MRC Medical Research Council

MRC Delivery Plan
2016-2020

Contents

1. Our vision

The MRC Strategic Plan 'Research Changes Lives 2014 – 2019'[1] sets out our vision to support excellent discovery science and strengthen partnerships to improve health and economic impact. We will:

- **Prioritise research into the most pressing health challenges worldwide:**
  The fight against infections and antimicrobial resistance; promotion of life-long mental health and strategies to address dementia; prevention of chronic non-communicable diseases; and regeneration of damaged tissues.

- **Discover – exploring new scientific principles and setting new paradigms:**
  Original discovery research in Universities and MRC Institutes; ambitious studies in humans to understand disease mechanisms; discovery and validation of drug targets; and interdisciplinary discovery science across Research Councils.

- **Transform health research and innovation:**
  Embed informatics and computation in health research; further consortia-based approaches to stratify disease and tailor treatment; develop precision public health for the UK and globally; and broaden innovative academic industry relationships.

Health risks are increasingly global opening opportunities for UK medical research to play a leading role in improving health and strengthening science and innovation in Low and Middle Income Countries (LMICs). This will deliver against the UK commitment to international development[2] and support cutting edge research that benefits everyone. Building on our existing strengths we shall deliver:

- New products, interventions, and policies that will **change lives in the UK and globally**[3]
- Research that tackles complex problems and achieves the quality and visibility needed to attract **inward R&D investment**[4] and global partners
- New research technologies, methods, and structures that **maximise productivity**[5]
- **Research capacity and leadership**[6] securing the UK's place at the forefront of medical research

1. http://www.mrc.ac.uk/research/strategy/
2. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/478834/ODA_strategy_final_web_0905.pdf
3. http://www.mrc.ac.uk/publications/browse/mrc-economic-impact-report-2014-15/
4. 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
5. http://www.frontier-economics.com/publications/rates-of-return-to-investment-in-science-and-innovation/ -strongest correlation found between MRC funding and growth
6. http://bmjopen.bmj.com/content/2/4/e001792.full

2. Delivering national needs

2.1 Research Excellence

The MRC remains committed to innovative discovery research addressing fundamental, clinical, or population-based problems. Supporting the best scientists to pursue novel ideas today will deliver tomorrow's transformative innovations. We will strengthen research in strategic priority areas through response mode funding and dedicated initiatives and enhance long-term strategic capabilities through MRC Units and Centres. We will reprioritise our investments in order to expand our portfolio in global health research benefiting people in LMICs.

2.1.1 Priority Challenges

We will build up programmes of research and create platforms for co-investment by industry, charities, and Research Councils to address major health and societal challenges in the UK and globally.

2.1.1.1 Infections

As the world gets smaller, the health challenges facing nations become a shared agenda. Infections can spread around the world in hours, microbial and viral resistance to therapies is increasing and there is a limited pipeline of new therapeutic/preventative options. Together these pose a growing threat to the health and economies of developed and developing nations. Building on the capacity created through programmes such as the £30M MRC-led cross-Council Antimicrobial Resistance (AMR) initiative we will:

- Develop partnerships to strengthen **preparedness for emerging and re-emerging infections**, through increased understanding of the drivers of emergence, the transmission of disease and outbreak evaluation and management
- Extend the **global networking of the cross-council AMR initiative**, to better assess global drivers of resistance and address global health needs
- Build a platform linking UK strengths in basic pathogen biology and immunology with **vaccine development** and promoting connections with the UK Vaccines R&D Network and Ross Fund led by the Department of Health and Department for International Development (DfID)

Expected outcomes and outputs:

- An increase in innovative inter-disciplinary collaborations in infectious disease research, linking basic science with clinical, population, social and environmental research
- A pipeline of discovery research enabling industry to develop new therapies
- New strategies for identifying, evaluating and tackling global infectious disease and resistance threats, including those arising in LMICs
- An increased UK capability and capacity for innovative and effective vaccines development addressing global needs

2.1.1.2 Lifelong Mental Health and Dementia

In response to the Prime Minister's ambition to find a disease-modifying treatment for dementia by 2025, we will establish a new £150M **UK Dementia Research Institute (DRI)**. The institute will be centred on the need for innovative discovery science to unlock our understanding of the mechanisms of dementias and will link excellent fundamental neuroscience with dementia research. By connecting with the momentum created through the £53M MRC Dementias Platform UK and the NIHR Translational Collaboration in Dementia Research, the DRI will invigorate the therapeutic pipeline and drive new approaches to diagnosis, treatment, prevention and care provision. Over the next 4 years we will:

- Establish the DRI with research activity to be delivered through a central hub and distributed regional centres
- Recruit a Director and cadre of DRI research professors and, working with partner HEIs, over 400 scientists associated with the DRI
- Connect the DRI to emerging research opportunities and attract scientists from complementary scientific areas who are not currently working on dementia
- Establish partnerships between the DRI and research charities, industry and international centres

Expected outcomes and outputs:
- Increased capacity in UK dementias research
- Accelerated pace of discovery research to stimulate the pipeline for new drug targets
- New approaches for developing and testing novel diagnostics and therapeutics in targeted patient groups
- New strategies for the prevention of dementia and/or delivery more effective care and support for people with dementia and their carers

As well as strengthening UK dementia research we will enhance our investment in lifelong brain health, covering neurocognitive development and mental wellbeing, with special emphasis on the young where many lifelong conditions emerge. We will:

- Support the **prevention and early interventions for mental disorders** based on better understanding of susceptibility and the environment
- Strengthen research on **neurodevelopmental disorders**
- Increase research on the high burden of **mental health and neurological conditions in the UK and LMICs**, with both intervention research and more basic studies of social, environmental and biological factors

Expected outcomes and outputs:
- A better understanding of the causes of mental health issues and possible interventions
- Improved linkage of biological mechanism with social and environmental drivers of mental health

2.1.1.3 Prevention

Better strategies for the prevention of disease, and determinants of disease, such as obesity, will achieve improved health and well-being whilst helping to reduce healthcare costs. The MRC-led National Prevention Research Initiative (NPRI) has influenced national policy, provided evidence for new interventions, helped to build capacity in public health research, and left a legacy of cooperation between funders[7]. Building on these capabilities, MRC will work with health departments, Research Councils and charities to:

- Support broad multi-disciplinary science at the scale and duration needed to incorporate the **complex interacting determinants of health**, including exploration of an increased emphasis on population-level changes
- Further improve and **accelerate the translation of this new public health prevention research** into policy and practice
- Develop and exploit a deeper understanding of **mechanistic underpinning of intervention effectiveness**

7. http://www.mrc.ac.uk/research/initiatives/national-prevention-research-initiative-npri/

Expected outcomes and outputs:

- Generalisable and scalable preventive approaches that lead to larger, quicker, and more cost-effective improvements in health, both in the UK and LMICs.
- Improved reciprocal knowledge exchange between users and researchers
- Strengthened expertise in public health prevention and non-communicable disease research that makes better use of new technologies and existing infrastructure (cohorts, data, biobanks, etc) in the UK and overseas (see also 2.1.3.4)
- Quantified economic benefits or costs

2.1.1.4 Regenerative Medicine

The MRC plays a leading role in supporting regenerative medicine, including cross-Council activities such as the £25M UK Regenerative Medicine Platform (UKRMP) established jointly with EPSRC and BBSRC to address obstacles to therapeutic development. The UKRMP promotes partnerships with the Innovate UK Cell and Gene Therapy Catapult and provides a platform for co-investment and alignment with medical research charity funding. Over the next 4 years we will:

- establish a **second phase for the UKRMP** that builds on existing strengths but promotes new approaches to the translational challenges faced
- ensure that the UKRMP agenda embraces opportunities in **advanced therapies** for instance building on cell engineering and gene editing approaches
- increase the focus on developing regenerative interventions against **tractable clinical problems**, exploring experimental medicine approaches and building clinical research capability in regenerative medicine
- promote the **emergence of new research leaders** in the field

Expected outcomes and outputs:

- An increase in the number of regenerative therapies entering clinical trial
- Increased research capacity and interdisciplinary programmes in regenerative medicine
- Growth in the number of collaborative activities with bioindustry

2.1.2 Discovery for Medicine

We will extend the UK's strong track record in leading scientific discovery, whilst bringing discovery closer to users in industry and clinical medicine.

2.1.2.1 MRC Institutes

Institutes foster transformative discoveries through inspirational leadership, a critical mass of the best researchers, and long term support. Discovery research at the Laboratory of Molecular Biology (LMB) has delivered break through medicines and an income of £350m for health research through sales of royalties and shares between 2011 and 2015. We will continue to support and develop the LMB, the Clinical Sciences Centre (CSC, to be renamed the MRC London Institute of Medical Sciences) and the Francis Crick Institute to **deliver world-leading interdisciplinary science that tackles the most challenging questions**. We will empower Directors to be entrepreneurial and foster new talent and scientific approaches.

Expected outcomes and outputs:

- Novel discoveries and a new generation of highly skilled researchers in strategic priority areas including the interface between structural and cell biology; gene function and health; computational approaches to improve biological understanding; and immunity and infections
- Opportunities for translation and industry partnerships

2.1.2.2 Experimental Medicine

Experimental medicine is investigation undertaken in human participants to understand disease mechanisms and identify potential therapeutic targets, providing an effective means to improve medical knowledge. The MRC has built up experimental medicine research with targeted initiatives since 2008 to foster more ambitious human studies and increase academic-industry partnerships. This is closely coordinated with other funders and builds on NIHR and devolved nation investment in clinical facilities, such as the £170M Clinical Research Infrastructure initiative[8] and over £680M investment in NIHR Biomedical Research Centres[9]. MRC will:

- **Increase the number of ambitious studies** addressing the biggest gaps in understanding of disease mechanism through involvement of human participants
- **Partner with NIHR, research charities, the pharmaceutical industry** and other organisations as appropriate, to add value and make best use of existing infrastructure and knowledge in supporting this approach

Expected outcomes and outputs:

- Increased understanding of the causes and mechanism of human diseases
- Through this understanding, identification of new valid target mechanisms for treatment of disease

2.1.2.3 Targeted Discovery for Disease

Development of many new drugs fails at a late stage due to a lack of efficacy or unacceptable toxicity. Too often, the underpinning target validation is insufficient or flawed[10,11], and could be strengthened through improved alignment and co-discovery between academia and industry. We will develop a co-ordinated approach providing access to existing specialist technologies and capabilities through the establishment of a virtual **'Targeted Discovery for Disease Network'** underpinning specific disease or mechanistic focused activities. Priorities are to:

- Build **capabilities and capacities in target discovery and validation** across the UK, capitalising on and supporting existing discovery science, and incorporating areas relevant to global health, including LMICs
- Identify and **bridge gaps in target validation**
- Enable greater **knowledge exchange between academia and industry**

Expected outcomes and outputs:

- Faster, more efficient progress in understanding disease mechanisms, which will be more rapidly translated or taken up by industry

2.1.2.4 Interdisciplinary discovery science

Many break-through discoveries happen at the interface between disciplines, with the physical and life sciences being one example of particularly fruitful collaborations[12]. MRC will work with Research Council partners to stimulate interdisciplinary discovery science, including flexible, locally prioritised Discovery Awards to build up new areas of research or scientific approaches. As an area of mutual strategic importance **Technology Touching Life (TTL)** will be taken forward as a highlighted priority across BBSRC, EPSRC and MRC to foster interdisciplinary technology development research across the engineering, physical and life sciences. Using shared information and coordinated review we will:

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8. https://www.mrc.ac.uk/research/initiatives/clinical-research-capabilities-and-technologies-initiative/
9. http://www.nihr.ac.uk/about/biomedical-research-centres.htm
10. Arrowsmith, J. (2011) Trial Watch: Phase II Failures: 2008-10. Nat.Rev.Drug.Discov. 10, 328-329
11. Cook D et al (2014) Lessons learned from the fate of AZ drug pipeline: a five dimensional framework. Nature Reviews Drug Discovery 13 419 - 432
12. https://www.epsrc.ac.uk/newsevents/pubs/the-importance-of-engineering-and-physical-sciences-research-to-health-and-life-sciences/

- Stimulate interdisciplinary collaborations, promoting the co-development of novel tools to address application driven challenges in the Life Sciences
- Develop technologies that will lead to future waves of technology-led discovery for the life sciences and create new opportunities to benefit the economy

Expected outcomes and outputs:
- New communities ensuring that novel interdisciplinary research can be nurtured and developed.

2.1.3 Transforming health research and innovation

We will transform the ecosystem for health research and innovation delivering step changes through pioneering partnerships

2.1.3.1 Informatics and computation

The scale and complexity of biomedical and health data is increasing through a variety of sources, including large population studies, high-throughput 'omics' platforms, imaging, and mobile, patient-centred technologies. Bringing these and other data together for analysis and interpretation offers unprecedented opportunities to advance understanding of the causes, prevention and treatment of disease. Building on major existing investments, such as the Farr Institute of Health Informatics Research and Medical Bioinformatics awards, we will establish a **single UK-wide, distributed health and biomedical informatics research institute** drawing on existing and new funding partnerships. The institute will be led by a visionary Director and will be open, inclusive and agnostic of institutions. It will:

- Develop **capability, talent and expertise in "translational" health and biomedical informatics research** – building interdisciplinary expertise across fundamental maths, statistics and computer science, through discovery science and bioinformatics to clinical and population health
- Create **secure, trustworthy and interoperable research environments** to experiment with new ways of integrating and managing complex and diverse health and biomedical data
- Establish an open science and **open innovation approach** and close partnerships with the owners/controllers of health data and with UK and international academic partners to generate novel analytical tools for rapid translation into use
- Working with government partners, academia and industry to identify and **prioritise major health challenges**, which need new ways of managing and integrating diverse data sources: across discovery science, stratified medicine, public and population health, learning health systems and citizen driven health

Expected outcomes and outputs:
- Greater understanding of the complex environmental, social and molecular determinants of disease, leading to novel approaches for prevention and therapy
- Significant increase in national capabilities and interdisciplinary medical data science skills and expertise
- Establishment of an interoperable technology framework, connecting the UK's diverse health and biomedical data assets and expertise; maximising the efficiency of cutting-edge data science infrastructure for research
- International data linkage capacity and impact

2.1.3.2 Stratified medicine

Stratified medicine identifies groups of people with specific disease 'subtypes' so that clinicians can accurately diagnose their conditions and determine treatments which are most likely to be effective – underpinning the practice of precision medicine. Through our Stratified Medicine Initiative, co-developed with industry, we invested £60m between 2010 and 2014 into thirteen disease-focussed consortia across

34 universities and in partnership with 70 companies. A further £16m was invested into six Molecular Pathology Nodes to embed outputs of stratified medicine into clinical practice. The consortia and nodes have developed into open innovation platforms linking clinical, academic and commercial research for real patient benefit. Over the Delivery Plan period we will:

- Establish **further consortia in disease areas that benefit from stratification but are currently under-represented**, including those where drugs are not yet available, and disease areas of relevance to global health, including LMICs
- **Maximise the scientific impact of the existing stratified medicine consortia and molecular pathology nodes** through proactive engagement and monitoring to ensure value for money and identification of new scientific opportunities
- **Link our consortia with MRC informatics investments** to develop novel ways of integrating and interrogating large scale multi-modal 'omic', imaging and health data – enhancing the health and scientific potential of these data as well as better develop and implement data standards and methodologies

Expected outcomes and outputs:

- Better models and markers of disease, better patient cohorts and improved capability in medical bioinformatics, linking rich biomedical data to clinical/population data sets to accelerate therapeutic discovery
- Deeper understanding of disease, from predisposition to end stage to better inform prevention and treatment strategies
- Increased innovation in molecular and genetic pathology and adaptive clinical trial designs with more biological subgroup analyses; Better integration into clinical care pathways

2.1.3.3 Academic industry relationships

Health care industries are a major contributor to UK Research and Development and collaborations between academia and industry drive new knowledge and spur innovation. The MRC has supported a spectrum of approaches to enable academic-industry partnerships, from individual research collaborations to large consortia such as the EMINENT research partnership between five leading UK universities and GlaxoSmithKline. Alignment with industry remains at the heart of MRC strategy. We will:

- Develop further opportunities for UK academic researchers to work in close partnership with industry scientists across the life sciences and beyond, **bringing in sectors such as the food and information technology industries**
- Foster such partnerships through pump-priming activities for early development such as **Proximity to Discovery** awards, and work to ensure that MRC support for academic/industry collaborations is flexible, agile and simple to navigate
- Develop further **innovative partnerships with companies to enable UK academic research to make use of cutting-edge research capabilities**, building on the landmark agreements with AstraZeneca to create the MRC/AZ Centre for Lead Discovery, and with UCB to access their antibody screening capabilities
- Continue the **MRC/Industry Asset Sharing initiative**, bringing in further companies and assets, beyond the seven already participating, and strengthening links to Experimental Medicine and Stratified Medicine

The largest impediment to drug development is the "valley of death" between target discovery and clinical trials. The Biomedical Catalyst (BMC) was launched in April 2012 to de-risk innovative science, helping to bridge the valley of death and accelerate the progress of novel products to market. Since launch, more than £250M has been jointly committed by MRC and Innovate UK, supporting over 300 projects (including 60+ first in human studies) and leveraging more than £120m in matched private funding.

Funded academics and companies have subsequently realised in excess of £1.3bn through additional financing, licensing deals, or as a result of acquisition with over 40% of the funded SMEs originating from the University sector. Over the next five years we will **work with Innovate UK to deliver a refined version of the BMC**, drawing on the outputs of the recent independent review of the BMC and ensuring it reflects the needs of the current and future research and innovation landscape.

Expected outcomes and outputs:
- More effective delivery of world-leading research into the understanding of human diseases, leading to innovative treatments being developed and evaluated, and increasing the translational skills and expertise of UK scientists.
- Promotion of industry interest in diseases affecting both, the UK and LMICs
- Drive the UK (bio-) economy

2.1.3.4 Stratified/global public health

Advances in 'omics', mobile, monitoring, and digital technologies open up opportunities for a paradigm shift in public health research. Improved analysis of individuals in their environment and over the life course will help to tailor preventative approaches to at risk groups or those most likely to benefit. We will:

- Explore the opportunities for advancing **'precision public health'** with a particular emphasis on global populations
- Tackle the increasing threat of **non-communicable diseases (NCDs) in LMICs** building on our infrastructure in global infectious disease research and broadening our UK-based strengths in NCDs

Expected outcomes and outputs:
- Novel tools and approaches to identify biological and environmental risk factors for disease
- Improved characterisation of individuals and their exposures to inform prevention strategies for UK and global application
- Expanded MRC scientific and geographical footprint in NCD research and increased in country capacity to undertake ambitious research plans

MRC supports the full spectrum of global health research from discovery through to implementation. We will continue our investment in **late phase global health research** to ensure that our discoveries are translated into effective interventions worldwide. We will work in partnership with other agencies to leverage additional funds and facilitate approaches that will optimise knowledge transfer. MRC will:

- Support late phase **clinical trials in partnership with the Wellcome Trust and DFID** to generate new knowledge about interventions that will contribute to the improvement of health in LMICs.
- Support late phase studies on new products to tackle infections relevant to Sub-Saharan Africa through the **European and Developing Countries Clinical Trials Partnership (EDCTP)**.
- Work via the **Global Alliance for Chronic Diseases** to build evidence for implementable solutions to address the rising impact of non-communicable diseases in developing countries
- Build on our previous funding partnerships to support research optimising the **systems for delivery of affordable healthcare**.

Expected outcomes and outputs:
- Accelerated clinical development of new or improved diagnostics, treatments and preventions for international health
- Evidence base for translation of research into policy and practice
- Strengthened research capacity that links UK expertise to that in LMICs

2.2 Capacity and Skills

The people we nurture and support to become tomorrow's research leaders are central to the MRC's mission. We continuously review the skills needed to deliver priority challenges and support researchers across a range of career stages via studentships, fellowships and grants, and through investments in specific research areas at universities, centres, institutes and units. In 2015, we launched the world-first interactive career framework for biomedical researchers, enabling early career scientists to explore the career pathways available to them. We also addressed key barriers to researchers' professional progression by simplifying and increasing the flexibility of our support mechanisms, such as removing eligibility criteria based on years of post-doctoral experience. We will continue to ensure our support will develop the next generation of biomedical research leaders by:

- **Supporting difficult transition points** in a research career, in particular the transition from post-doctoral scientist to independent investigator.
- Increasing **clarity and flexibility of career pathways** for scientists, including those working in emerging disciplines, by further developing our career framework.
- Transforming **medical bioinformatics careers** by developing a specific career framework to be implemented in the planned national informatics institute.
- Addressing skills needs, including **global health, interdisciplinary training, and training at the industrial interface**.
- Working with partners to address identified barriers to progression of clinical academics and to enable seamlessly **combined academic and clinical strands** of training.
- Increasing the **diversity of the research base** through exploration of how researchers might best exploit flexible working and career breaks, targets for gender balance on our Council, Boards and Panels, and consideration of how diversity in respect of other protected characteristics can be improved.

Expected outcomes and outputs:

- A stronger and more diverse UK research base
- A skills base across all career stages to respond to current and future challenges in human health in the UK and globally.

2.3 National Capability

UK research is the most productive in the world[13]. The Research Councils, including the MRC, will continue to work with BIS, HEFCE and the devolved funding councils, and the UK HEI sector to promote collaboration and sharing of infrastructure, data assets and other resources to 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. We will develop and sustain research capabilities for the delivery of the highest quality biomedical research, including:

- **State of the art technologies and facilities for discovery science**, including new investment in animal research facilities at the CSC/(MRC London Institute of Medical Sciences) and cutting edge computing and informatics infrastructure
- Resources for **population health and clinical research**, including strengthening our population cohorts[14], developing human tissue resources (biobanking) in partnership with medical research charities, and maximizing the impact of the Clinical Research Infrastructure initiative, including the medical imaging facilities provided through the Glasgow City Deal

13. Based on article volume and citations per pound invested: https://www.gov.uk/government/publications/performance-of-the-uk-research-base-international-comparison-2013
14. https://www.mrc.ac.uk/research/facilities/cohort-directory/

- Facilities to promote **Research and Development in ageing research** through the National Centre for Ageing Science and Innovation
- Leadership in **increasing the robustness and reliability of health research**, working with NIHR through the jointly funded Methodology Research Programme to support the development and uptake of novel methods in health research, as well as **promoting reproducibility** through approaches such as verification of reagents and a more 'open science' approach
- **Ensuring best practice** by continuing our commitment to the Reduction, Refinement and Replacement of animal use in research (the 3Rs) through provision of core funding to the NC3Rs jointly with BBSRC; and enhancing support for the navigation of regulatory requirements for research that involves human participants, their biosamples, or data through the MRC Regulatory Support Centre

Expected outcomes and outputs:

- Increased scientific innovation, translational capability and industry partnerships by advancing the UK's ability to conduct word leading research
- A higher level of robustness and reproducibility of research findings

3. Effectiveness through partnerships

The UK medical research environment is a complex ecosystem and we work with many partners to deliver the highest impact of MRC research. These include NIHR and the devolved Health Departments, medical research charities, industry and Innovate UK, the other Research Councils, and DfID and international partners. 25% of MRC expenditure is committed in partnership with other funders, the result of strategic co-ordination across all sectors of research. Around half of MRC funded research groups report adding new collaborations to their research effort throughout the life of their MRC support, with more than 15,000 new partnerships recorded via researchfish® since 2006[15]. Forty-four per cent of these collaborations are outside of the UK, and 8 per cent are with private sector organisations, all leveraging essential financial[16] and in kind contributions to UK research.

3.1 Health Departments and medical research charities

Joint working with Health Departments and medical research charities facilitates the sharing of resources and bringing our research closer to patients. MRC will further enhance partnership working with Health Departments and charities in a broad range of areas including clinical studies (for instance supported through the joint MRC/NIHR Efficacy and Mechanism Evaluation Scheme), prevention research, genomics and informatics, and health threats such as Antimicrobial Resistance and dementia.

3.2 Industry/Innovate UK

It is imperative for the UK that the research and innovation system is effective in supporting the translation of cutting edge science into growth and economic impact, and in attracting new innovative business investment to the UK. To enable this, research and innovation investment must work seamlessly together to leverage maximum impact. Our commitment to develop and sustain productive collaborations with companies in the UK is set out in Section 2 of this Plan. We will also continue to work closely with Innovate UK to drive forward a number of high potential areas to accelerate the growth of the UK economy.

3.3 Research Councils UK

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% of Research Council grant portfolios are interdisciplinary[17]. 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, for example publishing a call for research into Zika within hours of the WHO announcement of a public health emergency. 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 or global challenges that require interdisciplinary approaches, such as Antimicrobial Resistance, Data for Discovery, Urban Living, Regenerative Medicine and Technology Touching Life (MRC, BBSRC and EPSRC), and Mental Health (MRC and ESRC).

15. http://www.mrc.ac.uk/successes/outputs-report/
16. 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
17. 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.

3.4 International

International partnerships leverage funding and open up opportunities for influencing the international health research agenda. The MRC engages with the European Commission on the Horizon 2020 framework programme and Innovative Medicines Initiative and we monitor the development of new EU directives and regulations and work with partners to ensure that such legislation supports the health research environment. We co-fund the European Molecular Biology Laboratories and European Molecular Biology Organisation, including the European Bioinformatics Institute in Cambridge, and participate in Joint Programming Initiatives to address challenges such as antimicrobial resistance and neurodegeneration. Through membership of the Global Alliance for Genomics and Health, the MRC promotes responsible sharing of genomic and clinical data. We will ensure UK participation in the Human Frontier Science Programme jointly with BBSRC, continue support for the International Agency for Research on Cancer, and further engage with countries such as Korea and Japan.

3.5 Medical science for global development

The MRC has a long history of investing in high quality research to bring the benefits of biomedical research to populations across the world. We have worked in partnership with local or regional networks, governments, and other research funders to build up a substantial global health portfolio of ~£50M per annum. We will continue our engagement with DfID and other partners in supporting late phase global health research and will complete the first Newton programme and build on the partnerships created to help deliver the proposed expansion of the Newton Fund.

3.6 Public engagement

We will bring the benefits of excellent research to all sections of society by enhancing engagement and communication with our scientists and partners, policymakers and parliamentarians, and the public (including relevant populations in developing countries). Our Communication and Engagement Strategy 2014-2019[18] outlines our commitments to effective partnerships such as working with universities to ensure researchers have access to relevant resources and training, supporting researchers to engage public and local audiences, sharing best-practice and pooling resources, and partnering with Research Councils to improve evaluation. This will provide audiences with insight into science and its impact on health, show the human story behind scientific endeavour and build public confidence in research.

18. http://www.mrc.ac.uk/publications/browse/communication-and-engagement-strategy-2014-19/

4. An effective and efficient organisation

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[19]; 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 cross-cutting national research strategy, simplify transactional operations and reduce administration costs. In parallel we will work with Innovate UK to address the recommendations of the Dowling Review[20] to simplify public support for innovation. To ensure successful reform, we will be mindful of key principles identified by Sir Paul Nurse, government and the Research Councils[21]. These principles include: commitment to the dual support system for funding UK research; clear delegation from government for research funding decisions and their management; 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.

4.1 MRC University Unit Programme

We are delivering added value by developing stronger partnerships with Universities. Building on the successful completion of the first phase of the MRC's University Unit Programme which transferred 14 MRC Units to University ownership (annual research expenditure of £65M), we will embark on a second phase, transferring 7 further MRC Units (~500 staff) to 4 UK universities.

4.2 Grants services efficiency

MRC will work with other Research Councils, Innovate UK, UK SBS Ltd. and collaborate with BIS and GDS colleagues through the Grant Funding Delivery Programme to reform the platforms and processes that underpin our digital grants services. We will create systems that are flexible and inter-operable and support the entire grant funding process, from idea generation to impact reporting, to enable the best possible funding of research excellence. This will both improve the efficiency with which public money is invested and improve the experience for all users of grants services including applicants, peer reviewers, panel members and grant administrators.

4.3 Evaluation and Performance Management

The UK's dual support system for publicly funded research[22] includes a holistic and efficient investment appraisal and evaluation cycle compliant with HM Treasury guidance[23]. Research Councils evaluate or audit specific investments and processes, during or after their lifetimes. The MRC has a rolling programme of five-yearly reviews for all its Institutes, Units, and Centres which evaluates the past performance and future potential of these investments[24]. In addition, the MRC has an active programme

19. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/478125/BIS-15-625-ensuring-a-successful-UK-research-endeavour.pdf
20. https://www.gov.uk/government/publications/business-university-research-collaborations-dowling-review-final-report
21. For principles see: http://www.rcuk.ac.uk/documents/documents/strategicprioritiesandspendingplan2016/
22. 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.
23. HMT Green Book and Magenta Book: ROAMEF cycle.
24. http://www.mrc.ac.uk/documents/pdf/summary-of-mrc-unit-and-institute-quinquennial-reviews/

of commissioned and investigator-led research[25] in partnership with other funders and BIS to ensure its evaluations draw on the most appropriate methodologies. We will continue to develop rigorous business cases for large capital proposals and evaluate benefits realised from completed capital projects[26].

We use our own and independent evidence to evaluate long-term impact outcomes[27] and performance against Royal Charter objectives. An important component of this evidence is the systematic and structured information gathered from all researchers that have held RCUK funding, currently using the researchfish® system[28]. The MRC will provide information about its performance against the objectives in this delivery plan on a quarterly basis to BIS to support discussion about the progress, productivity, quality and impact of medical research.

25. http://www.mrc.ac.uk/funding/how-we-fund-research/highlight-notices/economic-impact-highlight-notice/
26. For example the MRC is conducting a review of the benefits realised through its transfer of Units to Universities, a programme initiated in 2011 which has transferred 14 Units, 970 staff and £62M per annum to the University sector. In 2016 the MRC will also set a baseline against which the benefits of establishing the Francis Crick Institute will be assessed.
27. See, for example, Research Council impact reports: http://www.rcuk.ac.uk/media/news/impact/
28. http://www.rcuk.ac.uk/research/researchoutcomes/

Annex 1: MRC Financial Allocations

Resource

£M	2015/16 baseline	2016/17	2017/18	2018/19*	2019/20*
MRC Resource	580	566	554	544.5	539
MRC Dementia Research Institute	–	1.5	6	18.5	21
MRC GCRF**	–	14	34	34	34
MRC Total resource	580	581	594	597	594

Capital

£M	2015/16 baseline	2016/17	2017/18	2018/19	2019/20
MRC World class labs (incl. animal facility infrastructure)	36	33	33	34	47

Additional capital projects £M	2015/16 baseline	2016/17	2017/18	2018/19	2019/20
Dementia Research Institute***	0	0.5	4.5	20	10
National Centre for Ageing and Innovation	0	1	5	14	0
Glasgow City Deal Medical Imaging	7	8	0	0	0
Bio-banking with charities***	0	1	1	1	1
Total major capital projects	**7**	**10.5**	**10.5**	**35**	**11**

Admin

£M	2015/16 baseline	2016/17	2017/18	2018/19	2019/20
Admin	24.6	22.9	tbc	tbc	tbc

Proportional allocation of resource expenditure across headings

Heading	Approx. % of spend 2016-2020****
Research Excellence	70
Impact (Academic industry relationships and clinical and population health translation)	15
Capacity and Skills (Fellows and Students)	10
National Capability (Underpinning infrastructure)	3

* indicative only
** additional to MRC's current spend of ~£50M per annum
*** profile may change subject to business case approval
**** figures may not add up due to rounding

Medical Research Council (Swindon office)
2nd Floor David Phillips Building
Polaris House
North Star Avenue
Swindon
SN2 1FL

Medical Research Council (London office)
14th Floor
One Kemble Street
London
WC2B 4AN

Phone (+44) (0)1793 416200

www.mrc.ac.uk

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