Engineering and Physical Sciences
Research Council

EPSRC
Investing in research for discovery and innovation

EPSRC Delivery Plan 2016/17-2019/20

Science for a Successful Nation

PRODUCTIVE

CONNECTED

RESILIENT

HEALTHY

CONTENTS

1. OUR VISION

EPSRC invests in research discovery and innovation. Our contribution to the UK is the world-leading research and postgraduate training which have benefit for society and the economy. We deliver highly skilled, numerate individuals who become leaders in industry, academia and the public sector.

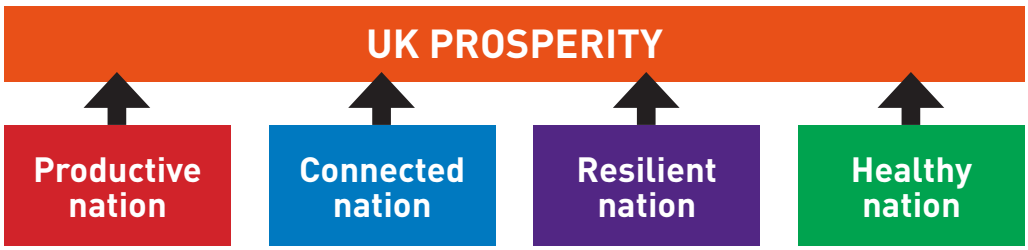
In fulfilling our role, through our staff, we take a strategic, value-adding approach beyond simply awarding grants. We capture and use our knowledge of the research and skills base to manage our portfolio. Building on our strong relationships with universities, business and others, we are able to profile and articulate the research and innovation landscape, its people and relationships, its strengths, weaknesses and opportunities. This in turn enables us to provide the direction and guidance which makes our investment more effective and efficient.

We prize our ability to make stable, long-term investment, in order to:

- provide researchers with the best environment for ideas and innovation to flourish;
- get the most from public investment by attracting leverage from the private sector and other partners, and by attracting foreign investment;
- with our partners, help the creation of new jobs and new products and services, facilitating growth; and, ultimately,
- benefit society and improve the quality of life within the UK.

1.1 Delivering Prosperity for the UK

This Delivery Plan sets out our principal plans for 2016/17-2019/20, and is issued in response to the government's allocation for research investment following the 2015 Spending Review. Our central intention is for our investments to support four inter-linked outcomes which collectively underpin UK prosperity. This framework is the strategic expression of how engineering and physical sciences research and skills add value to the nation, and provides an ambitious vision to inspire researchers.



It is our aspiration that researchers can, by thinking about this framework of Prosperity Outcomes, apply their curiosity, knowledge and skills to meet the challenges facing us all.

1.2 What does this Delivery Plan mean for researchers?

The essentials of how we have always operated will remain in place. **We will** retain a thematic structure with familiar entry points for making research applications and for discussing programmes of work with us[1]. Researchers remain free to submit any ideas, at any time, for projects that will further knowledge and enhance the UK's capability – our

[1]Please see our website for further information on our thematic priorities: https://www.epsrc.ac.uk

commitment to the ideas of researchers is paramount. We do, though, want the Prosperity Outcomes described above to prompt researchers to think widely and creatively about how their curiosity, their knowledge and skills can be deployed, either singly or alongside others, to directly address the challenges we all face.

The importance of peer review is axiomatic, with ***excellence*** continuing to be the primary criterion for assessing proposals. **We will** also continue factoring in ***national importance***, providing the broader, strategic context in which research proposals can be considered; the national outcomes leading to prosperity, shown above, will help to inform this. The requirement to identify appropriate ***pathways to impact*** will remain. Other factors that will remain crucial to our prioritisation and investment choices are:

- Ensuring a forward-looking, ambitious portfolio of research and training which makes a positive difference for the UK;
- The protection of the UK's long-term capability, and the expansion of multidisciplinary research;
- The securing of leverage in order to get the most from public funds;

Across the whole of our operation, **we will**, as ever, adhere to the values of openness, transparency, consistency, and a commitment to what is best for the UK, and for global development.

1.3 What does this Delivery Plan mean for business and other users of research?

The Prosperity Outcomes shown above provide a framework for businesses to engage with our Delivery Plan and to consider ways in which their research and innovation agendas may dovetail with the research base. **We will** look to use this framework as we facilitate dialogue and broker relationships between universities and business, and other end users of research. Our operating mechanisms and routes will remain substantially the same, although in a climate of increasing budgetary constraint, and in responding to the Dowling Review, **we will** be looking to provide routes that are more efficient and streamlined than ever before.

1.4 Strong Economies are Science Economies

Strong economies invest in research, discovery and innovation, and in particular in the engineering and physical sciences. The government[2] recognises the link between science and national prosperity, identifying 'high-quality science and innovation, spreading fast, as one of the foundations of productivity growth.' EPSRC plays an essential part in this. Research funded by EPSRC has been associated with £80 billion of economic activity over the period 2008-13 including £16 billion of cost savings to the public and private sector[3]. Our investments in underpinning Engineering and Physical Sciences (EPS) have enabled the advancement of other disciplines such as health and life sciences, leading to environmental and societal benefits and new public policy.

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

[3]Reference – REF Impact Case studies

2. DELIVERING NATIONAL NEEDS: OUR SCIENCE STRATEGY

2.1 Our Strong Foundations

This new Delivery Plan builds on a successful record of investment in the UK EPS research base. REF Impact Case Studies[4] show that we have realised demonstrable benefits in:

- Excellent research;
- Impacts beyond EPS;
- Impacts on the economy;
- Impacts on the public sector/policy;
- Environmental/social advances;
- Skilled people/leadership.

2.2 Investment Priorities

Building on those foundations, we have developed an outcomes-focused approach to drive our Delivery Plan. The four *Prosperity Outcomes* represent what we expect our investments to deliver on behalf of the UK:

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. Our ambitions anticipate economic and social change, and imply significant re-skilling of the UK workforce with a particular requirement to achieve technical leadership through the development of future scientists, engineers and technologists.

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 will be a major driver of economic growth and efficiency across all regions and sectors of the UK. 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 mathematical and physical sciences, computing and engineering are fundamental to the new thinking and innovation needed to build a truly resilient nation and to increase UK competitiveness. Moreover, EPS contributes to the resilience of developing countries through, for example, robust, low-cost infrastructure.

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 transform the way care is delivered. Novel technologies and materials will continue to improve our ability to predict, diagnose and treat disease. Research will deliver better quality of life, higher standards of affordable care and will drive UK growth through new products and services.

[4]https://epsrc.whp.rcuk.ac.uk/newsevents/pubs/refreport2015/

Priorities specifically addressing the above outcomes will, over the Delivery Plan period, form a significant element of our 'top-down' strategic research programme, which will constitute around 40 per cent of our portfolio. By presenting challenges in terms of outcomes for the UK, our aim is for all researchers, across the entire EPSRC remit, 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** also welcome initiatives from the academic and business communities to develop challenge-led programmes that contribute to these.

Example priority areas for strategic programmes	
Productivity • Innovative, disruptive technologies; • Business innovation via digital transformation; • Transformation to a sustainable society: the circular economy	**Connectedness** • Data-driven economy; • Capitalising on the Internet of Things; • Safe and trusted cyber-society.
Resilience • Energy security and efficiency; • Reliable infrastructure; • Better solutions to acute threats.	**Health** • Transforming community health and care; • Improving prevention and public health.

2.3 Protecting the UK's Long-Term Capability

A core strength of EPSRC's operation is our flexible investment in research activity which enhances the UK's academic capability. **We will** maintain a programme of long-term, excellent research where the emphasis is on 'bottom-up' investigator-led ideas, including community-generated challenges. Comprising around 60 per cent of our total research portfolio, this investment is essential for the UK to compete in a globally competitive environment now and in the future. The longer term results from this will support all our Delivery Plan aspirations, including the Prosperity Outcomes. REF Impact Case Studies show that real-world benefits often emerge over a twenty-year timeframe; consideration of the appropriate 'pathway to impact' will therefore remain a priority.

However, investment choices are necessary in order to deploy public funds wisely. Our **Balancing Capability** strategy, set out in our Strategic Plan[5], is our means of determining priorities at the research area level. By articulating and signalling evidence-based trajectories for each area, **we will** make appropriate levels of investment, in line with UK strengths and needs, and taking account of existing capacities. Our peer review processes have been adapted to support this, and our advisory structures help us to monitor the portfolio and identify corrective action.

> ❖ **Expected outcomes include an adjusted set of research area trajectories, and a greater contextual alignment of the Balancing Capability methodology to other stakeholders/ perspectives including university strategies and business.**

Supporting interdisciplinary research

The UK Research Councils are recognised internationally as leaders and innovators in supporting interdisciplinary research. Many other funders look to us for best practice. At any one time, more than 50 per cent of Research Council grant portfolios are interdisciplinary[6].

[5]https://www.epsrc.ac.uk/about/plans/strategicplan/

[6]RCUK analysis of open data available on Gateway to Research (http://gtr.rcuk.ac.uk/), based on active grants in 2014 where investigators come from different departments.

We have a strong track record of co-facilitating and co-funding interdisciplinary research, innovation and PhD training – through individual Council investments and through multi-agency 'grand challenge' programmes. We are agile in responding to emerging UK needs and new partnership opportunities.

We will now use our experience and convening power to help design and implement the new, multi-agency Global Challenges Research Fund (GCRF), working with BIS to develop a consistent approach to the GCRF and to maximise the fund's impact in meeting combined UK aid and research goals. Within our own budgets, Research Councils will continue working together to address complex UK and global challenges that require interdisciplinary approaches, such as *Energy*, *Digital Economy*, *Technology Touching Life*, *Data for Discovery*, and *Urban Living*.

2.4 Investing in highly skilled, numerate individuals

EPSRC delivers the highly skilled people the UK economy needs. The people we train[7] are the next generation of UK leaders in business, research organisations and elsewhere. The highly skilled, numerate people we deliver take with them into the economy the skills and know-how needed to produce the new technologies, products and services which create jobs and enhance productivity. They also have the absorptive capacity to use knowledge and technologies which may have been developed elsewhere.

Our **Building Leadership** strategy[8] recognises that it is inspirational scientists and engineers who lead excellent research and maximise its impact for the economy. **We will** invest in people with leadership potential across all career stages, enabling them to maximise their contribution within Universities, Business, Government and other research organisations.

> ❖ **Expected outcomes include an enhanced approach to early career development, improved diversity of our portfolio and governance structures, and better ways of encouraging innovation through people.**

2.5 Investing to ensure that national funding has real impact

It is not enough simply to make investments in world-leading research and training. Our role is also to ensure that those investments have as much impact as possible for society and for the economy. We take action to make it more likely that impact will arise, that it will rise more quickly, and that benefits accrue to the nation.

Our **Accelerating Impact** strategy[9] sets out our plans in this area. **We will** ensure that the resources researchers need to achieve maximum impact are embedded within our standard investments via the 'Pathways to Impact' element. Note that this includes our commitment to Public Engagement. However, we also recognise the case for non-embedded, bespoke investment[10] which enables universities to respond rapidly as exploitation opportunities arise from their portfolio of EPSRC-funded research. These direct investments in support of enhanced impact are supplemented by our commitment to *responsible innovation* and to effective data tools for users to access the outputs from our investment.

> ❖ **Expected outcomes include strengthened university/Catapult interactions, integrated critical mass university/business environments, and a rich variety of deliverables both from our Pathways to Impact investment on grants, and from our Impact Acceleration Accounts which we will continue.**

[7]Via our established routes: Centres for Doctoral Training, Doctoral Traning Partnerships, and Industrial CASE.

[8]https://www.epsrc.ac.uk/about/plans/strategicplan/

[9]https://www.epsrc.ac.uk/about/plans/strategicplan/

[10]Impact Acceleration Accounts: in the first three years, the £60 million invested by EPSRC in 33 IAAs has leveraged £58 million and involved 1,142 new company partners.

2.6 Investing in state-of-the-art infrastructure

The UK's international stature in research is founded in part on the availability of internationally competitive scientific infrastructure including world-class laboratories. For many areas of science, it is vital that both UK researchers and industry have access to the equipment which enables them to be at the forefront of scientific discoveries and pioneering innovation. The use of such infrastructure also helps develop the skills of the next generation of highly skilled individuals. **We will** invest in:

- **mid-range facilities** (e.g. mass spectrometry, Electron paramagnetic resonance spectroscopy, X-ray Magnetic Scattering facilities), giving more than 5,000 researchers across the UK access to national, state of the art infrastructure, expertise and techniques that are core to EPSRC research priorities, providing an essential layer of capacity and capability, between lab-based equipment and the large national facilities;
- **state-of-the-art equipment** used by multiple users and multiple research projects;
- **large-scale, strategic equipment** the nation needs to enhance its research capability – with technology roadmaps used to identify future requirements;
- **e-infrastructure** (e.g. next generation high performance computing) which supports techniques such as modelling and simulation that are as important as physical experimentation, benefiting areas such as aerospace, climate modelling and security.

2.7 Investing in International Collaboration

Many of the challenges the UK faces are shared across the planet. Research is therefore a global endeavour. We believe that cross-border collaboration:

- increases the range, quality and impact of our investment;
- provides opportunities to share complementary expertise and facilities; and
- inspires new challenges and routes for impact.

The UK has a successful track-record of active collaboration with researchers worldwide[11]. **We will** ensure that UK researchers have appropriate opportunities to collaborate with the best partners globally. Our proactive international engagement will continue to focus on Europe, USA, Japan, China and India. Broadly, our targeted international activities have one of two aims: to simplify or enhance connections with those nations which have a strong history of collaboration, or to facilitate partnership with those nations which are rapidly growing their research activity.

The research component of these partnerships must always be clear: they must foster excellent research, building collaboration between the best researchers in the UK and those overseas. In an environment of competing priorities, proposals must also be equitable in terms of the outcomes accruing to the UK as well as partners. Building on our established facilitation role, **we will** engender links across the relevant agencies, building a more joined-up UK international policy, and seek to maximise collaboration from synergy between UK activities and those bodies' existing activities.

Maximising our contribution to international development

Whilst our portfolio of investments is primarily targeted at delivering outcomes for UK benefit, it is clear that some aspects of the research we support may be expanded to address challenges of primary relevance to lower income countries. Under the Global Challenges Research Fund **we will** work in partnership with our research communities and sister Research Councils to develop interdisciplinary research and training programmes which address the UN's sustainable development goals and contribute to the UK's commitment to Official Development Assistance (ODA).

[11]In 2014, 8,116 papers were published citing support from EPSRC (web of science data); this included authors from 95 countries, ranging from USA (co-author on 1,965 papers) to Angola (co-author on 1 paper).

Under the Newton Fund **we will** continue to prioritise partnerships with China and India, where we have extensive ongoing collaborations. In this Delivery Plan period **we will** continue our programme of joint activities in sustainable energy, as well as exploring opportunities in other ODA-compliant areas, for example water engineering.

❖ **Expected outcomes include the UK research base remaining connected to the best researchers globally, and an increased portfolio of research addressing international development goals.**

2.8 Realising the benefits of government investments in Grand Challenges

The Government recognises the importance of science and innovation investments in driving productivity across the UK[13]. This has partly been expressed in a number of major Grand Challenge infrastructure announcements which EPSRC is helping to deliver in line with approved business cases:

- The Alan Turing Institute
- The Sir Henry Royce Institute
- The UK Collaboratorium for Research in Infrastructure and Cities
- The Institute for Physical Sciences
- National Nuclear Users Facility
- Flagship NMR Facilities
- Cavendish Laboratory
- Centres for Doctoral Training
- Quantum Technologies Programme

We will ensure that these investments are integrated with our portfolio to bring together, in complimentary ways, research, training and the development of leaders. The recurrent resource needed to get the best from these investments will be available through competitive peer review.

We will seek opportunities for securing additional investment of this nature, whilst looking to ensure that the core principle of excellence is safeguarded.

2.9 Enhancing equality and diversity

The long-term strength of the UK research base depends on harnessing all the available talent. As an investor in research, we are committed to attracting the best researchers from a diverse population into research and innovation careers. Unlocking this diverse talent increases our ability to achieve our ambitions in this Delivery Plan and beyond.

As part of RCUK we produced a Statement of Expectations for Equality and Diversity[14] and published Equality and Diversity data[15]. In this Delivery Plan **we will** continue to take bold, transparent action, in partnership with others, to drive the diversity agenda. Working through RCUK **we will** deliver the RCUK action plan which has the objectives of:

- *Leading by example*;
- *Challenging bias and ensuring fair and inclusive funding processes*;
- *Leading and supporting change in our research community*.

We are working towards an equality and diversity target to recruit under-represented groups (e.g. women and ethnic minorities) into strategic advisory positions (at least 40 per cent by the under-represented gender for our Council and SAN and 30 per cent female membership for our College and SATs by 2020).

[13]For example, our investment in Quantum Technologies.

[14]http://www.rcuk.ac.uk/RCUK-prod/assets/documents/skills/EqualityStatement.pdf

[15]http://www.rcuk.ac.uk/RCUK-prod/assets/documents/skills/RCUKDiversityNarrativesanddata.pdf

❖ **Expected outcomes include improved diversity in the research workforce, in strategic advisory positions and in the membership of peer review bodies; assurance on the objectivity of our peer review and policy decision making processes, such that they are not influenced by gender, or any other protected characteristic; and management of the impact of unintentional bias from peer review processes, behaviours and culture.**

2.10 Driving an efficient research base

UK research is the most productive in the world[16]. The Research Councils, including EPSRC, will continue to work with BIS, HEFCE, Universities UK and the HEI sector to promote collaboration and sharing of infrastructure, data assets and other resources to further raise efficiency and productivity across the sector. Using our expertise as funders of research and facilities, **we will** work with the sector to pioneer policies, incentives and performance measures for efficient sharing and utilisation of research assets.

[16]Based on article volume and citations per pound invested:
https://www.gov.uk/government/publications/performance-of-the-uk-research-base-international-comparison-2013

3. EFFECTIVENESS THROUGH PARTNERSHIPS

We know that we cannot work alone. We are already a well-established broker between the constituent parts of the research and innovation eco-system. **We will** continue forging collaborations with businesses[17] and will seek to work seamlessly with Innovate UK and the Catapults[18].

3.1 Our Partnership with Universities

Active partnership with universities is a major element of what we do. We have maintained a strategic relationship with our Framework and Strategic Partner Universities[19] since 2008. **We will** seek even more coherence and efficiency across the UK academic research system so that public investment is used wisely and for the larger benefit of the UK. The benefits of a sustained relationship and dialogue at a senior level are:

- mutual contribution to, and understanding of one another's strategies and plans, based on a strong culture of information-sharing;
- faster implementation of activities which address our strategic plan goals;
- strengthening of our capability in the knowledge management of the broader EPS landscape.

❖ **Expected outcomes include: more coherently structured interactions with partner universities; stronger alignment between EPSRC strategies and university strategies (eg on diversity); more open discussions about areas of comparative strength, influencing future decision making; clear understanding of, and buy-in to, EPSRC strategies at the Faculty/School level as standard.**

3.2 Our Partnership with Business and other innovation funders

a) Business Partners

In addition to our strategic relationships with universities, we work in partnership with research-active business and users of research. **We will** partner with business in a number of ways, through one-off involvement in research or training investments, through to co-invested research programmes developed between EPSRC academia and business. From those relationships, the following benefits accrue:

- over £900 million leverage on a £4.3 billion portfolio;
- a high degree of engagement with SMEs (60 per cent of our collaborative partners);
- strategic relationships with the UK's leading research-intensive companies, providing a highly effective route for co-invested research programmes and strategic understanding of the business environment;
- additional sales revenue generated as a result of EPS research[20];

[17]EPSRC currently has 19 Strategic Partnerships with companies, charities and others: Arup, AstraZeneca, AWE, BAE Systems, BT, Cancer Research UK, DSTL, Dyson, EDF Energy, GlaxoSmithKline, NDEvR, Jaguar Land Rover, National Physical Laboratory, Procter and Gamble, Rolls-Royce, Shell, Siemens, Tata Steel, The Wellcome Trust.

[18]Innovation funders include Innovate UK but also Cancer Research UK, Wellcome Trust, Scottish Innovation Centres.

[19]33 institutions which between them hold 90 per cent of EPSRC's research portfolio.

[20]REF Impact Case Studies reported over £60 billion additional sales revenue during the period 2008-2013.

- a joint presence at the relevant sector councils and leadership groups;
- a research-base environment which is attractive to inward investment[21];
- coordinated advocacy for continued support for the EPS research base.

> ❖ **Expected outcomes include engagement with an increased range of businesses which engage with EPSRC's portfolio, with greater impact from EPSRC funding and increased influence from EPSRC and the research base into sector and business strategies; increased intellectual contribution and financial investment from business in the EPSRC portfolio, in terms of both existing investments and new opportunities; and greater business input into: (a) EPSRC strategy, increasing its relevance to national needs, and (b) peer review, helping increase impact from our portfolio.**

b) Innovate UK & Catapults

Innovate UK and the network of Catapult Centres offer important pathways to impact for EPSRC investments in research and training. EPSRC has a well-established relationship with Innovate UK and has engaged with all the Catapult Centres. Through these partnerships **we will**:

- align relevant processes at the strategic and operational levels;
- develop joint approaches in key areas, as in Quantum Technologies;
- align or co-fund activities in line with organisational and joint priorities; and
- enable more and deeper connections between EPSRC investments and the Catapult Centre network.

3.3 Our Partnership with Government

The Science and Innovation budget is one of the most powerful policy-making and innovation tools the UK has to help government deliver its policies. It affects every government department, and has the potential to:

- support delivery of the UK's Productivity Plan;
- create efficiencies in government;
- transform large public services - like the NHS - increasing efficiency and effectiveness; and
- identify where it is best to invest.

Areas of potential transformation include financial stability and growth, health and ageing, clean, safe, affordable energy, infrastructure and transport, crime reduction.

We already have established strategic partnerships with some departments, and will aim to build our working relationships with other departments where our research strengths and priorities align and contribute most closely to their own policy objectives. **We will** facilitate, bringing together those who can identify and articulate the challenges for the nation with those who can develop technological solutions.

> ❖ **Expected outcomes are: EPSRC-supported research and researchers inform government policy; and Departments automatically look to EPSRC to connect them to the research and researchers who can help them achieve their policy objectives.**

[21]Economic Impact of Engineering, Technopolis, 2015: "Overseas investors are drawn to the UK's globally recognised engineering expertise – e.g. Samsung Heavy Industries announced in 2012 it would base its first European offshore wind project in Fife [with] investment of up to £100 million and more than 500 new jobs."

4. AN EFFICIENT AND EFFECTIVE ORGANISATION

4.1 Reforming the Research Councils

The Research Councils together will continue to participate actively in a suite of government reforms involving BIS partners across the UK research and innovation funding landscape. These reforms aim to ensure the UK is the best place in the world to do research, to innovate and to grow businesses, whilst delivering the best return on public investment. They include: reform of higher education; implementation of the Nurse Review recommendations[22]; BIS 2020 organisational and efficiency reform; BIS common technology platform; BIS grants programme.

We will work with government and BIS partners to bring together the seven Research Councils and dual support system as 'Research UK'. This new organisation will take responsibility for national research strategy, simplify transactional operations and reduce operating costs.

To ensure successful reform, **we will** be mindful of key principles identified by Sir Paul Nurse, government and the Research Councils[23]. These principles include: commitment to the dual support system for funding UK research; clear delegation from government for research funding decisions and their management; commitment to the Haldane principle; recognition of the breadth and scale of research investments within and across disciplines.

In preparation for reform, the Research Councils will plan and implement internal change and cost-reduction measures from 2016, ensuring that our changes support wider government reforms.

Our achievements so far

In partnership with AHRC and ESRC, EPSRC has already created a Professional Support Unit (PSU), bringing together common HR, Finance, Information Systems and Project Management units so that Councils benefit from efficiency savings as well as harmonised approaches.

We have also operated an internal efficiency programme which has enabled the transfer of twenty-six posts from support functions to front-line delivery.

4.2 How will we know we are successful?

Evaluating Research Council investment

The UK's dual support system for publicly funded research[24] provides a holistic and efficient investment appraisal and evaluation cycle compliant with HM Treasury guidance[25]. Playing complementary roles, Research Councils focus on *prospective quality assurance* through rigorous peer reviewed competition for grants, while Higher Education Funding Councils focus on *retrospective quality evaluation* through the research excellence framework (REF). Besides informing Funding Council allocations, REF evaluates the excellence and impact (economic and societal benefit) of university research supported by all funders, including Research Councils.

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

[23]For principles see: http://www.rcuk.ac.uk/documents/documents/strategicprioritiesandspendingplan2016/

[24]Dual support: Higher Education Funding Councils provide stable 'quality-related' (QR) funding to support research capability in universities; Research Councils operate at arms-length from government under the Haldane principles (http://www.publications.parliament.uk/pa/cm200809/cmselect/cmdius/168/16807.htm) and provide specific project funding to named researchers.

[25]HMT Green Book and Magenta Book: ROAMEF cycle.

For operational efficiency, Research Councils minimise further evaluation. Hence evaluation or audit of specific investments and processes, during or after their lifetimes, is selective and based on strategic need or risk. Large capital proposals require business cases and economic valuation to inform investment decisions and to evaluate benefits realised. Research Councils use their own and independent evidence, including REF, to evaluate performance against Royal Charter objectives, and longer-term impact outcomes[26].

Success can be measured in a variety of ways: EPSRC will continue to draw on information at a number of levels to monitor progress in achieving our expected outcomes. In the shorter term, **we will** focus on intermediate outcomes such as:

- maintaining research excellence in engineering and physical sciences;
- the establishment or development of active communities of practice (involving researchers and 'practitioners' and multidisciplinary collaborations) in key areas, including in 'disruptive' technologies;
- the extent of engagement of partner organisations (private, public and third sector) and level of commitment (leverage).

Evidence will also be gathered on longer-term outcomes and impacts such as:

- technology adoption by relevant practitioners and the resulting savings through efficiencies or improvements in delivery;
- commercial exploitation, for example, the development of new technologies, products, processes;
- growth of new industry based on the development of new/disruptive technologies;
- influence on policy and practice, for example, through regulations, standards, or guidelines;
- Improved quality of life for UK citizens through improved services or facilities.

EPSRC will continue to use research management information on its investments, including Research Outcomes information provided by grant-holders, as well as other sources, including evaluations, reviews and policy studies, to ensure successful delivery.

[26]See, for example, Research Council impact reports: http://www.rcuk.ac.uk/media/news/impact/

ANNEX
EPSRC FINANCIAL ALLOCATIONS

Planned expenditure

Resource

£m	**2015/16 baseline**	**2016/17**	**2017/18**	**2018/19***	**2019/20***
EPSRC Resource	795.5	**796.7**	**781.5**	**774.8**	**767.6**
EPSRC Global Challenges Research Fund	0	**10**	**15**	**15**	**15**
EPSRC Total Resource	**795.5**	**806.7**	**796.5**	**789.8**	**782.6**

Capital

£m	**2015/16** baseline	**2016/17**	**2017/18**	**2018/19**	**2019/20**
EPSRC World Class Labs	58	52.2	52.2	52.2	54.2

*2018/19 and 2019/20 are 'indicative funding'.

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