

Hwange and Tsavo, have a further important role to play in the self-regulating mortality of juvenile and adult elephants. The Round Table saw this as a process to be encouraged, rather than prevented as advocated by Prof Allen.

“Adaptive management” or learning-through-doing, is now seen as the best way to find out what works in wild ecosystems, where future outcomes remain uncertain. Trying different approaches in different areas of elephant range, and accepting that results of ecological experiments take time, are important aspects of an experimental approach to discovering how to work with, rather than against, ecosystem processes. Landscape-level planning looking at the whole ecosystem, including corridors for

dispersal between protected areas, is an important means for encouraging population and habitat heterogeneity.

Finally, the Round Table recognised that social issues are important, but distinct from the scientific issues in elephant management. Ethical issues may be debated on their own merits, with sympathy for elephant intelligence and sociality, or intervention to “save” elephants from dying naturally, becoming an important talking point. Economic considerations are clearly necessary, and again, should be evaluated on their own terms. In summary, it is essential to distinguish the different strands of argument over elephant management, and to keep the question over whether or not to cull in its proper place as one, rather blunt, tool

hardly deserving the overblown argument that it all-too-often receives.

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IS DUAL FUNDING OF OUR UNIVERSITIES FIT FOR PURPOSE IN THE 21ST CENTURY? MEETING OF THE PARLIAMENTARY AND SCIENTIFIC COMMITTEE ON MONDAY 18TH JUNE

Is Dual Support funding of our universities fit for purpose in the 21st Century?

Rama Thirunamachandran

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The dual support funding arrangement for research is a well established cornerstone of research policy in the UK.

Traditionally dual support has been described in terms of the two major arms of public funding for university research – namely the Higher Education funding bodies which provide core funding to universities for permanent staffing and infrastructure

and the seven research councils which provide project and programme funding for specific areas or themes.

Though there may not be many countries with explicit dual support arrangements akin to the UK it is nevertheless the case that most research rich countries have multiple streams of public funding. In most large research strong private universities in the USA very

substantial endowment income performs the functions of the HEFCE research grant (QR). In Western Europe funding from state governments provides the equivalent to QR. It is also important to recognise that almost half of the £3,800 million research income of English higher education in 2005/06 came from a range of other sources including charities, Government departments

and the NHS, business and overseas sources. This presentation focused on the HEFCE side of dual support.

HEFCE's QR funding provides for the 'well found laboratory' through a stable funding stream supporting staffing and infrastructure which in turn enables universities to seek project funding from a range of sources. QR also provides funding for institutions to undertake 'blue skies' research and respond quickly to new ideas. As such it is an important source for institutions to plan and shape their research strategies. QR plays a crucial role in the arts, humanities and social sciences where it provides for over 80% of total research income recognising that the research approaches and methods in these subjects are less amenable to 'project grants'. Otherwise arts and humanities scholars would simply be writing grant applications to recover their salary costs which would not be the most efficient use of intellectual talent.

QR is allocated to institutions as a block grant based on the outcomes of the most recent Research Assessment Exercise (RAE). The RAE, which was first run in 1986, is based on peer assessment of research across the full range of subjects and has a role both in informing the allocation of QR funding and in demonstrating the power of the national research base. RAEs have been held in 1989, 1992, 1996 and 2001 with the next RAE taking place in 2008.

There is ample evidence to demonstrate that the RAE has had a positive effect on UK research by driving up research quality. Evidence Ltd, an independent consultancy, have

published data to show that the UK share of world citations had declined in the first half of the 1980s reaching the lowest point of 5% in 1989. The data also show a steady increase in the UK's share of the world citations with each RAE cycle reaching the current high level of 12%. Equally significantly the RAE has also driven institutions to take a more strategic approach to managing their research and better utilisation of infrastructure.

The review of the RAE by the late Sir Gareth Roberts in 2003 led to a number of changes to the RAE including the introduction of a 'quality profile' and better approaches to assessing applied, practice-based and interdisciplinary research and joint submissions between institutions.

However, it is undoubtedly true that, 20 years on, the RAE has created some less desirable behaviour in the HE system including influencing institutional missions to the possible detriment of teaching and other activities. Though the administrative costs, in relation to the grant allocated using the outcome, are considerably lower than the costs of the research council operations, the burden on the system as a whole has increased due to what many call 'games playing'.

There is therefore now a growing consensus that the RAE in its current form has run its course and it is time for change to a new approach, at least in the sciences, which, whilst reducing the burden, continues to recognise excellent research and to enable QR to be allocated on this basis wherever excellence may be found. Following consultation, the December 2006 pre-budget report announced a new approach to replace the RAE after

2008. Any new approach will need to be both robust and transparent; to have 'buy-in' from the sector; and to continue to provide well founded quality indicators for both funding and benchmarking purposes. In the sciences the assessment and funding system will be based on bibliometric indicators of quality, research income and postgraduate student data. Some seven large subject groupings are envisaged in the place of 26 subject units of assessment in the current RAE. Expert panels will continue to play an advisory role so that subject specific differences in data are properly understood and applied. In the arts, humanities, and social sciences and in mathematics a light touch peer based system will need to continue given the immaturity of bibliometrics in these subjects.

As the largest single source of funding for research, over the past five years HEFCE has been engaging in policy development across a range of research related issues: bringing on and supporting the next generation of researchers; supporting the development of a sustainable research base; building research capacity and capability in certain subjects; promoting research collaboration; improving infrastructure and knowledge transfer. The remainder of this presentation highlights some aspects of this work.

An explicit element in our QR is support for the training and development of postgraduate research (PGR) students. In recognition of concern about the variability in the quality and standards of postgraduate research training in the sector we have worked with the HE sector, the research councils and the Quality

Assurance Agency to introduce minimum threshold standards which are now a condition of our PGR grant. I believe that this, together with HEFCE's plans to publish research student completion rates, will have a positive impact on the research student experience.

At the next level many postdoctoral and other researchers are funded by project grants and employed on short term contracts. We are working closely with the research councils and other funders to develop a new research careers concordat which will be in line with the European Charter for Researchers. Research is fundamentally about people and knowledge and HEFCE remains committed to ensuring that the UK is well placed to produce the next generation of researchers.

We recognise that there are a number of disciplines which are not yet well

established in research terms. This has led to HEFCE providing specific research capability funding in the following subjects: art and design; drama, dance and performing arts; communication, cultural and media studies; social work; nursing; other studies and professions allied to medicine; and sports-related studies. Even in well established areas there are specific sub-disciplines where our research capacity may be low. In recognition of this, we are working in partnership with the research councils to support research in specific areas of national priority. For example, with the AHRC and ESRC we are providing funding to support area studies and related languages in Chinese, Japanese, Middle Eastern/Arabic and Eastern European Studies.

Public funding for research will always be limited. Very few institutions are

able to conduct cutting edge research across the full range of disciplines. Therefore collaboration between institutions and subjects will become increasingly important as we drive to maintain a world class research base which is also financially sustainable. We consider that collaboration works best where it emerges from within institutions and departments rather than from external pressure, and are happy to consider proposals for our support for strategic research collaboration on this basis.

Ultimately, HEFCE wishes to see its policies and funding lead to not just the creation but also the dissemination of knowledge. HEFCE/OSI's Higher Education Innovation Fund is central in promoting the dissemination of knowledge or knowledge transfer which is central to wider economic and social benefits.

IS DUAL FUNDING OF OUR UNIVERSITIES FIT FOR PURPOSE IN THE 21ST CENTURY?

Is Dual Support Fit for Purpose in the 21st Century?

Sir Keith O'nions FRS

Director General of Science and Innovation

The UK's dual support system has broad counterparts in a number of other countries. These also separate core funding support from project based research. The question is not so much whether or not dual support is a good thing,

but more about how well-tuned it is to our current needs.

We should first consider just what a dual support system is trying to achieve. An essential requirement of the research base must be to deliver



world class research. The UK is demonstrably very successful in this regard – bibliometric analysis shows the UK is second only to the US overall in the output and impact of its research. A second key requirement is successful exploitation of the research base for economic benefits. This too is an area where the UK is performing well, and has been improving rapidly in recent years. Successful links between universities and business is a recognised part of this successful exploitation. Finally the research base should have the capacity and ability to address national priorities which are often cross-cutting and interdisciplinary in nature and include such topics as energy, climate change, ageing and security.

What is required in order that the UK research base meets these aspirations? It is vital that the system is sustainable in both financial and functional terms. We must be able to attract and retain the best people and train them with the skills required for a range of careers which are relevant to a globally competitive economy. Everything we do in this regard must be world-class.

To answer the question we must first consider the state of play in the following three areas:

1. Research excellence
2. Knowledge transfer and economic benefits
3. Sustainability

Research Excellence

The research base is overall in very good shape. In many areas (bioscience, health and medical science and social sciences) the UK is second only to the US, and leads the world in the most highly cited biomedical publications. However, there is no room for complacency – some parts of engineering and the physical sciences for example could be stronger.

Knowledge Transfer and Economic Benefits

It remains difficult to achieve an overall measure of the economic impact of research. The Worry Report, a review of knowledge transfer undertaken by Research Councils, and published last year, stated that “the output of highly educated people rather than research results is widely regarded as the most effective knowledge transfer mechanism”. This view is widely endorsed but is difficult to quantify fully. In those areas that are easy to quantify the UK is performing well. For example, the number of patents granted in the UK more than doubled between 1998/99 and 2003/04 and over the last three years some 25 university spin outs reaching IPO have a combined capitalisation of £1.5bn. When normalised to the research expenditure of US then the UK is seen to perform at least as well in patent generation, at a lower expenditure, with around half of the IP income of the USA.

Sustainability

Until the early 1990s Research Councils funded only a contribution to the direct costs of research projects. A contribution to indirect costs (of 46%) was introduced in 1992 and since 2005 Research Councils have, rather than identify a particular set of direct costs and a tariff to cover some part of the indirect costs, been paying a fixed proportion (set at 80%) of the full economic costs of research. An historic backlog of infrastructure investment in universities estimated at £10.6b in 2001 by JM Consulting has been very substantially reduced on the research side by the Investment Fund (SRIF) and is expected to reach a manageable level before the end of this decade.

Since 2002 Councils have also changed the way they fund some large capital projects that can be difficult for one Council alone to fund. This has led to the introduction of the Large Facilities Capital Fund, which currently stands at £110m pa and is supported by an agreed roadmap for large projects. The EU and US have also produced large facility roadmaps. This central fund enables long term investment in capital intensive projects, such as the Diamond synchrotron, which was recently completed and is the largest single science facility in the UK for 30 years.

The scope of Research Councils' support has also increased, with the creation of the Arts and Humanities Research Council. Finally, Research Councils have changed the way they work together through the creation of RCUK. This is a successful change that has been welcomed widely and helps Councils to address cross-disciplinary challenges such as climate change and ageing. RCUK also provides a single brand for international collaboration; this will be rolled out through RCUK offices opening in Washington and Beijing later this summer.

These changes have undoubtedly increased the effectiveness of the Dual Support system over time but we do need to consider what else is needed. The introduction of SRIF and FEC has made a significant contribution to sustainability but there may still be more to do. Anecdotal evidence suggests that the Higher Education Innovation Fund (HEIF) has prompted a real change in the way universities approach knowledge transfer. Not all funding sources currently consider the full economic cost of research. In order to maintain a diverse range of funding sources we should consider if we currently have appropriate incentives in place to encourage access to these sources.

IS DUAL FUNDING OF OUR UNIVERSITIES FIT FOR PURPOSE IN THE 21ST CENTURY?

Dr Peter Cotgreave

Campaign for Science & Engineering in the UK (CaSE)

In answering the question of whether the dual support system of funding university research is fit for purpose, the starting point must be that a dual support system of some kind is essential. Whatever defects the current system may have, nobody who has studied the issue would conclude that we should scrap the system and develop a wholly new one. But the current system has some serious flaws, and in the light of changed and changing circumstances, needs significant improvement.

In theory, the dual support system is easy to explain, but in practice, there is great confusion. The Research Council half is relatively simple. Researchers obtain grants for specific projects and the funds they receive pay for specific things that are detailed in advance. Over the years there have been changes to precisely what is included, and the current developments of a mechanism for identifying 'full economic costs' are a good example. But for any given Research Council grant, a researcher has always known to a high degree of precision what the money was for.

However, the Funding Council half of dual support has always been rather vaguer, and this can be illustrated by some quotations from official Government publications that purport to describe its purposes.

The White Paper, *Realising Our Potential* in 1993, which set up the system in its current form, had a very simple description of the Funding Council's allocations for research – "general funds available for use at the institutions' discretion". Seven years later in 2000, another White Paper on science, *Excellence and Opportunity*, had an even shorter definition – "infrastructure money".

The point about these is not just that they are rather different in detail, but that they take wholly different approaches. *Excellence and Opportunity* defined Funding Council support in terms of what the money was spent on – infrastructure, which might include

buildings, equipment or human resources. But *Realising Our Potential* used a definition based on the process by which spending decisions were taken. The key point was that power was explicitly devolved from the centre to the universities.

These are not the only different official definitions of the purposes of the Funding Councils' funding of research. The Treasury's *Cross-cutting review of science* in 2000 described it as providing "the capacity to undertake research, and in particular the flexibility to pursue 'blue skies' research and develop new areas of excellence". This is yet another completely different kind of definition, focused not on who decides how to spend the money or on what types of thing that might be bought, but on the expected outcomes of the research that is funded.

When the Treasury repeated its *Cross-cutting review of science* in 2002 it once again came up with a new description of the purposes of the Funding Councils' pot of research funding. It contains elements that had appeared in some of the earlier ones, but also has a fresh form of words about providing "the base from which academics can make credible proposals [to the Research Councils, charities, the European Union, industry and so on]". It differs in a significant way from some of the previous attempts at definition by saying that Funding Councils should pay for "the costs of training new researchers," when earlier versions had suggested that it should include only a contribution to these costs.

The Government's overall strategy for science published in 2002, *Investing in Innovation* had another, longer, definition, while in 2004, the *10-Year Science and Innovation Investment Framework* reverted to a short, simple one – "a foundation allowing university leaders to take strategic decisions about the research activities of their own institutions". This harks back to the original definition from 1993, and seemed to put the decision-



making power back into the hands of managers within institutions.

Anyone not already immersed in the system could be forgiven for being confused. Apart from anything else, few of the definitions included any reference to the fact that this funding pays the salaries of academic members of staff, but in reality that is what the vast majority of it is actually used for.

A composite list, trying to encapsulate the wide range of elements in the various descriptions would include:

- strategic investment in new areas
- 'blue skies' research
- training new researchers
- rapid reaction to changing circumstances
- a base to apply for other funding
- high risk, potentially high-reward research
- research that cannot be funded from elsewhere
- capacity-building
- infrastructure [including laboratories and libraries etc. but also the staff salaries that support human infrastructure]
- filling the shortfall on other sources of funding such as grants from Research Councils, charities, the European Union or industry

Although it would be possible to deal in detail with all of these things, the two at the top of the list are important for special reasons.

Strategic investment is crucially important in allowing universities to start new areas, and to develop their

research as exciting opportunities become available. To do this, research leaders need a modest financial surplus, after they have paid for all the essentials. Because of changes in the two funding streams of dual support, the freedom created by such a surplus no longer exists.

Over the last twenty years, the proportion of funding that comes through the two different streams of dual support has changed. The practical effect of these changes on the ground is that whereas in the mid-1980s, for every pound that the Research Councils were distributing, the universities were getting £1.27 from the Funding Councils towards the costs of all the things in the composite list of purposes for this funding stream. Now they get 64p.

In other words, after university managers have paid for the shortfall on Research Council grants, the costs of training new researchers, their basic infrastructure, library and salary costs, there is now little if anything left for investment in strategic future priorities.

'Blue skies' research suffers from the same problem, but its difficulties are exacerbated by the processes that have been invented for rationing funding. Over recent decades, the number of researchers expecting to share in public funding has grown faster than the availability of funds. The number

of academic institutions receiving cash from the Funding Councils (or their predecessor the University Grants Committee) has grown by almost four fold since 1970, and the number of academic staff has grown by a factor of at least 2.5. There has also been a massive growth in the number of postdoctoral researchers who are not classed as academic staff, so the total number of people doing university research has expanded by a very large multiple. Although funding has grown rapidly, it has not kept pace in the same way.

Because there are now so many more people eligible to receive public funding for university research, the system has had to invent mechanisms for rationing it in fair ways. Both halves of dual support have invented their own methods of doing this. The Research Councils have special themes and panels and ring-fenced pots for particular subjects. They even reached the point of issuing a document with a list of questions that UK researchers would "work to solve within the next few years" which ranged from "What is gravitation?" to "What does it mean to be a member of an expanding European Community?" This is a far cry from the words of the Council for Science Policy in 1966, said that the task of science policy was nothing more than "to maintain the environment necessary for scientific discovery".

On the Funding Council side of dual support, the mechanism for rationing funds is the Research Assessment Exercise, which a very senior scientist in the UK recently described as "immense timewasting".

As soon as these methods of rationing funds are introduced, it is inevitable that anything that does not fit with current themes and paradigms finds it almost impossible to get funded. And indeed, a recent report commissioned by the Higher Education Funding Council for England could find no evidence that its funding was "supporting research which has led to fundamental breakthroughs or radical changes in research areas".

So for many parts of the research system, the dual support system works well. Indicators such as citation rates show that the vast majority of research funded by the Research Councils and Funding Councils is excellent, judged against the international competition.

But some particular areas – including 'blue skies' research and strategic investment in new priorities – are much less well served by the current arrangements. So while the dual support system is fit for many of its current purposes, it is very far from perfect if the UK is to sustain the truly innovative and exciting science and engineering base it needs to thrive in the coming years and decades.

In discussion the following points were made:

The 'cliff face' drop down of QR money means that any department that does not get a five rating may as well fold up as far as 'blue skies' research is concerned.

Infrastructure money was transferred to Research Councils when new universities were created from polytechnics and never returned subsequently due to the fear that Vice Chancellors had too much freedom in the 1970s on how the infrastructure money was spent and they would direct funds away from scientific research. Has this situation been changed subsequently?

The £98 million recently transferred to bail out the Rover Car Company by the DTI from the MRC budget, that had been previously ring-fenced for clinical medical research training purposes, will not be restored although everyone regrets such adjustments. The Cooksey review will secure the MRC and NHS research funds in the future. Prospects for clinical research will not be starved. "It felt like a slap round the face with a wet kipper." The science community felt very badly treated as a result. All sources of funding need consideration together especially when the two halves of the dual support system contract simultaneously. Is there anyone who is taking a realistic overview of the whole situation?

Deliberate obfuscation on the costs of what universities do with their money results in the closure of chemistry departments as there is no clear understanding of the financial commitments needed to keep them open. Chemistry department closure is a complex subject which is cyclical and could lead to catastrophic loss of infrastructure. 120 institutions have some, but not much, funding for QR and this funding is mainly absorbed by departments with a higher mark.

The system is working fairly well at the 90% level, however 80% of research funding goes to only 20 universities which leaves many universities very short of facilities for supporting research. Universities have to make everything add up as a whole including teaching. Innovative ways of increasing overall funding for universities from a wider range of sources are urgently needed.