



RCUK Strategic Priorities and Spending Plan

2016-20

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“...the UK research base is truly world-leading...the UK Research Councils have played no small part in ensuring that prime position” Sir Paul Nurse

The Research Councils’ collective ambition is to ensure that the UK is the best place in the world to do research, to innovate and to grow business. We play a major role in contributing nationally and internationally to challenges such as tackling poverty, managing the environment responsibly, and in promoting physical health, social cohesion as well as contributing to the wellbeing of the UK and the world.

Our nation’s success is underpinned by the UK’s world-class research base. The UK Research Councils invest around £3 billion per year in world-leading research, covering all disciplines and sectors, to meet tomorrow’s challenges today. Our investments:

- Create new insights and knowledge that contribute to the sustainable development of our nation;
- Provide solutions to major challenges facing society, in the UK and globally;
- Stimulate hundreds of new businesses every year across the UK;
- Generate thousands of high quality jobs;
- Train thousands of highly skilled people each year;
- Attract billions in investment from private and overseas investors, ahead of major competitor nations; and
- Sustain excellent facilities, infrastructure and a world-class higher education system.

Over the next four years and beyond, our collective focus will be to understand, be responsive to, and seek to shape a research landscape that is rapidly changing both nationally and internationally. Funding a total of £12 billion of world-class research over this period as effectively and efficiently as possible for maximum impact will remain our overriding priority.

Long term stability for the benefit of the UK

The UK is currently one of the world’s most successful research nations. We are first on value-for-money per pound of spending and leveraged business investment from overseas; first on quality of output; and fourth, and rising, in research/business interaction. It is a UK success story of which we can be proud. Building upon this success story, the UK through the Research Councils remains committed to supporting world-class research.

Our strategic role as Research Councils is to enable research and develop research capability, whilst engaging with key stakeholders and addressing international challenges. As outlined in our recent response to the Higher Education Green Paper, we will seek to protect the key principles we have identified as essential to the continuation of the success of UK research:

- Clear delegation from Government to an independent non-departmental public body (or bodies) for research funding decisions and their management, in keeping with the government’s stated commitment to the Haldane principle;
- Long term stability in the public funding commitment to a research capability that will support future UK needs and opportunities;

- Clarity in delegated authority and accountability for (and recognition of) the full breadth and scale of research investments within and across disciplines;
- Recognition of the distinctive Research Councils' individual science and research missions and identities (currently defined in their respective Royal Charters), and the reflection of the distinctive disciplines and communities;
- The continuation of a dual support system for funding research in UK universities, and clear protection of a partition between these two funding streams; and
- Operation of the evidence-based approach of peer review that identifies excellent research and provides the basis for funding decisions.

As new opportunities and challenges emerge, and the need to work collaboratively across disciplines increases, we are committed to building on existing successful methods which identify common interests and are driven by collective goals. We will work with government to implement the recommendations of the Nurse Review¹ using our deep knowledge of the research funding landscape and our detailed understanding of the research and user communities. Our aim is to establish an organisation with clear accountability and responsibilities, and build upon the foundations of our existing strategic partnership approach, to maintain our support for the UK's world-class research base.

Looking to the future, building on strength

Research and innovation is the engine for growth and productivity. We fund excellence wherever it is found, in every sector and region of the UK economy. It is the bedrock of physical wellbeing, social cohesion and community regeneration. Using the Spending Review outcomes we will make wise investments with the funding available so that we:

- Continue to provide long-term investment to ensure strong national research infrastructure and a healthy UK research base across all disciplines;
- Maintain commitment to the development of skills essential for a growing economy by supporting excellent researchers, developing capability through fellowships and investing in doctoral training programmes, and enhancing the flow of talent to all sectors of the economy;
- Promote, support and broker partnerships that bring together companies, enterprises, policy-makers, and other research users with the research base to help accelerate growth;
- Continue the development of Research and Innovation Campuses across the UK to accelerate the translation of research for innovation and impact, both nationally and in regional clusters.

The Government's plan for productivity; *Fixing the foundations: Creating a more prosperous nation*² emphasised that the UK's system of funding research is central to ensuring that the best researchers have the flexibility to innovate, and to maintain the UK's position as a world leader. Working both individually and collectively, the Research Councils have excellent strategic relationships with key partners such as HEFCE and Innovate UK. Working in partnership, the UK's innovation performance was fourth in the world for university-industry collaboration³. We will continue to build

¹ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/478125/BIS-15-625-ensuring-a-successful-UK-research-endeavour.pdf

² <https://www.gov.uk/government/publications/fixing-the-foundations-creating-a-more-prosperous-nation>

³ The Dowling Review of Business-University Research Collaborations. Department for Business Innovation and Skills (2015)

on these successes, working closely with our partners to remain ahead in research and innovation. As research underpins innovation, we will ensure strong links to the Government's forthcoming National Innovation Plan.

Alongside our work to promote, support and deliver research and innovation we will continue to take a lead in improving equality and diversity within the research sector in the UK. Our collective ambition is to lead by example, ensuring the research community reflects the society from which it is drawn, challenging bias to ensure fair and inclusive peer review and funding decisions, as well as leading and supporting change.

Planning for tomorrow's challenges today

Real world problems are inherently interdisciplinary. To make progress and for translation to occur, the expertise of different disciplines must be combined. Interdisciplinary research is an integral part of all Research Councils' activities, and we already actively contribute to addressing national priorities and global challenges. The UK and the world face major challenges over the coming decades. The Research Councils will invest in excellent research and capability to plan for tomorrow's challenges today.

The Research Councils recognise the need to deliver research excellence at a quickening pace, with increased agility to seize new opportunities and with higher levels of collaboration across disciplines and institutions. We will continue to enhance our strengths of interdisciplinary working through the Government's £1.5bn Global Challenges Research Fund announced in the 2015 Autumn Statement⁴. We will:

- Address complex societal challenges through supporting frontier interdisciplinary research and innovation;
- Build additional capability in research that can help address global challenges;
- Address the problems faced by developing countries whilst further improving our ability to deliver cutting-edge research; and
- Provide agile responses to sudden emergencies or new opportunities requiring interdisciplinary solutions.

Over the summer 2016 we will consult and engage with the research and stakeholder community to help inform priority areas and build research and innovation capability in both the UK and the developing world. Through the Global Challenges Research Fund and as a main strategic delivery partner of the Newton Fund, we will also continue to identify opportunities for longer-term engagement and collaboration with partner countries.

The Research Councils will enhance collaborative working both bilaterally and multilaterally, and in addition we will continue to strengthen our relationship with Innovate UK.

To underpin the excellence of UK research, it is crucial that our researchers are able to engage and collaborate with the brightest minds, organisations and facilities wherever they are placed in the world. Our international strategy will contribute to our

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https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/479749/52229_Blue_Book_PU1865_Web_Accessible.pdf

approach in addressing these challenges by removing barriers and promoting collaboration. We will enhance our partnerships with emerging economies, which ensures that the UK has access to new centres of knowledge generation and commercial exploitation. Collectively we will ensure that the UK expertise continues to play an important role in the research effort vital to address global challenges.

Unlocking research opportunities requires vital underpinning national infrastructure which is an essential component of a world class research base. Collectively we will continue to invest in, and promote, the UK's world-leading research infrastructure and facilities, as well as securing access to unique international facilities. This capital investment is a key factor in the vibrant UK research environment, serving as a magnet for the most talented researchers and multinational R&D companies and maintaining the UK's world-leading position.

The success of the UK research base is in part due to the strength, stability and continued vitality of its disciplines. Building on our collective approach, each Research Council has developed individual plans for the 2016-20 Spending Review period which are set out in summary in the following sections, and which will be followed by more detailed delivery plans in due course.

Strategic direction

The arts and humanities underpin the UK's reputation for world-leading research into human identity, behaviour and expression, and the global significance and success of the nation's cultural, heritage and creative sectors. Our remit covers c.31% of all active UK researchers. Through 2016-21 the AHRC's focus for delivery will be firmly aligned with *The Human World: Strategy 2013-18*. We will support and advance:

- the most innovative research ideas in our core disciplines, alongside targeted initiatives in Heritage, Design, Languages, and the Creative Economy;
- cross-disciplinary research that includes addressing major societal challenges and promoting understanding of cultural difference and diversity. This will include active involvement in the new RCUK Global Challenges Research Fund;
- the next generation of postgraduate and early career researchers, in order to provide the strongest possible foundations for future enquiry.

Investing in research, innovation and growth

Open Call Research: discovery-led research will be supported through larger, collaborative grants pursuing complex fields of enquiry beyond the scope of individual scholars, and exploratory networks building future capacity. Fellowships will enable outstanding scholars to undertake transformative pieces of research and develop new approaches to knowledge exchange and interdisciplinary working. Together, Research Grants, Networks & Fellowships ensure the strength of our core disciplines, stimulate new areas of enquiry, grow research capacity in leading cultural organisations, and feed the creative economies. Researchers are able to take advantage of opportunities provided by AHRC collaborations with funders in countries across Europe, the Americas and Asia, as well as our International Co-Investigator initiative (2011-15: partners were drawn from 44 countries/6 continents).

Thematic Research: themed funding, framed around emerging research areas, will be stimulated by developing new 'Horizon Questions' across our portfolio. We will become more alert to new disciplinary and interdisciplinary trends, and achieve greater synergies between open-call and targeted funding. We will bring to fruition the AHRC's current four research themes (Care for the Future; Digital Transformations; Science in Culture; Translating Cultures), which are building new communities of researchers and tackling problems that cannot be addressed by single disciplines.

Priority Areas: as well as funding research across our core disciplines, we will advance our priority areas. The role of **Design** research in policy, entrepreneurship and public service innovation will be enhanced. New international initiatives in **Heritage** will secure the UK's place at the cutting edge of this dynamic multidisciplinary field. The new Open World Research Initiative (2016-20) will open avenues of research in **Modern Languages** and sustain national skills in vital areas of linguistic capability.

Multi-Disciplinary Research: Since 2010 we have contributed to or led 10 RCUK programmes, including Connected Communities. Over 2016-21 we will invest in new approaches to problem-centred research and cross-council collaborations. Prime examples include: leadership of the Conflict Theme within the Partnership on Conflict, Crime & Security; and the Urban Living Partnership between RCUK & Innovate UK.

Partnerships and International Collaboration: the UK's leadership in the creative and digital economies draws upon the combination of historical, cross-cultural, religious, literary, philosophical and legal understanding distinctive to the arts and humanities – a major competitive asset in a globalised world. We will enhance AHRC researchers' wide-ranging collaborations with Whitehall and devolved administrations, national agencies such as the Heritage Lottery Fund; and promote engagement with cultural organisations including Britain's national museums and libraries and the BBC. Research is increasingly a worldwide enterprise. AHRC will actively support arts and humanities researchers in shaping the future direction of transnational research programmes and co-development of overseas research initiatives. We will achieve significant further leverage from the EU Horizon 2020 programme and Humanities in the European Research Area. Our international engagement will build on the successes of the Newton Fund and partnerships in the heritage, creative economy and cultural sectors in countries such as Brazil, China, Egypt and India.

The AHRC is the UK's foremost public funder of high quality doctoral work in the arts and humanities. The third of our budget spent on PG delivers highly skilled cohorts of researchers. We will continue to invest in doctoral training programmes and enhance the flow of talent to public and private sectors. The AHRC's existing 18 Doctoral Training Partnerships (DTPs) and Centres for Doctoral Training support PhD students in 75 HEIs with over 150 non-academic partners. Our Collaborative Doctoral Partnerships (CDPs) equip future specialists in cultural heritage with the skills required to secure the future of the creative economy and cultural industries. Over 2016-21 we will refine our PG funding model and invest in around 10 DTPs and the CDP scheme. Devolved decision-making will ensure training is tailored to the needs of each student. Researcher mobility will be supported, including much-prized international placement opportunities in leading libraries, archives and museums in North America, China and Japan.

AHRC funding delivers demonstrable impact on: community cohesion, engagement and regeneration; public debate on policy-making; and professional practice in health and wellbeing. We will intensify this impact over 2016-21, including the Creative and Digital economies (c. 9.7% of UK economy) and heritage tourism sectors (> £26.4bn of UK GDP). Our Creative Economy Hubs (2012-16) engage with 2,000 SMEs and microbusinesses, delivering £4.3 million into 253 projects, with over 140 innovative outputs (software, hardware, platforms and services). Building on these successes, we will further invest in creative economy clusters and forge partnerships between universities and businesses, including collaboration with LEPs and their equivalents to generate local and regional growth. Cultural Engagement funding for early career researchers will allow cultural organisations to benefit from their expertise. The AHRC's flagship Follow-on Fund for Impact and Engagement will deliver creative impact from previously funded projects. Deloitte's (2016) study of this fund estimates a gross benefit cost ratio of £5 for every £1 from AHRC.



Strategic direction

BBSRC's vision is for the power of biology to deliver a healthy, prosperous and sustainable future. To deliver this vision, BBSRC invests in world-class bioscience that builds capability and realises benefits for the economy and society.

Economic activity based on biology and biotechnology already creates more than £150bn GVA per year in the UK and supports four million jobs. This bioeconomy spans major industries such as agri-tech, food and drink, chemicals, manufacturing, energy and pharmaceuticals. The UK now has the opportunity to leverage its world-leading bioscience research to create a strong bioeconomy, simultaneously boosting knowledge generation, sustainable development, security, productivity and economic growth. The challenges for the UK bioeconomy are also challenges for the global bioeconomy, and BBSRC is committed to excellence in bioscience not only for the UK but also for the developing world.

BBSRC's priorities for 2016-21 will underpin and enable the bioeconomy by:

- **Driving bioscience discovery** – advancing the boundaries of knowledge and upholding the UK's global leadership in bioscience
- **Building a more resilient and secure future** – promoting bioscience research that addresses strategic scientific opportunities, economic targets and societal challenges in the UK and beyond
- **Transforming and creating bio-based businesses** – using the outputs of bioscience research to enhance productivity, transform traditional businesses and create new market opportunities
- **Growing and attracting talent** – investing in skilled people for the research base, and building capability in the UK workforce
- **Strengthening the UK's position as a global partner of choice** – capitalising on UK bioscience research strengths and strong European and international links through institutes and universities to foster collaborations and inward investment.

Investing in research, innovation and growth

BBSRC's plans prioritise sustained support for investigator ideas-led research as the lifeblood of knowledge discovery and innovation. BBSRC will protect funding for excellent research to deliver new knowledge and high-impact discoveries, promoting creative, curiosity-driven 'frontier bioscience' research as well as areas specifically identified to address strategic economic opportunities and societal challenges, for example:

- **Agriculture and Food Security:** bioscience for sustainable and productive agriculture, improving food security and resilience, and coordinated investment in animal and plant health with Defra and other partners.
- **Industrial Biotechnology and Bioenergy:** enhancing sustainability through the exploitation of biological systems to generate fuels and high-value chemicals, including from waste.
- **Bioscience for Health:** improving diet-related health and related policy through research to better understand the role of diet in health and wellness across the lifecourse, and driving innovation in the food and health industries with a new flagship multidisciplinary institute for food and health research.

BBSRC will continue to take a strategic approach to its investment in research capability, promoting the development and update of new analytical and computational technologies, and ensuring that UK bioscience research has access to the infrastructure and other facilities necessary to maintain its global standing.

BBSRC's investments will stimulate business innovation by supporting the emergence and exploitation of disruptive platform technologies (e.g. synthetic biology), providing solutions to strategic challenges faced by established industrial sectors, and maximising opportunities for discovery arising from 'big data' bioscience across and between sectors.

More broadly, BBSRC will enable the realisation of economic and societal benefit from bioscience research by supporting partnership approaches that bring together companies and other research users with the academic research base, including the continued development of Research and Innovation Campuses across the UK.

A highly skilled and trained workforce is essential for the success of the bioscience sector, and a driving force for the bioeconomy. BBSRC's investments in postgraduate training, early career researchers and the development of research leaders will ensure that the research base is equipped with the range of skills and talent required for modern bioscience, and provide highly-skilled people for the public, private, third and research sectors.

BBSRC's international leadership and strategic engagement will help to position the UK as a global partner of choice for bioscience research, maximising the nation's interests in the EU, US and worldwide.

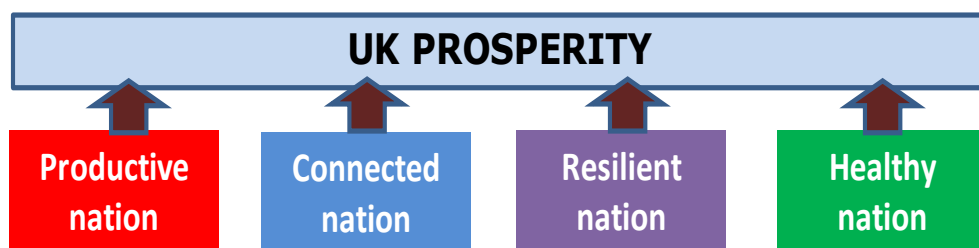


Strategic direction

EPSRC's contribution to the UK is founded on our investment in excellent research and postgraduate training which has beneficial impact for society and the economy, and which delivers highly skilled, numerate individuals with the potential to become leaders in industry, the public sector and academia.

Investing in research, innovation and growth

Our vision for 2016-20 and beyond is for our investments to explicitly support four inter-linked outcomes which collectively underpin UK prosperity. This framework is a strategic expression of how engineering and physical sciences research and skills add value to the nation, and provides an ambitious vision to inspire researchers.



PRODUCTIVITY The future competitiveness and creativity of the UK economy requires the successful development of world-leading products, processes and technology based on the discovery and innovation in the mathematical and physical sciences, information and computing technologies, and engineering.

CONNECTEDNESS The UK's success will be driven by as yet unimagined new industries and services, and by innovative, more cost-effective ways of delivering existing services through transformational technologies which connect people, things and data together, in safe, smart, secure, trustworthy and productive ways. This relies on discovery and innovation in the mathematical and physical sciences, computing, and engineering.

RESILIENCE Safeguarding future generations requires an ability to anticipate, adapt and respond to changes - natural or man-made, short or long-term, local or global. UK prosperity depends on the smooth and sustainable functioning of complex infrastructures: transport; communications networks; water, energy and waste utilities. The engineering and physical sciences are fundamental to the new thinking and innovation needed to build a truly resilient nation and to increase UK competitiveness.

HEALTH Our health - our state of mental and physical wellbeing - affects our quality of life, the resilience of communities and the productivity of the nation. Advances based on new research in the engineering and physical sciences will revolutionise our ability to manage our own health, help us to maintain healthier behaviours and environments, and to transform the way care is delivered.

Priorities addressing the above Prosperity Outcomes will, over the Delivery Plan period, form our 'top-down' strategic research programmes, constituting around 40% of our portfolio. By presenting challenges in terms of outcomes for the UK, our aim is for all researchers to consider how they will contribute and how they can combine with others in the multi-disciplinary approaches required to solve the national and global problems of our age. We will welcome initiatives from the academic and business communities to develop challenge-led programmes that contribute to this.

We will maintain a programme of long-term research where the emphasis is on 'bottom-up' investigator-led ideas, including community-generated challenges. Comprising around 60% of our portfolio, this investment is essential for the UK to compete in a globally competitive environment. In the longer term, this part of our portfolio will support our whole Delivery Plan aspirations, including the Prosperity Outcomes. REF impact case studies show that real-world benefits often emerge over a 20-year timeframe; consideration of the appropriate 'pathway to impact' will remain a priority.

Our training portfolio will invest through a flexible range of routes, attuned to academic and business environments, with the aim of producing the highly-skilled, numerate individuals a globally competitive economy requires.

EPSRC has long been a champion of closer ties across the research and innovation ecosystem and is a well-established broker between the constituent parts, helping to facilitate and bridge all parts for the national growth endeavour. We will continue to make partnership-building a critical component of all we do.

Through our investment, we will ensure:

- researchers can pursue novel ideas wherever, and whenever, they occur;
- a platform on which more strategic programmes of the future can be built;
- the critical mass to attract co-investment from business, both national and international, and for partnering with relevant government stakeholders;
- a stable environment for the training of the next generation of highly-skilled people, who will take their know-how into the economy;
- the absorptive capacity that allows ideas to be rapidly adopted and exploited in the UK.

Approaches

In developing programmes to get the most from our investment, we will prioritise:

- The approaches set out in our **Strategic Plan**⁵: *Building Leadership* for research and its impact for the economy, *Balancing Capability* at the research area level, and *Accelerating Impact* from our investments;

⁵ <https://www.epsrc.ac.uk/about/plans/strategicplan/>

- Maximising the EPS contribution to research which supports **Official Development Assistance**, for example off-grid and low-carbon energy research to increase access, resilience and wealth-creation in developing nations;
- Realising benefits from **government investments in the research base** such as The Alan Turing Institute and Quantum Technologies. In order to balance capital investment with recurrent funding, we will make strategic decisions in the best interests of the UK's capability as a whole;
- Enhancing the **equality and diversity** both of our research base and our governance and advice structure;
- Driving an **efficient research base**, both by facilitating universities to work collaboratively (e.g. equipment sharing), and by securing leverage from investment partners so that public resources go further.



Strategic direction

At the core of our increasingly globalised planet and our advanced industrial societies are human-dominated and human-influenced systems. Social science provides robust evidence and insights at the level of individuals, communities, institutions and societies. Social science plays a key role in framing the major societal questions which need to be addressed and identifying ways in which these might best be tackled. Social scientists often challenge common-sense assumptions about the world, demonstrating the importance of gathering detailed evidence before reaching conclusions. If we want new technology and scientific breakthroughs to deliver for society, we also need the capacity to understand that society. Close collaboration is needed between the social sciences and the natural sciences to address major challenges such as how to ensure access to energy, food and water across the globe. These problems require more than technical solutions. Over the Spending Review period we will invest in the highest quality social science with the power to aid growth, promote innovation and to shape society.

Investing in research, innovation and growth

Over the Spending Review period we will:

- Invest in areas of national priority, mobilising social science evidence to address significant social and economic challenges.
- Continue to support ambitious, impactful and innovative social science across all funding modes, including our Transformative Research scheme, which supports research at the frontiers of the social sciences.
- Protect funding for our responsive mode Standard Grants scheme, ensuring we continue to be able to support the highest quality curiosity-driven social science.
- Maintain and extend investment in the innovative 'What Works' network, providing robust evidence to guide decision-making on public spending.
- Support further opportunities for partnership-working and knowledge exchange, leveraging funding from a range of partners to tackle pressing societal issues.
- Launch our new Doctoral Training Network, including thematic Centres for Doctoral Training in New Forms of Data and Biosocial, to support the development of highly capable and innovative researchers for a wide range of careers.
- Develop new opportunities to support Early Career Researchers, allowing us to develop a strong cadre of leaders for the future.
- Enable postgraduate students and early career researchers to forge links and networks internationally.
- Increase investment with international partners, providing significant leverage on UK investment and enhancing the global standing of UK social science.

- Continue to take a strategic lead in expanding the UK's world-class infrastructure for research, focussed on large-scale sources of data including longitudinal, cross-national, administrative and business data.
- Explore the potential of new forms of data (both quantitative and qualitative), and innovations in data collection, linkage and use, providing the necessary infrastructure to support bold and innovative social science.
- Identify further opportunities for exploitation of our existing investment in datasets, including greater integration of our unique portfolio of data infrastructure with that of others, ensuring seamless access for academic and non-academic users alike.

Our initial priority areas for investment across all areas of our portfolio are:

Productivity – the UK has experienced a long-term slowdown in productivity growth and, since 2008, the “productivity puzzle” of exceptionally weak growth compared to international competitors. There is a pressing need for further research evidence to explain productivity levels and to provide the basis for development of new policy measures to support and foster productivity.

Understanding the macro-economy - long-standing criticisms of the economics profession, and particularly mainstream academic macroeconomics, were given impetus by the perceived failure of macroeconomists to anticipate the 2008 financial crisis and the subsequent recession. The apparently limited relevance of mainstream macroeconomic theory to associated policy debates underlines the need for innovative work in this area to address this.

Mental Health and Wellbeing - it is estimated that 23% of the UK population is directly affected by mental health problems at some point each year, and the economic and social cost of mental illness in England is estimated at £105 billion⁶. Mental illness is the largest single cause of disability and the leading cause of sickness absence in the UK, accounting for 70 million sick days in 2007⁷. Estimates suggest that 75% of people with mental health problems live in low and middle income countries, while 25% of the global burden of disability comes from mental disorders. However, compared with investment in physical health, investment in mental health is relatively low. Much current research is medical or clinical in nature and the majority of it is UK-focussed. New investment in research on mental health that takes a more global and social scientific perspective is therefore a priority.

Housing – the supply, accessibility and affordability of housing influences the wider economy, the financial system and the wellbeing of citizens. The quality, tenure, price and location of homes all have implications for other outcomes, including shelter, wealth, health and education. We have identified a clear gap in the translation of research to provide robust evidence to inform housing policy and practice across the UK. ESRC can add real value by working with a range of partners to bring this research together, to generate a better and more comprehensive understanding of the complex housing market and policy environment.

⁶ [MQ report on UK Mental Health Research Funding, 2015](#)

⁷ Chief Medical Officer for England [annual report on Public Mental Health, 2014](#)

Ways of Being in a Digital Age - digital technology is present in all aspects of our lives, whether we actively engage with it or not. It impacts on the way we communicate and the ways we receive, consume and process information. It influences routine behaviours – the way we travel, shop and work. The presence of digital technology mediates our perceptions, behaviours and practices across these different domains and thereby influences our ways of living. This raises a number of fundamental questions about our ways of being in a digital age, the risks and opportunities associated with digital living, and our understanding of the individual, community and society.



Strategic direction

Over the next five years from 2016/17 MRC has a vision to support excellent discovery science and strengthen partnerships to improve health and economic impact⁸. MRC will:

- **Prioritise** – addressing the most pressing health challenges worldwide
- **Discover** – breaking new scientific ground and setting new paradigms
- **Transform** – working in partnership to transform health research and innovation

Investing in research, innovation and growth

Priority Challenges

MRC will build up programmes of research and create platforms for co-investment by industry and charities to address major health and societal challenges in the UK and globally, working across Research Councils as appropriate:

- **Infections** – working with industry and other partners to develop new approaches to strengthen global security from infectious threats and combat antimicrobial resistance.
- **Brain health and dementia** – a major new UK Dementia Research Institute, complementing Dementias Platform UK and accelerating research to identify new treatment opportunities and attract partnerships with the biopharmaceutical sector; applying UK research strengths in neurobiology to address developmental and early-life cognitive deficits and life-long mental health.
- **Prevention** – a new multi-funder initiative targeting critical areas such as obesity, diabetes, mental health and childhood development; capitalising on new technologies to promote public health, to deliver improved evidence for policy makers, help to reduce health care costs, and support health improvement worldwide.
- **Regenerating damaged tissue** - building on the UK's international lead in stem cell science to develop regenerative medicine and cell-based therapies.

Discovery for Medicine

Extending the UK's strong track record in leading scientific discovery, whilst bringing discovery closer to users in industry and clinical medicine, including:

- **MRC Institutes** – continuing to support and develop the LMB, CSC and Crick institutes to deliver world-leading multidisciplinary science that tackles the most challenging questions.
- **Experimental medicine** – focussing more medical research on advanced studies in humans, working on programmes, skills and facilities with NIHR, the Health Departments and industry.

⁸ <http://www.mrc.ac.uk/research/strategy/>

- **Targeted discovery for disease** – a new initiative to create novel joint academic/industry programmes and technology platforms to speed up discovery and validation of new drug targets for global impact.
- **Interdisciplinary discovery science** – foster new opportunities at the interface with physical science, engineering and social science through seed funding, career development, and partnerships with Research Councils and universities.

Transforming Health Research and Innovation:

We will transform health research and innovation by leading the development of new scientific approaches and collaborative networks, and investing in the programmes, skills, and state-of-the-art infrastructure to promote more efficient, flexible, and effective approaches:

- **Informatics and computation** – making data-driven science central to medical research, developing a long-term Institute for Health Informatics Research, introducing novel and faster methods for data analysis and increasing understanding of complex systems to deliver health benefits.
- **Stratified Medicine** – further investment into pioneering academic/industry consortia using modern biology, advanced clinical measurement and informatics, to redefine disease concepts and open up more tailored treatment approaches; building partnerships with NIHR, charities and Innovate UK as well as industry.
- **Stratified/global public health** – promote tailored interventions to improve public health worldwide.
- **Academic/industry relationships** – carry on accelerated translation of research into medical practice and industry with an emphasis on novel, innovative, high risk/high gain medical technologies; and also broaden partnerships with industry to explore more areas of medical research with a common purpose.

Across all priority areas we will place a strong emphasis on training and career development, with a particular focus on developing the skills for the big data era and multidisciplinary working. We will build research capability and skills to address global health problems, and broaden the range of research in infections and non-communicable diseases and partnerships to increase impact in developing countries.

Investing into investigator-led discovery research and the above strategic themes and associated skills, infrastructure and innovation will deliver:

- Faster progress from discovery to industrial and clinical use and new products, interventions, and policies that will **change lives in the UK and globally**⁹
- Research to tackle complex problems and achieve the quality and visibility needed to attract **inward R&D investment**¹⁰ and global partners
- New research technologies, methods, and structures that **maximise productivity**¹¹
- **Research capacity and leadership** securing the UK's place at the forefront of medical research.

⁹ <http://www.mrc.ac.uk/publications/browse/mrc-economic-impact-report-2014-15/>

¹⁰ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/438763/bis-15-340-relationship-between-public-and-private-investment-in-R-D.pdf

¹¹ <http://www.frontier-economics.com/publications/rates-of-return-to-investment-in-science-and-innovation/> -strongest correlation found between MRC funding and growth



Strategic direction

The environment is everyone's business.¹² We depend on it for shelter, heat, light, food and water. Yet we are now the dominant source of environmental change in the UK and across the planet. To sustain livelihoods and prosperity, whilst living within the Earth's limits, is the greatest UK and global challenge we face.

NERC strategy priorities are to invest in world-leading research, skills and innovation that enables business, government and citizens to:

- Use our natural resources¹³ safely and securely to sustain life, prosperity and wellbeing.
- Build resilience to environmental hazards¹⁴ – saving lives and costs, protecting business and essential infrastructure.
- Predict, mitigate and adapt to man-made environmental and climate change.

NERC funds the best environmental science in the world¹⁵; supports the whole economy¹⁶; creates resilience, jobs and growth in regions across the whole UK¹⁷. NERC science benefits the UK by many billions of pounds every year through better flood warnings, more secure food and energy, cleaner air and water¹⁶.

Investing in research, innovation and growth

Resources: To support UK and global needs for secure and sustainable resource supply, NERC investment priorities include sustainable food production, renewable energy, and valuing the UK's natural capital (nature's stocks and beneficial services) for use in policy and business decisions. Capital investment in new underground monitoring systems¹⁸ will pave the way for safe regulation and extraction of shale gas, and support the development of underground carbon storage.

Resilience: With the Met Office and Environment Agency we will invest in research to improve UK flood forecasts for more precise, earlier warning. With industry¹⁹ we will provide the evidence to mitigate environmental risks and impacts on essential UK transport and energy infrastructure. Thanks to NERC science, smog and sulphur pollution in the UK is nearly past – now we will invest to safeguard health, food, soils from nitrogen pollution in the UK and particulate air pollution in China and India.

Climate change: With the Met Office we will invest in the UK's world-leading weather and climate prediction capability. We will mobilise the NERC fleet of research ships

¹² <http://www.nerc.ac.uk/latest/publications/strategycorporate/strategy/the-business-of-the-environment/>

¹³ Natural resources include, for example: food, water, energy, minerals, essential services from nature.

¹⁴ Hazards include, eg: floods, extreme weather, earthquakes, volcanoes, pollution, animal and plant diseases.

¹⁵ <https://www.gov.uk/government/publications/performance-of-the-uk-research-base-international-comparison-2013>

¹⁶ <http://www.nerc.ac.uk/about/perform/reporting/reports/>

¹⁷ <http://www.nerc.ac.uk/about/whatwedo/factsfigures/region/>

¹⁸ Energy security and innovation observing system (ESIOS).

¹⁹ Industry partners include HighSpeed2, Atkins, Arup, National Grid.

and autonomous vehicles to find out how the Southern Ocean absorbs and releases heat and carbon that drives our climate and weather. With DfID we will invest in climate models for sustainable resource use and resilience in Africa and Asia.

Jobs and growth across the UK: Seventy percent of NERC funding lands outside London and the South East, creating jobs and economic growth across the UK.²⁰

We will help industry and government find and use NERC-funded research and technology to accelerate innovation and impact:

- Environmental science impact programme – funding research organisations to work with business, policy, LEPs for growth and societal benefit in their region.
- Marine robotics centre (Southampton) – developing autonomous vehicles with environmental sensors for maritime, defence, energy industries to operate undersea at less cost, growing UK SMEs in a £9bn global market.
- Industry partnership – supporting HMG innovation plan and industry priorities, eg *Sustainable Agriculture*, *Environmental Risks to Infrastructure*, *Oil & Gas*.

NERC will sustain the flow of top talent for UK business, government and science employers by growing the proportion of NERC budget invested in future leaders through independent fellowships and PhD training.

UK national capability: NERC will support essential national assets and research centres that allow the UK environmental science community to conduct world-leading strategic and discovery science on national to global scales. We will invest in: large research infrastructure²¹; scientific facilities and data centres; long-term science²²; national and public good²³. We will drive productivity and efficiency through capital investment in new technology and regional centres of excellence, and by ensuring that our national capability focuses on ambitious research that integrates NERC, BBSRC and Met Office capabilities.

Antarctic logistics and infrastructure: NERC will support UK environmental science infrastructure and capability in the British Antarctic Territory and Southern Ocean to meet FCO and National Security Council requirements for the UK, and to provide access to the Antarctic for UK scientists and their international partners. NERC provision includes research stations plus research and logistics ships and aircraft. Capital investment will ensure safety and replace two older ships with a single new vessel that provides £100m lifetime savings in operating costs and emissions.

²⁰ <http://www.nerc.ac.uk/about/whatwedo/factsfigures/region/>

²¹ Specialist research ships and aircraft.

²² National to global scale research, survey, monitoring where specialist centres direct capability to UK needs.

²³ Independent scientific information and advice to HMG & society for national security, resilience, emergency.

Strategic direction

STFC's Vision "to maximise the impact of our knowledge, skills, facilities and resources for the benefit of the United Kingdom and its people" is achieved through three distinct, but interrelated, long-term strategic programmes:

- **World-leading frontier science:** Supporting frontier research, innovation and skills development in astronomy, particle physics, nuclear physics and space science through our partnership programmes with UK universities and research institutes.
- **Large-scale Facilities and Research Infrastructures:** Creating and supporting access to a broad range of world-leading research facilities and infrastructures to underpin frontier and discovery research across the science base for academic researchers and industry. These long-term and technically complex infrastructures play a key role in multi-disciplinary research, supporting cross-council priorities and addressing the grand challenges.
- **National Campuses:** Developing the Harwell Oxford and Sci-Tech Daresbury National Science and Innovation Campuses as national and regional centres for economic growth, promoting innovation and stimulating the creation of high-value jobs through academic and business collaboration.

Investing in Research, Innovation and Growth

STFC's broad and varied programme of research across the physical sciences and computational sciences creates a strong contribution to the UK's economic and societal prosperity. Through our investments we will continue to maximise the impact of our support for research, innovation, skills and infrastructure.

World Class Research and Infrastructure

We will deliver the highest quality, internationally leading, data-intensive research programme with our university partners, national laboratories and facilities and through our membership of international science organisations, leading to new understanding of the structure and evolution of the universe and addressing global challenges:

- Continuing to deliver an excellent programme in particle physics, nuclear physics and astronomy;
- Guaranteeing on-going access to the world-leading international research facilities CERN, ESO, ESRF, ILL and FAIR;
- Supporting UK leadership in the technical upgrades at CERN and in the development of the world's largest optical telescope E-ELT and the Large Synoptic Survey Telescope;
- Delivering new Government commitments to next-generation flagship European facilities ESS and XFEL, and establishing the UK-headquartered Square Kilometre Array – as the next big global inspirational science project;

- Operating our three world-leading multidisciplinary UK national facilities, Diamond, ISIS and the Central Laser Facility, and through their upgrades deliver new capabilities for users.

Innovation

We will realise the innovative capacity of STFC's science and research facilities to support the growth of a high-technology UK economy by:

- Developing opportunities to engage industry and other partners earlier in the development of technology solutions
- Increasing innovation output from our funded activities, including funded university programmes and STFC laboratories
- Developing and implement plans with our campus partners to deliver high-value job creation and economic growth for the benefit of the UK
- Establishing the Higgs Centre for Innovation in Edinburgh

World Class skills

We will help to deliver a scientific and technically skilled workforce that will sustain the UK as one of the world's leading research nations and support the growth of a high-technology economy by:

- Delivering a skills programme that reflect modern science and engineering requirements by coupling traditional STEM disciplines with skills in software engineering, technology development, and innovations in data science
- Delivering a programme that increases the number of apprentices and graduates that join STFC's programmes
- Delivering a strong volume programme of public engagement in inspirational science to sustain the STEM skills pipeline.

Research Councils Allocations 16/17/- 19/20 (Table 1)

(£m)		16/17	17/18	18/19*	19/20*	20/21*	Total SR15
AHRC	Resource Total	101	101	99	98		398
BBSRC	Resource Total	353	356	350	347		1406
	World Class Labs Capital	64	66	53	58	58	241
EPSRC	Resource Total	807	796	790	783		3176
	World Class Labs Capital	52	52	52	54	54	211
ESRC	Resource Total	155	157	154	153		618
	World Class Labs Capital	28	26	21	17	12	92
MRC	Resource Total	581	594	597	594		2367
	World Class Labs Capital	33	33	34	47	50	147
NERC	Resource Total of which -	291	294	290	288		1163
	- ALI ²⁴ Partition baseline	30	30	30	30		118
	- ALI ²⁴ Partition pressures	3	4	4	5		16
	World Class Labs Capital of which -	40	39	35	31	31	144
	- ALI ²⁴ Partition baseline	7	7	7	7	7	28
STFC	Resource Total of which -	388	396	406	414		1603
	- International subscriptions	114	118	127	134		493
	- UK National Facilities	108	108	109	110		435
	- Core Programme inc GCRF	166	170	170	170		676
	World Class Labs Capital of which -	131	123	129	114	115	497
	- International subscriptions	39	39	41	43	43	161
	- UK National Facilities	45	39	45	46	47	176
	- Core Programme	47	45	44	25	25	161
	Resource Total	2676	2694	2686	2676		10,732
	World Class Labs Total	347	339	324	321	320	1,331

*Indicative only. Totals may not add due to rounding. The SR15 period is from 2016/17 – 2019/20.

This table provides clarity to the final allocations and includes supplemental allocations to STFC received after the publication of the BIS Allocations booklet²⁵.

²⁴ ALI: Antarctic logistics and infrastructure.

Research Councils Allocations from Global Challenges Research Fund 16/17 – 19/20 (Table 2)

GCRF (£m)	(£m) Resource				
	16/17	17/18	18/19*	19/20*	SR Total
AHRC	5	7	7	7	25
BBSRC	10	20	20	20	70
EPSRC	10	15	15	15	55
ESRC	5	10	10	10	35
MRC	14	34	34	34	115
NERC	5	10	10	10	35
STFC	0	4	4	4	11
Unallocated GCRF	0	38	122	216	377

**Indicative only.*

These figures set out the allocation to the Research Councils from the Global Challenges Research Fund announced as part of the Government's £1.5bn Global Challenges Research Fund announced in the 2015 Autumn Statement²⁵.

These figures are included in the resource allocations in Table 1.

²⁵ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/505308/bis-16-160-allocation-science-research-funding-2016-17-2019-20.pdf

²⁶ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/479749/52229_Blue_Book_PU1865_Web_Accessible.pdf