
The Royal Society: The Fruits of Curiosity: science, innovation and future sources of wealth**Response by the Wellcome Trust**

September 2009

1. The Wellcome Trust is the largest charity in the UK. It funds innovative biomedical research, in the UK and internationally, spending over £600 million each year to support the brightest scientists with the best ideas. The Wellcome Trust supports public debate about biomedical research and its impact on health and wellbeing.
2. We appreciate the opportunity to contribute to the Royal Society's Fruits of Curiosity inquiry. We recognise that this is an ambitious undertaking with the potential to have a significant impact on the direction of UK science policy.

General comments

3. We consider that the Fruits of Curiosity project will have most impact if it can articulate a compelling vision for the future direction of UK science, and then place the various actions and recommendations in that context. For example, we suggest that such a vision will need to include:
 - the changing global landscape for science, and the need for the UK to respond;
 - the need for new roles and relationships between the various players – government, delivery agents, universities, and businesses;
 - the opportunity to embed science as a major contributor to our economy and society.
4. As part of the vision, it will be important to emphasise the UK's existing strengths, one of which is our enormously strong medical research charity sector, which works in close partnership with government and HEIs. The strength and contribution of this sector places us in a unique position within Europe, and internationally.
5. The Call for Evidence identifies a number of questions and challenges in relation to UK science policy, science education, research careers, innovation policy and funding. While the questions are interesting and thought-provoking, we consider that something may be lost in the reductionist approach – many of the questions are inter-connected and it will be difficult to answer or develop actions to respond to them in isolation. The report will need to be structured in a way that acknowledges the interconnections between the various areas – perhaps by linking back to the over-arching vision discussed above.
6. We note the comment in the Call for Evidence that the list of issues is long, and will need to be prioritised. We agree that prioritisation will be important, and suggest that one of the factors that the Royal Society should consider is which areas have significant existing activity which can be built on, and which require substantially new thinking. In some areas there is already substantial evidence about what types of initiatives are likely to be effective, and the greater challenge may be implementing existing strategies. In these areas, the Royal Society could consider using the Fruits of Curiosity project to support the further implementation of existing strategies and recommendations, rather than seeking to develop new, and potentially

competing initiatives. For example, the area of building and sustaining research careers, with the recent 'Concordat to Support the Career Development of Researchers', may be one of these areas.

7. By comparison, some of the areas identified in the Call for Evidence have had minimal policy focus and in these areas the Fruits of Curiosity project presents an opportunity to pose questions and propose a direction that others can follow. Such areas might include the role of public sector R&D outside the ring-fenced science budget, and the interface between secondary and tertiary education.
8. Policy statements that seek to shape the long term direction of UK science and education policy, such as the Fruits of Curiosity project, will be most effective if they provide clear statements regarding best practice going forward, including how best to implement recommendations. They should include follow up reports and evaluation as a way of monitoring success. Partner organisations must commit to relevant recommendations and actively build these into their own strategic plans.

The long-term direction of policy for science

9. The Wellcome Trust supports the Royal Society's desire to challenge the artificial distinction between pure and applied research. We suggest that the recent study '*Medical Research: what is it worth*'¹, which was partly funded by the Wellcome Trust, may be a useful source of evidence. This study illustrates the time lag between research expenditure and the realisation of benefits, and the presence of significant 'spillover' benefits from basic research. It may also be useful to obtain information from the research councils on any differences in research application trends following the introduction of 'impact statements.'
10. The Government's ten-year Science and Innovation Investment Framework has been successful in raising the political profile for science, setting out a blueprint for public investment that allows long-term commitments outside the spending review cycle, and recognising the contribution of other sectors, including medical research charities. The approach has allowed other funders, including the Wellcome Trust, to develop long term partnership activities with government. Although constrained economic circumstances are likely to require hard choices, and greater focus and selectivity of investment, it is important that a long-term, strategic approach to Government investment in science be maintained. The Wellcome Trust therefore supports the development of a further ten year framework.
11. From the Trust's perspective, the introduction of full economic costing has also been positive in enabling university research to be placed on a more sustainable footing, and allowing greater transparency around the real costs of research. The Charity Research Support Fund forms an essential part of this model, recognising the important role that charities play in supporting UK university research.
12. The US and China are specifically mentioned as important geographical considerations. We suggest that emphasis should also be given to the European context. For example, the report could emphasise the need for early input of science advice into EU decision-making. Each year more than 100 European Directives have to be implemented into UK legislation, and if these are not informed by the best available advice there is a risk that they could inhibit research. The EU animal directive is a good example – while the goal of improving and harmonising animal welfare standards across Europe is laudable, early drafts would have significantly limited important types of fundamental research that can only be undertaken using animals, and dramatically increased bureaucracy and costs with minimal benefit for animal welfare. It has taken the submission of more than 400 amendments, and many hours of work

¹ Health Economics Research Group, Office of Health Economics, RAND Europe (2008)
<http://www.brunel.ac.uk/385/other/TAP825EconomicBenefitsReportFULLWeb.pdf>

by researchers, funding organisations, industry representatives, medical charities and patient groups, to begin to reach a workable balance.

13. As this example demonstrates, it is crucial that Europe develops mechanisms to embed high-quality scientific advice within decision-making, and develops a regulatory environment which is able to preserve public confidence while striking the right balance between risk and opportunity. The example of stem cell research, where the UK has taken a facilitative position compared to other nations (in particular the United States), shows how an effective regulatory environment can present a competitive advantage to the UK. We must ensure that the impact of EU regulations do not jeopardise this. The forthcoming review of the EU Clinical Trials Directive is an important test – since the Directive was implemented the UK's participation in global clinical trials has dropped from 6 per cent to 2 per cent.

Investing in tomorrow's talent in schools, universities and in the FE sector

14. The Wellcome Trust is currently conducting a review of science education for the future, informed by experts in the field of science education, policy and strategy. The first phase will be to produce a policy 'road map' report which addresses the overarching question:

“What should the future of science education up to the age of 19 years look like in order to inspire young people, ensure they understand the role of science and ensure that science and technology underpin our future prosperity and well-being?”

15. Phase 2 of the road map project will be to consider implementation of the recommendations through development of the Wellcome Trust's commitment and contribution and fostering partnerships with key players in the sector to address areas that need further development.
16. As the roadmap will address a number of the same topics listed in the Call for Evidence, we suggest that both organisations should work closely over the common areas, to consolidate agreement around the aims, with the view to strengthening the overall voice of both reports.
17. One area of focus of the Wellcome Trust road map will be testing and assessment methods. While there have been significant improvements in curriculum design in recent years, 2007 research commissioned by the Trust in and carried out by the Institute of Education revealed concern from teachers that statutory testing was leading to a narrowing of the science curriculum, and making it difficult for pupils to develop positive attitudes to science.
18. High quality and inspiring teaching from well-trained teachers is vital to ensure effective student engagement. The Wellcome Trust is active in the area of continuing professional development (CPD) for teachers, in particular through Project Enthuse - a £30 million partnership with Government and Industry to remove barriers to CPD. The most frequently cited barrier to participation in CPD is cost, and Project Enthuse will help address this by providing bursaries for travel and lesson cover to enable teachers to attend residential courses at the National Science Learning Centre.
19. We suggest that in addition to any specific recommendations around STEM education at primary, secondary and tertiary levels, the Fruits of Curiosity inquiry should consider the interface between these levels. In particular, we would like to see some attention given to the transition between secondary and tertiary education, including the question of how we can attract more promising secondary students into science studies at tertiary level. The project might also consider the implications of the evidence that suggests an increasing number of students are turning to medicine and the biological sciences, rather than engineering and the physical sciences. Inter-disciplinary research is becoming increasingly crucial to answer the challenges of today's society, and we need to ensure that students understand the important contributions all disciplines can make to scientific and technological advancement.

Building and sustaining research careers

20. A significant trend in science policy over the last decade has been the increased focus on research careers and the role of the individual researcher. The Trust sees this as a very positive development, which the Fruits of Curiosity project could highlight, while noting the significant challenges that still remain in this area. As the area of research careers has been a topic of intense focus in recent years, it is important that any recommendations and initiatives in this area build on and complement the existing body of work. In particular, we suggest that the 'Concordat to Support the Career Development of Researchers' is a useful point of reference.
21. A key message emerging from the recent initiatives in the careers area has been that, while financial rewards are undoubtedly one factor contributing to the attractiveness of science careers, they are not the main motivator. We suggest that actions to improve the attractiveness of science careers will also need to target the broader issues of recognition, career security, and opportunities for mentoring and personal development. These challenges are summarised well in the Concordat. The Careers in Research online survey also provides a useful source of evidence on the experiences of researchers.
22. In relation to the 'standard career track model', we question whether such a model actually exists. The need to support people with less conventional career paths (which includes mobility, but also other issues such as the retention of women in science) have long been recognised and the Wellcome Trust has developed mechanisms (e.g. Career Re-Entry Fellowships), to respond to them, as have other funders. There is a large body of evidence on the importance of mobility which the report could draw on, such as the work of the Organisation for Economic Co-operation and Development (OECD) Committee for Science and Technology Policy.
23. In addition to considering the role of individuals with research skills within industry and business, the report should also note the need for skills to support public sector innovation. In particular, we need to maintain and grow research capacity within the NHS. The Government should continue to support initiatives which promote an effective interface between clinical and basic research, speeding up the process of taking research breakthroughs into NHS patient care. Academic Health Science Centres (AHSCs) are one such mechanism, although there is an opportunity for greater industry involvement. There is a need to address barriers to clinician-led research within the NHS, through providing greater support and recognition for research career paths, and reviewing incentives and cultural barriers to research within NHS Trusts and other structures.

Science, innovation and wealth creation

24. The questions in the Call for Evidence are very broad and we suggest that in this area the project would benefit from greater focus. There is a huge volume of existing policy work the science and innovation area, including key reports such as the 'Innovation Nation' white paper, the Sainsbury Review of government science and innovation policies, and recent work by NESTA, such as the report on the role of public investment in financing growth. These reports contain a large number of recommendations, many of which are still in the implementation phase. The Fruits of Curiosity project could be used to support and give further impetus to existing recommendations which support its overall vision for UK science.
25. One potential area of focus might be the evolving relationship between universities and industry. The trend towards 'open innovation' is changing the way industry sources research and development and intellectual property. For universities, this may require a radically new approach to industry partnerships, and a new set of skills needed in our next generation of researchers.

26. The Higher Education Business Community Interaction survey² indicates that collaborative interactions between universities and industry are increasing, but a number of barriers remain. These include cultural barriers, such as the tendency by the academic community to undervalue time spent in industry; financial barriers, including a relative lack of funding for industry-academic collaborations compared to competitor countries, and the difficulty accounting for intangible industry contributions under the full economic cost model; and practical barriers, such as an absence of metrics to identify collaborative excellence in research. It is important that future policy initiatives, such as the Research Excellence Framework, act to reduce, and not further exacerbate, these barriers. The UK should also consider policy models adopted in other nations, such as Ireland and the Netherlands, which have been successful in facilitating industry-academic collaboration.
27. Taxation policy also plays an important role in enabling partnerships between research organisations and industry. The Trust is experiencing challenges as we work towards the establishment of the UK Centre for Medical Research and Innovation (UKCMRI) at St Pancras, which will be a world-class research centre tackling some of the most important medical challenges of the 21st century. The impact of Value Added Tax (VAT) threatens to limit the viability and success of UKCMRI, as new buildings can only be zero-VAT rated for construction costs if they are used predominantly for non-business charitable purposes. This would impose major constraints on technology transfer, external collaborations, and industry investment at the UKCMRI. The Trust is continuing discussions with government to resolve this issue.

The ecology of research funding

28. The Wellcome Trust considers that there is a role for both response-mode and targeted funding in the UK science portfolio. Government strategy must recognise the importance of pursuing research for the advantage of expanding knowledge as well as for potential economic and social benefit. Where funding is targeted at particular socio-economic outcomes, it will be important to give researchers sufficient flexibility to put forward the best ideas to address a identified problem or opportunity.
29. The Government's decision to ring-fence the budget for science, and for research within the Department of Health, has been successful in achieving greater profile, awareness and investment in science. Going forward, there may be trade-offs associated with such a siloed approach to science investment. There is an increasing need for science to be integrated into policy on macro-level issues, such as climate change, obesity and the implications of an ageing population. The inquiry could consider whether new arrangements are required to respond to this, such as structural links between government departments, or a thematic approach to Budget development. A number of the actions in the Government's recent 'Life Sciences Blueprint' relate to the need for better coordination of activity across government.
30. The report should also comment on the future of the dual support system for university research, following the implementation of full economic costing, and the creation of a single department for higher education and science. The dual support system has been effective in allowing a diversity of funding sources to support excellent research, and we strongly support its continuation. Universities UK has also conducted work relating to the benefits of dual support, which the Fruits of Curiosity project could usefully draw on.
31. For charitable funders, the Charity Research Support Fund (CRSF) is a key element of the existing university funding model – retaining the integrity of the full cost model while providing certainty to public donors that their contributions will be spent directly on research. Recent evidence has underlined the importance of the CRSF, while suggesting that more needs to be done to raise its profile, and that the level of funding needs to be revisited. For example, a

² <http://www.hefce.ac.uk/reachout/hebcil/>

recent report by Breast Cancer Campaign³ revealed low awareness of the role of the CRSF amongst academics, and a perception that the current level of funding is too low to enable charity-funded research to stand on an equal footing with research funded by Research Councils. These findings are consistent with those from the recent Research Councils UK and Universities UK report 'Review of the Impact of Full Economic Costing on the UK Higher Education Sector,' The Wellcome Trust considers that the CRSF has a crucial role to play in the university funding ecosystem, and Government and the devolved administrations should make a clear commitment to its future. Charities and Government should work together to determine the appropriate level of funding for the CRSF.

32. In relation to question 17, we note that the issue of full economic costs is a potential barrier to the expansion of research funded through other government departments, as currently other departments are not meeting 100 per cent of costs. This issue is explored in the RCUK/UUK report referred to above. We support the report's recommendation that government departments funding research at HEIs should fund on the basis of paying 100% full economic costs, unless funding through competitive tender.
33. In addition to research funding, the Fruits of Curiosity project should also consider the questions around sustainable funding for research resources and infrastructure. Government investment in large research infrastructure must occur in a coordinated and strategic manner, and opportunities for a more coordinated approach to infrastructure investment across Europe should be explored. Bioinformatics and data management infrastructure is a good example. New, more powerful informatics resources and platforms are crucial to enable researchers to share, analyse and interpret the growing volumes of bioinformatics data. For Europe to remain internationally competitive, key data resources, such as European Life Sciences Infrastructure for Biological Information (ELIXIR), must have sustained, long-term support. The UK government and funding agencies must provide long-term commitments, and take a leadership role in securing sustainable European Union funding. It is important that investment in European-wide infrastructure initiatives does not occur at the expense of investment in the UK's national infrastructure.

³ <http://www.breastcancercampaign.org/files/fecreport.pdf>