BIOSCIENCES FEDERATION

Setting funding priorities for scientific and technological research

A response from the Biosciences Federation and Institute of Biology to the House of Lords Science and Technology Committee

25 September 2009

Introduction

The **Biosciences Federation** (BSF) is a single authority representing the UK's biological expertise, providing independent opinion to inform public policy and promoting the advancement of the biosciences. The Federation was established in 2002, and is actively working to influence policy and strategy in biology-based research – including funding and the interface with other disciplines – and in school and university teaching. It is also concerned about the translation of research into benefits for society, and about the impact of legislation and regulations on the ability of those working in teaching and research to deliver effectively. The Federation brings together the strengths of 45 member organisations (plus nine associate members), including the Institute of Biology (IoB).

The **Institute of Biology** is an independent and charitable body charged by Royal Charter to further the study and application of the UK's biology and allied biosciences. It has 12,000 individual members and represents 36 additional affiliated societies. This represents a cumulative membership of over 65,000 individuals, covering the full spectrum of biosciences from physiology and neuroscience, biochemistry and microbiology, to ecology, taxonomy and environmental science.

In October 2009, IoB and BSF will come together as a single organisation, the Society of Biology.

This response was developed through consultation with our science policy committees, representatives of BSF's member organisations and IoB's affiliated societies and branches.

What is the overall objective of publicly-funded science and technology research?

1. Science underpins much of what we value but take for granted in society. It is essential for advanced societies competing in a globalised world and is too important to be left to short-term market interests alone. Long-term public sector investment is necessary to generate new knowledge, some of which may have commercial potential; to provide ideas and inspiration for all; to support strategic and innovative research that the market doesn't provide; to train a skilled workforce; to sustain a critical mass of activity and expertise in key areas (e.g. taxonomy) which the private sector does not supply; to nurture multi- and inter-disciplinary research; to inform public policy and risk assessments; to meet our international obligations, and to create and maintain long-term datasets.
2. Even in areas well supported by commercial companies, for example in drug development, public research is often also needed.

How are public funds for science and technology research allocated? Who is involved at each level and what principles apply? Where appropriate, is the Haldane Principle being upheld?

3. The main mechanism, which has proven its value over many years, is the dual funding mechanism of Research Councils (RCs) and Higher Education Funding Councils. There have been many discussions in the past over whether these should be merged into one mechanism. But the current system, although not perfect, provides flexibility for researchers and institutions in accessing funds. However, the Haldane Principle which has been core to RCs has come under significant pressure in the last few decades as the economic value of science has been recognised, with the funding bodies being under pressure by Government to allocate funding through directed modes.
4. A disproportionate amount of funding for science is being held by centralised Government departments, where it is perceived (in UK academia and in the commercial sector and overseas) as being allocated in a directed mode by non-scientists, and without transparent peer review processes, thus potentially further undermining the Haldane Principle and potentially limiting the value of the UK science base.

Are existing objectives and mechanisms for the allocation of public funds for research appropriate? If not, what changes are necessary?

5. Our long running concerns over the replacement for the Research Assessment Exercise (RAE) may be relevant here. The old system was very labour intensive for universities and we would welcome a less time-consuming but nonetheless rigorous assessment of universities for research and other activities e.g. teaching. However, although increased use of bibliometrics has often been touted as a solution, these have inherent biases, and should be used to inform the assessment process, not drive it. Peer review remains essential and should be as transparent as possible. The system should be as unbureaucratic as possible.

What governs the allocation of funding for Government policy-directed research through Government departmental and agency initiatives? Are existing mechanisms appropriate? What is the role of Departmental Chief Scientific Advisers?

6. We have serious concerns that the civil service has a reputation, whether deserved or not, of not hiring or deploying enough excellent science graduates and science experts to inform this process.
7. Departmental Chief Scientific Advisors (CSAs) generally have a good reputation and have helped in the process. But how much influence and backing do they really have in large Government Departments? Departments managed by CSAs are often under resourced, and employ temporary or casual staff. Employment of and engagement with competent and respected scientists is essential, as is maintaining the expertise of employed scientists through formal schemes of continuous professional development.
8. The Economic and Social Research Council has for many years done sterling work in supporting independent policy research, and in working with relevant natural scientists, Government Departments and other agencies. Stronger links should be forged between natural and social scientists and Government Departments on common policy research interests, as there is still a perception that Government Departments tend to make these decisions from their own internal political drivers. Within each Government Department, R&D funding is delegated to policy customers. Often this is inadequate to provide scientifically robust solutions.
9. Government has supported the concept of applying a levy on industry. For example the developers of offshore wind farms through licensing arrangements provide R&D funds in addition to the evidence they have to provide on their environmental impacts. This levy, the so-called COWRIE fund (Collaborative Offshore Wind Research Into the Environment), has been managed in collaboration with government departments, industry and nature conservation organisations.[1] Similarly, a levy on primary aggregate extraction has also been applied. The Aggregate Levy Sustainability Fund has terrestrial and marine components. The latter is highly respected for the quality of R&D supported.[2]
10. Government Departments and Chief Scientific Advisors could engage more with the Learned Societies (and vice versa) to access relevant grass-roots academics and strategic thinking in defined areas. Government should maintain a published, up-to-date list of the departmental chief scientists, chief social scientists etc and their contact details, to facilitate this.

How are science and technology research priorities co-ordinated across Government, and between Government and the relevant funding organisations? Who is responsible for ensuring that research gaps to meet policy needs are filled?

11. There is a fear, with such large monolithic structures involved, that gaps and duplication will inevitably appear and thus limit UK global competitiveness. Some organisations keep this under review in specific areas, e.g. the UK Collaborative on Development Sciences, but it is difficult to see how an organisation for every area could be resourced. At a more general level, RCUK, the Research Councils and the relevant Government Departments and their Chief

[1] See www.offshorewind.co.uk
[2] See www.alsf-mepf.org.uk

Scientific Advisors have to be committed to dealing with this and providing a helicopter view.

As an illustration of a funding gap affecting a strategic area of research, we quote this comment relevant to systematics research: "NERC routinely rejects applications for undertaking fundamental alpha taxonomy". Such research is fundamental in answering policy and research questions for the major scientific and social challenges of this century: preserving biodiversity; maintaining ecosystem services and adapting to climate change; underpinning many other areas of bioscience; supporting economically important trade activities, and enabling the UK to comply with its legal and moral obligations to protect the environment and its natural resources. (See our response to this committee's inquiries on systematics and taxonomy[3] for detailed examples.)

12. It is also essential to maintain the appropriate balance of funding for research carried out in universities, public sector research establishments, specialist centres and agencies. Research establishments and specialist centres, such as those run by the Research Councils, have an essential role – distinct from universities – for example in the collection and stewardship of long term research, collections and datasets which inform current and future policy. Their funding must be maintained.

Is the balance of Government funding for targeted versus response-mode research appropriate? What mechanisms are required to ensure that an appropriate and flexible balance is achieved? Should the funding of science and technology research be protected within the Research Councils or Government departments?

13. A study to assess the success of major directed programmes in meeting their objectives would help to inform Government and other funding bodies of their value, alongside a comparative study of the costs and (long term) benefits of directed and responsive mode research. NERC has funded several years of Knowledge Exchange R&D & is currently (Sept 2009) reviewing the effectiveness of this initiative.
14. Directed modes of funding are important to tackle known strategic priorities in e.g. disease control, renewable energy technologies, but their effectiveness is unproven and needs to be tested. For example, there is a widely held view that an initiative on e-science was launched at a time when there was little agreement or understanding of what constituted e-science. It will be important to assess outcomes.
15. Responsive funding mechanisms that allow researchers to come up with new ideas which don't readily fit into established organisational agendas are essential, but we accept may not be sufficient. Blue skies research is not a luxury, but the foundation of intellectual and societal wealth. It is often the source of long term innovative ideas (e.g. DNA fingerprinting and magnetic resonance imaging (MRI)) and should be adequately funded.
16. We commend funding schemes that support excellent researchers rather than defined projects. The Royal Society's university research fellowships and professorships are a very successful example. Such schemes deserve more government funding.

[3] http://www.iob.org/consultations2008

17. Young people are often inspired into a research career by choosing to target their research towards useful and applied objectives. Others are inspired by areas of research where the benefit to mankind appears to be less direct at first sight. It is important to support that work, recognising that benefits cannot always be clarified at the outset. The ability to convert research success into commercial gain is not often within the skill set or time budget of active researchers focused on tackling fundamental questions. It is important not only to create an environment which supports these processes which are of societal importance in a way that is sympathetic to researchers and funders in terms of property but also in terms of the assessment of success.
18. One possibility for the administration of directed mode funding could be to set a general list of questions to be addressed, invite applications in a responsive mode, and then fill any important gaps with commissioned research. The final specification for the directed programme can then be informed by the applications received, rather than being pre-determined by funding body assumptions.
19. Government, through a Treasury-lead initiative, should consider the costs of **not** investing in research. This should include recognition that understanding the value of fundamental ecosystem services such as pollination by bees - see www.naturalcapitalinitiative.org.uk - is crucial in setting long-term priorities. The decline in funding for fundamental agricultural research and training over many years has long been a concern of ours. Foot and mouth disease (FMD) has cost the UK approximately £8bn, illustrating the need for solutions to this problem yet extra funding for research in this area has not been forthcoming.

How will the current economic climate change the way that funds are allocated in the future?

20. It is important to maintain a high level of funding for response-mode and curiosity-driven research, irrespective of the economic climate, if the UK is to remain competitive in the long term. The committee should avoid a conclusion that basic curiosity-driven research is, in some sense, a "luxury" that the UK will be forced to cut back on in difficult economic circumstances.
21. It would be wrong to conclude that such research differs from targeted research in that the former does not solve societal problems. The history of science and medicine offers numerous examples of basic research leading to solutions to human problems. The difference between basic and applied research is, typically, that the specific problems that basic research will solve cannot always be identified until the research has been carried out – for example the discoveries of monoclonal antibodies and DNA fingerprinting.

How is publicly-funded science and technology research aligned and co-ordinated with non-publicly funded research (for example, industrial and charitable research collaborations)? How can industry be encouraged to participate in research efforts seeking to answer societal needs?

22. There are a number of initiatives relevant to fundamental public science which are funded by groups of public, trust-based and corporate bodies (e.g. the Structural Genomics Consortium (www.thesgc.org) and the Single Nucleotide Polymorphism (SNP) Consortium of the International HapMap Project (www.snp.cshl.org)). The output of research into proteins and genes funded under these schemes is publicly accessible. Even part-funding large-scale enterprises of

this nature is beyond the capacity of most medium-sized companies or independent charities. However, opportunities for engagement may well exist and the willingness of industry to fund external pre-competitive research should not be overlooked in designing public science-focused funding schemes.

23. Industry can also be engaged where a commercial benefit may derive from publicly- funded research outputs, perhaps as a partner in knowledge transfer to help deliver innovative products or services. Many businesses are also well aware of the benefit in terms of customer loyalty of supporting forward-looking initiatives e.g. building on environmental or health research, and also report economic benefit of research involvement.[4] From the point of view of public funders effective management of intellectual property (IP) is key here and this area has seen great improvement. There is an appetite for greater accessibility to information on funded programmes of societal importance and this may raise challenges to standard notions of IP.

To what extent should publicly-funded science and technology research be focused on areas of potential economic importance? How should these areas be identified?

24. As effective crystal balls don't exist, this is always going to be an ad hoc process. The Foresight Programme provides some useful insights into mechanisms. The system needs to be flexible enough to respond to issues as they are identified in discussions with scientists, policy makers, media and general public.
25. Economic value should not be the only criterion under consideration. Benefits to public policy, health, education, well-being, quality of life and the natural environment are also legitimate and very important outcomes of publicly funded research.

How does the UK's science and technology research funding strategy and spend compare with that in other countries and what lessons can be learned? In this regard, how does England compare with the devolved administrations?

26. In general, the UK looks good and has provided models for other countries to follow. However very close attention needs to be paid to developments in the Far East, particularly the evolving science policies of Singapore, India, China, and the radical developments occurring in the US under the Obama administration, if we are not to be left behind.
27. The EU has supported the concept of pan-government agreements to identify good policy practice. These so-called ERANETs (European Research Area–NET[5]) work on a partnership basis often involving core departments linked to the R&D community. An example is the ERANET for Accidental Marine Pollution, AMPERA www.ampera-net.info which has a large UK component.

Openness

We are pleased for this response to be publicly available and will shortly be placing a version on our websites. Any queries regarding this response should be addressed to Dr Barbara Knowles, Senior Science Policy Adviser, b.knowles@iob.org

[4] Valuing our Life Support Systems Symposium Report (2009) http://www.naturalcapitalinitiative.org.uk/9-valuing_our_life_support_systems/ pp 5, 14, 19

[5] See http://cordis.europa.eu/coordination/era-net.htm

Appendix

Member Societies of the Biosciences Federation

Association for the Study of Animal Behaviour
Association of the British Pharmaceutical Industry
AstraZeneca
Biochemical Society
Bioscience Network
British Andrology Society
British Association for Psychopharmacology
British Biophysical Society
British Ecological Society
British Lichen Society
British Mycological Society
British Neuroscience Association
British Pharmacological Society
British Phycological Society
British Society of Animal Science
British Society for Developmental Biology
British Society for Immunology
British Society for Matrix Biology
British Society for Medical Mycology
British Society for Neuroendocrinology
British Society for Plant Pathology
British Society for Proteome Research
British Toxicology Society
Experimental Psychology Society
Genetics Society
Heads of University Biological Sciences
Heads of University Centres for Biomedical Science
Institute of Animal Technology
Institute of Biology
Institute of Horticulture
Laboratory Animal Science Association
Linnean Society
Nutrition Society
Physiological Society
Royal Microscopical Society
Royal Society of Chemistry
Society for Applied Microbiology
Society for Endocrinology
Society for Experimental Biology
Society for General Microbiology
Society for Reproduction and Fertility
Syngenta
Universities Bioscience Managers Association
UK Environmental Mutagen Society
Zoological Society of London

Associate Member Societies

Association of Medical Research Charities
BioIndustry Association
Biotechnology &Biological Sciences Research Council
GlaxoSmithKline
Medical Research Council
Merck, Sharp & Dohme
Pfizer
Royal Society
Wellcome Trust

Additional Societies represented by the Institute of Biology

Anatomical Society of Great Britain & Ireland
Association for Radiation Research
Association of Applied Biologists
Association of Clinical Microbiologists
Association of Veterinary Teaching & Research Work
British Association for Cancer Research
British Association for Lung Research
British Crop Production Council
British Microcirculation Society
British Society for Ecological Medicine
British Society for Research on Ageing
British Society of Soil Science
Fisheries Society of the British Isles
Freshwater Biological Association
Galton Institute
International Biometric Society
Marine Biological Association of the UK
Royal Entomological Society
Scottish Association for Marine Science
Society of Cosmetic Scientists
Society of Pharmaceutical Medicine

Additional Societies represented by the Linnean Society

Botanical Society of the British Isles
Systematics Association