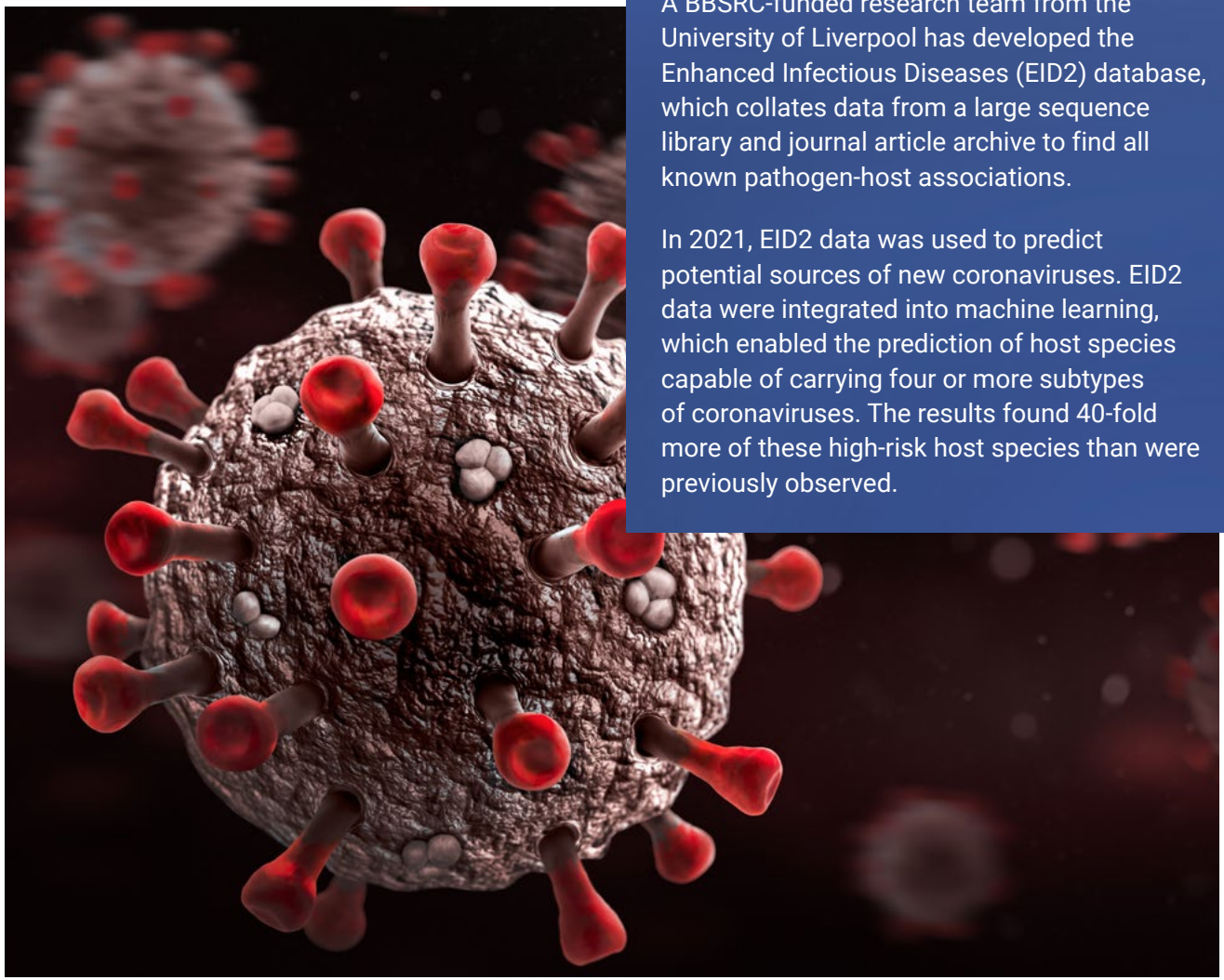
In support of UKRI's Tackling Infections strategic theme, working with MRC and other UKRI Councils, government, third sector funders and business, BBSRC will help lead the coordinated, interdisciplinary approaches required to transform the way we predict, prevent, detect, manage and treat infections in human, animal, and plants.

We will:

- Work with MRC, Defra, the UK Health Security Agency (UKHSA) and other stakeholders to support rapid responses to outbreaks of infectious diseases such as Avian Influenza and Monkeypox.
- Enable 'one health' and data-intensive approaches to address the evolving nature of vector-borne disease threats arising from climate, environmental and land-use changes.
- Support national capabilities in infectious disease research and veterinary vaccinology, including BBSRC strategically supported The Pirbright Institute and The Roslin Institute, part of the University of Edinburgh *(see 2.1)*.
- Support multidisciplinary research and community building for a step change in the translation of AMR research to answer problems posed by industry and the national AMR action plan.
- Work with NERC, Defra and Scottish government to improve UK resilience to bacterial diseases of crops, trees, and other plants through the £18 million Bacterial Plant Pathogens programme.

We will:

- enable new mechanistic understanding of key biological mechanisms underpinning health including the biological basis of ageing with MRC; and the gut-microbiome-brain-immunology axis.
- facilitate the development, validation and uptake of transformative tools and technologies to understand, manage and improve health and wellbeing in animals and humans, including models, platform technologies (vaccine, diagnostic and therapeutic), neurotechnologies, digital and AI technologies.
- deliver a £4 million investment, with the National Centre for the 3Rs (NC3Rs), to drive the development and uptake of non-animal technologies for bioscience research, building capacity and partnerships between academia, small and medium enterprises (SMEs), and industry.
- capitalise on advances in neuroscience and AI to support interdisciplinary work that will both advance understanding of the human brain and inform the development of next generation AI.
- refresh our bioscience for health strategic framework to inform our future priorities, programmes, and investments.



Case studies

A ‘big-data’ approach to predict potential sources of new coronaviruses

A BBSRC-funded research team from the University of Liverpool has developed the Enhanced Infectious Diseases (EID2) database, which collates data from a large sequence library and journal article archive to find all known pathogen-host associations.

In 2021, EID2 data was used to predict potential sources of new coronaviruses. EID2 data were integrated into machine learning, which enabled the prediction of host species capable of carrying four or more subtypes of coronaviruses. The results found 40-fold more of these high-risk host species than were previously observed.

Objective 6: A world-class organisation

Working as one UKRI we will strive to continuously improve our ways of working, building on the knowledge and expertise right across the organisation to catalyse more inclusive, efficient, and effective approaches to supporting world-class bioscience in the UK, ensuring value for the UK taxpayer, and delivering within our agreed operating budget.

6.1: Embedding EDI

We will work with our staff, communities and stakeholders to facilitate sharing of good practice across the sector and embed EDI in our own ways of working.

We will:

- refresh our EDI Action Plan, aligned to our UKRI EDI strategy and reflecting the priorities of the biosciences community.
- provide tools, training, and guidance for colleagues so they are confident in embedding EDI within strategy/policy development, programme design and peer review processes.
- improve the collection, analysis, and communication of data about the diversity of our portfolio and activities, to inform strategy development and identify targets for interventions.

6.2: Efficiency, effectiveness and agility

As part of our new UKRI Operating Model and organisational change programme we will continue to streamline and harmonise our systems, policies, and funding processes to make them less bureaucratic and more sustainable and efficient. This will include supporting the delivery of a single funding service, through the Simpler, Better Funding programme and a new Enterprise Resource Management system through the Services for HR, Accounting, Reporting and Procurement (SHARP) progamme. In doing so, we will ensure these improvements capture the full benefits of the recommendations from the Grant and Tickell Reviews.

A robust evidence base will allow us to track progress against our priorities, inform our decision making and guide our future strategies and plans. We strive to be at the leading edge of data analytics, collaborating with international experts in visual analytics, auto-classification, text analysis, and bibliometrics. We work across UKRI to share best practice in data management, analysis, monitoring, evaluation, and impact evidence, as well as fulfilling public accountability, transparency, and corporate reporting requirements.

We will:

- improve peer review processes, including ways of working for committee/panels meetings, aligning to our UKRI review of peer review.
- review and refresh our committee and panel appointments processes, increasing transparency, reducing barriers to participation, and supporting a greater range and diversity of people in engaging our work.
- support implementation of the UKRI Environmental Sustainability Strategy, including working in partnership with our strategically-funded institutes to adopt and share best practice.
- enhance our corporate dashboards to monitor the balance and outcomes of our investments, including by subject area, place, partnerships and the diversity of people we invest in.
- showcase discoveries and impacts arising from our investments using a range of impact evidence materials, including Research Excellence Framework 2021 impact case studies.
- deliver analyses and evaluations on topics such as antimicrobial resistance, industrial biotechnology and collaborative R&D, and UKRI 'deep dive' reviews on topics such as food.

6.3: Influence and engagement

BBSRC is an influential partner, leader and representative of UK biosciences across a range of policy areas, such as Open Research *(see 1.2)*, Research Culture & Ethics, Research Integrity, Trusted Research, Research Involving Animals, Science in Society and Genetic Technologies. We will ensure that such policies reflect, support and are embedded in bioscience research and innovation, and support the development of wider public policies to optimise the contribution that biosciences make to UK society and economy.

Through a strategic approach to communications and engagement, we can better understand, and reflect, the needs and interests of our diverse communities. We will enhance the effectiveness of our connectivity with stakeholders – including academia, government / policymakers, industry, NGOs, and the public – through a range of mechanisms to enable more inclusive ways of identifying and developing future priorities and reach wider audiences.

Our new Deputy Executive Chair will play an active role in engaging with stakeholders in academia, business and government, working collaboratively across UKRI and with partners more broadly to support strategic developments.

We will:

- co-lead with MRC, development and implementation of UKRI policies on Research Involving Animals.
- partner with the Nuffield Council on Bioethics and UKRI's Sciencewise programme to undertake a major new public dialogue on Genome Editing in Farmed Animals.
- draw on insights from our stakeholder engagement research to inform our new stakeholder engagement implementation plan.
- identify bioscience-specific actions and opportunities for public engagement in support of the forthcoming UKRI Public Engagement Strategy.
- deepen trusted relationships by providing guidance and opportunities for researchers to engage the public, and work with the UK Government and National devolved administrations, external funders and Learned Societies, in the UK and overseas, to deliver joint messaging and campaigns on areas of strategic interest.
- refresh our strategic approach to communications, based on audience insights, and enhance communication channels such as the BBSRC blog as part of our outreach and engagement.

Case studies

Citizen science to put public at the heart of food safety research

In 2021, BBSRC and ESRC collaborated with the Food Standard Agency to involve the public in tackling food standards challenges. Together with the UKRI Public Engagement team, the collaboration resulted in six citizen science projects connecting researchers with members of the public to explore a range of important issues around food safety. Issues include antimicrobial resistance, food hypersensitivity and food hygiene in the home.

Genome editing public dialogue

Genome editing technology – the precise, targeted, alteration of a DNA sequence in a living cell – has the potential to transform food production and food security. As the government considers next steps for regulation of genetic breeding technologies, it is vital to ensure that policy making in this area is informed by broad views and perspectives.

BBSRC, together with the Nuffield Council on Bioethics, and with the support of UKRI's Sciencewise programme, have commissioned a public dialogue on genome editing in farmed animals. The outcomes will help to shape research strategy, wider policy, regulation and responsible research and innovation pathways as the technologies develop.

Our budget

Budget category[i] [ii]	2022–23 (£m)	2023–24 (£m)	2024–25 (£m)
Core R&I Budgets	**300.41**	**317.51**	**326.41**
Existing cross-UKRI Strategic Programmes	**43.48**	**36.79**	**17.36**
Fund for International Collaboration	3.95	2.97	0.90
Strategic Priorities Fund	39.53	33.82	16.46
Infrastructure*	**56.16**	**70.32**	**73.55**
World-class Labs	55.99	70.24	73.55
Digital Research Infrastructure Programme – phase 1b pilot projects (2022–23 – 2023–24)	0.17	0.08	0.00
R&I Budgets – existing time-limited commitments	**1.07**	**0.00**	**0.00**
COVID interventions	1.07	0.00	0.00
Grand Total	**401.12**	**424.62**	**417.32**

* Infrastructure projects are detailed separately below. Note that further infrastructure allocations to Councils may be made during the Spending Review period from the Infrastructure Fund, Digital Research Infrastructure Programme and Carbon Zero Fund Programme.

Notes

i. The figures provided in this document are in line with the 2022–23 – 2024–25 budget allocations for UK Research and Innovation. These are broken down by our budgeting and reporting categories, and exclude funding for ODA, Financial Transactions, and BEIS Managed Programmes. Figures are indicative and may vary over the course of the three-year period due to budget adjustments made as a part of on-going financial management and planning processes to maximise the use of our total funding.

ii. From 2022–23 UKRI talent investments are managed collectively across the Research Councils. The funding for collective talent activities outlined in this delivery plan are accounted for in the broader collective talent funding line included in our Corporate Plan.

Infrastructure Fund projects include:*	Total lifetime allocation (some in future SR periods)
Infrastructure Fund: Wave 1 – Full project – John Innes Centre/ The Sainsbury Laboratory (JIC/TSL) *Subject to business case approval*	317.67
Infrastructure Fund: Wave 2 – Full project – BioFAIR *Subject to business case approval*	TBC
Infrastructure Fund: Wave 2 – Full project – EMBL-EBI: Data Resources for the Life Sciences P2 *Subject to business case approval*	80.70
Infrastructure Fund: Wave 2 – Preliminary Activities – UK Plant & Crop Phenotyping Infrastructure	2.40

* Further allocations may be made during the Spending Review period. Excludes wave 1 preliminary activities where spend was in 21–22 only. Allocations include contingency, which may be returned if unused.

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Image references

Cover National Plant Phenomics Centre, IBERS, Aberystwyth University
Credit: National Plant Phenomics Centre, Institute of Biological, Environmental & Rural Sciences (IBERS), Aberystwyth University

Page 2 A mouse intestinal organoid stained for actin (red), nuclei (blue), smooth muscle actin (green) and beta catenin (white). The Sharpe Lab at the Babraham Institute uses organoids to study the role of phosphatases in the gut. The organoid on the right shows several crypts which have developed from the mouse intestinal stem cells
Credit: Katie Young, Babraham Institute

Page 3 Credit: BBSRC

Page 4 Petri dishes of cell cultures inside an incubator
Credit: Babraham Institute

Page 8 Owned photograph from Rothamstead Research's North Wyke agricultural research facility in Devon

Page 10 Owned photograph from shoot at Quadram Institute
Postgraduate student Yemane Tedros and Researcher Dr Didier Ndeh

Page 11 The University of Edinburgh – Easter Bush Campus
Credit: The University of Edinburgh

Page 16 Colourful C. *elegans* by Célia Raimondi. The image shows DNA staining (DAPI) of a mutant strain of Caenorhabditis elegans. This tiny nematode worm is one of the model systems used by researchers at the Babraham Institute to investigate the biology of ageing.
The image has been modified for colour using the ImageJ image processing software
Credit: Célia Raimondi, Babraham Institute

Page 22 Seedlings in the ground
This asset has been licenced for use by UKRI and our councils, and cannot be shared with third parties for their use

Page 25 Credit: Holiferm

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