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SBS 04/06

An opportunity to save British science

SBS response to the consultation on a 10-year investment framework for science and innovation

1. Save British Science is pleased to submit this response to the Government's consultation on a 10-year investment framework for science and innovation. SBS is a voluntary organisation campaigning for the health of science and technology throughout UK society, and is supported by over 1,500 individual members, and some 70 institutional members, including universities, learned societies, venture capitalists, financiers, industrial companies and publishers.

2. We applaud the Government for attempting to create a ten-year framework for investment in science, because we believe science, engineering and technology will continue to be significant drivers of the British economy in the coming years. We do not propose to rehearse here the well-known arguments about why this is so, because we believe that the current Government accepts the case that we have been making for many years that future prosperity depends on current investment in research.

3. Science has delivered many great benefits for the taxpayers who have shown confidence by investing in the work of the UK's researchers. Indeed, SBS is about to publish a document outlining the superb value for money that British scientists and engineers deliver for the public investment they receive.[1]

4. Inevitably, a response of this kind focuses on the areas where SBS believes the Government needs to do more, and stresses what is still wrong with UK science policy, but we remain convinced that the Government was right to invest heavily in science in recent spending reviews, and that the scientific community has delivered substantial benefits for the money it has received.

Tension between existing excellence and new potential

5. A common theme running through many Government policy decision in recent years has been the tension between supporting existing excellence and developing new potential.

6. By attempting to enhance existing strengths, funding decisions have begun to neglect the possibility of supporting future potential. In choosing to cut funding for departments rated 4 in the Research Assessment Exercise, in allowing ambiguity in the formula for funding the Regional Development Agencies, and in colluding in the divergence from the official rules regarding European funding, the Government has glossed over this tension.

7. Perhaps the single most important change that is needed in Government thinking on science is to recognise the tension explicitly, and develop appropriate policies both to promote and reward excellence and to allow potential to flourish.

8. Our more specific comments begin by outlining two broad categories of issue that we believe need to be addressed if the UK is to achieve it scientific potential, and we give a single illustrative example of each to indicate more clearly what we mean by these categories. We then develop a more detailed response to the consultation document. It has not been possible for us to give comprehensive answers to all of the questions in the timescale provided.

Two categories of problems

9. SBS believes that the policy areas that need to be addressed fall into two broad categories.

10. First, there is a series of problems to which the answers are relatively obvious, largely involving some new investment and some modest reforms.

11. Second, there is a group of more difficult problems. In many cases, the nature of the problem has been clear for some time, but in all of the issues in this category, the solutions are far from obvious.

An example of the first category

12. A clear example of the first set of problems is the state of science laboratories in secondary schools. The nature of the problem is reasonably obvious. For example, when SBS surveyed the heads of science in English secondary schools, 65% of schools said that funding for larger items of scientific equipment was inadequate.[2] Senior staff in three out of every five schools believed that poor laboratory facilities affected their ability to attract good staff, while positive effects on recruitment and retention were observed at schools lucky enough to have had their facilities upgraded recently.

13. The solution to this problem is equally obvious. New investment is essential, at levels far higher than has hitherto been the case. The £60 million distributed via the "Laboratories for the 21st Century" scheme was a drop in the ocean. It is plain that twenty or thirty times as much investment is needed just to start the process. Given that the highly successful Science Research Investment Fund (SRIF) has injected several billions into the 100 or so universities, from which half the population benefits, it does not seem unreasonable to expect a similar overall level of investment in the thousands of schools, from which everyone benefits. A "SRIF for Schools" would be a major investment in the nation's scientific capability.

14. But money is not the whole answer. There is need for modest reform, such that neighbouring schools are better able to share larger, more expensive, pieces of equipment, which it would be impractical to expect every school to possess. And with three quarters of schools in the survey mentioned in paragraph 12 saying they cancel practical classes because of disruptive pupils, reform is needed to make it easier to exclude children who behave dangerously from ruining the scientific potential of their better-behaved classmates.

15. This is just a single example of this category of problem, which also includes: difficulties in the recruitment and retention of world-class researchers; some aspects of the failure of the system for delivering scientific advice to Government; and a lack of balance in the universities between funding for research questions driven by the research community and funding for questions dictated centrally.

16. If the Government is serious about making the UK "one of the most competitive locations for science, research and development," then substantial progress should be made on the problems that fall into this category, quickly and relatively simply. Most of them have been the subject of at least one review or consultation, and there seems to be little reason for any further delay.

An example of the second category

17. An obvious example of the second category of problem is the failure of most businesses to invest in research and development in the UK. The Government's own survey shows that apart from the pharmaceutical and aerospace sectors, companies in Britain invest less of their profits in research and development than their counterparts in the rest of the increasingly-competitive industrialised world.[3]

18. It is not obvious how companies that choose to take a short-term view of the world can be encouraged or forced to behave more sensibly. Fiscal measures may help, but they cannot be the whole answer – after all, British investment has been low for decades, under different tax regimes, and the pharmaceutical industry manages to

invest sensibly while labouring under the same fiscal rules as the electronic industry, which does not.

19. Other examples of problems in this field include: the shortage of school teachers specialising in science and mathematics; some aspects of the lack of confidence expressed in the Government's ability to obtain and use scientific advice; and the relatively poor image of science and engineering among young people, with the consequent falling numbers of people choosing to study science and mathematics at school and university.

20. In at least some of these cases, it is not entirely clear that the Government will be the main player in finding solutions – Ministers cannot force businesspeople to adopt a healthier long-term approach or make young people interested in science.

21. Indeed, we have defined this second category by reference to the fact that the solutions to the problems are far from obvious. We assume that this is one reason why the Government has had so many consultations and reviews on science and innovation in recent years, hoping that eventually somebody will come up with fresh and attractive ideas about how to solve these problems.

22. Although SBS does not pretend to have a raft of new and brilliant approaches to these issues, we do believe that if the first set of problems were addressed and if the Government took the modest actions we propose below, the rest of the scientific and business communities might do more to generate real progress for themselves.

Consultation questions

23. Although we have tried to stick to the consultation questions in the order in which they appear in the consultation document, we have found it helpful to digress from this structure and expand on some areas not specifically covered by the document. Our responses focus on what we believe to be the most important areas for action rather than addressing every possible angle, which (although it might be desirable in framing such a long-term and important strategy) is not practicable within the time frame of the current consultation.

Q1. Part 1. Are these the right areas for the Government and its partners to target over the next ten years?

24. Broadly, we agree that these are the right aims, although we have some concerns about the way they are expressed.

<u>World-class research and sustainable laboratories</u>

25. The focus on the "UK's strongest centres of excellence" appears to carry further the Government's aim of concentrating resources in a tiny few institutions. However, we assume that the aims of maintaining "sustainable and financially robust universities and

public laboratories across the UK" is intended to encompass adequate support for those institutions that fall outside the Government's more-or-less arbitrary definition of centres of excellence.

The needs of the economy

26. The phrase "continuing step-change" is rather odd (we understand a step-change to be a discontinuity rather than a continuous process), but we agree that the research base should feed into the economy and public services as much as possible. However, this focus should not come at the expense of 'blue-skies' research, which is essential for the generation of future economic benefits.

Business investment

27. We wholeheartedly agree that British business needs to invest more in R&D, as we expressed in paragraphs 17 to 18.

Skills

28. SBS agrees that the supply of people with appropriate scientific, engineering and mathematical skills will be a crucial element of any ten-year plan, although we think the phrase "greater flexibility" is somewhat vague, and in terms of the headline objective, it is difficult to assess what it is intended to mean.

Confidence in science

29. We agree without reservation that confidence is required across UK society in scientific research and its use.

Q1. Part 2. What are the underlying components of success in these areas and what roles do Government and other funders of the science base need to play in achieving these aims?

30. The key components of success in world-class research are: (i) adequate funding and (ii) the freedom for the research community determine the principal areas of investigation. The Government is essentially the guarantor of both.

31. A substantial tranche of the funding must come from Government, partly because other sources will not generally fund fundamental research but also because, as SBS has shown elsewhere, there is a broad base of evidence to demonstrate that where Governments invest heavily in the science base of their countries, other sources of funding (including industrial funding) tend to follow suit.[4]

32. Given that it is inevitably one of the principal paymasters of the science base, the Government clearly has a major role in protecting the freedom of members of the research community to pursue those ideas that they believe may be most interesting. To this end, it has been utterly inappropriate of the Government in recent years to ring-fence parts of the science budget for politically-driven questions that

should really be investigated by individual departments[5], to dictate a list of specific questions that the research community must answer in the coming years[6], and, most damagingly, to reduce the Funding Council leg of dual support to such a degree that there is, in effect, no longer any unencumbered funds for universities to use at their discretion.[7]

33. To deliver sustainable laboratories, the Government must not move the funding goalposts without adequate warning. For example, the reduction of funding for departments rated as being nationally excellent following the Research Assessment Exercise in 2001 is deeply damaging, as is the Government's breaking of its own principles by excluding studentships[8], academic fellowships[9] and funding from the National Health Service[10] from the general rule that Government funding should cover the full economic costs of the research it is intended to support.

34. More generally, sustainable laboratories across the UK depend on funding streams that are not heavily concentrated into a tiny minority of institutions.

35. The Government's role in generating confidence in science is largely in ensuring that it obtains and uses scientific advice from a range of trusted independent sources, including publicly-funded institutions, and that it is seen to do so. It must properly communicate the risks involved in new technologies and must be honest about its own uncertainty.

Q2. Which strengths of the UK science base could be further developed; what are the weaker areas that need to be addressed; and what are the risks to the UK's continued production of the internationally competitive levels of research? What criteria should the Government use to help determine its overall commitment to science?

36. SBS has a policy of not commenting on the relative strengths of different subject areas within the scientific competence of the UK, partly because we do not have the in-house specialist expertise required to give authoritative comment, and partly because we believe it is destructive to set disciplines against one another.

37. The criteria that the Government should use to determine its overall commitment to science is essentially a political judgement. But as a rough rule of thumb, there is always room for more investment as long as high quality proposals are coming forward from the research community. At the moment, many alpha-rated proposals are routinely rejected by the Research Councils; whatever the precise optimum overall level of commitment, we are still a long way short of it at the moment.

Q3. In which key technology-based sectors does the UK have the potential to maintain and grow?

38. SBS has a policy of not commenting on the relative strengths of different subject areas within the scientific competence of the UK.

Q4. In order to inform decisions on the future investment framework, and building on the Research Councils' extensive consultations with stakeholders, in what areas are there opportunities for the UK research base to excel and contribute to the economy and society, which might form the basis of future strategic research programmes?

39. As we explained in our letter to the Chief Scientific Adviser and Director General of the Research Councils following the start of consultations on the ten-year framework, SBS believes that a mountain of evidence shows that it is impossible to "pick winners" in this way.

40. It would be a mistake for the Government to try to predict which particular subjects should be the focus of investment over the coming decade. There are many well-known examples of failed attempts to predict what science will prove useful and important, and we feel very strongly that no such attempt should be made now.

41. Indeed, as we explain above in paragraph 32, we think the Government should reverse the recent trend of increasing attempts to direct the course of research in the science base. The ten-year framework must avoid the temptation to dictate too closely the relative distribution of funding among subject areas in science and engineering.

Q5. In the light of changes to be made to the next RAE, how can funding mechanisms build on existing resources and research assessment reforms to reward excellence and underpin sustainability?

42. This question presupposes that the proposed changes to the RAE will go ahead as currently planned in 2007 or 2008. SBS believes this would be a mistake.

43. Although the proposals offer some clear advantages over the old system, there remain very serious problems with the new proposals. The most serious is that institutions will not have any idea in advance how their assessment scores will translate into financial rewards. Sir Gareth Roberts' Review was unambiguous in saying that "it is of the first importance that there is a clear and predictable relationship between assessment outcomes and funding".[11] Roberts even published (as Figure 4 of his report) a hypothetical table, illustrating how this could be done simply and clearly, recognizing that the various weightings would be different in England, Wales, Scotland and Northern Ireland.

44. The rejection of this principle by the Funding Councils will make the proposed RAE in 2008 very unfair. It is open to the Councils to say that work scored with 3-stars under the new system will receive twice as much money as work scored with 1-star. It is equally open to them to say that the factor will be three times as much, or 25 times as much, or 57.8 times as much, or 100 times as much, or any other number. The precise value is, in essence, a political decision.

45. However, universities are not to be given *any* advance warning of what the ratio will be. It is as if they are playing a game in which they do not know the rules, because the referee will not even decide what the rules are until after the game has ended. It is like living in Alice's *Wonderland*.

46. To build on existing resources and reward excellence and underpin sustainability, SBS believes there should be a simplified, 'triple support' system of funding for university research.

47. As a peer review process, a complex RAE is unnecessary duplication, because the bulk of what is assessed is either (a) grant income, which has already been handed out on the basis of rigorous peer review, and (b) papers, patents and other publications, which are also rigorously reviewed, in various ways, before publication.

48. Not surprisingly, as the President of the Royal Society has demonstrated, the outcome of the peer review process of the RAE is almost identical to the outcome of the peer review process for grant applications.[12] In other words, hundreds of people spend a year assessing information that thousands of people have spent months preparing, and produce an outcome that could have been reached in a few minutes. Most of those people could have spent that time better doing more research

49. Moreover, the costs of this process, although *relatively* small (compared to other administrative processes), come out of a research budget that is already inadequate. The money would be better spent doing more research.

50. The new proposals will continue to force thousands of people to spend large sums of money and huge amounts of time only to discover that nothing has changed, and that the best research is still being done by the people with competitive grants who publish in competitive journals.

51. While acknowledging that the RAE has run its course, SBS sees some problems in suggestions, such as that by the Royal Society, that

the money can simply be distributed on the basis of topping-up existing peer-reviewed grants.

52. Any funding system needs to recognise that, in a world of over 100 universities, each distinct from the others, we cannot simply return to the good old days when dual support worked well. We must, however, attempt to preserve what was good about the good old days, while adjusting to modern constraints.

53. Our proposal for "triple support", although it contains three elements, is simpler to understand than the ambiguities of dual support as it is currently supposed to work.

54. First, academic salaries should be paid out of a block grant, as at present. The size of the block grant distributed to each institution might well be decided on a simple model like that proposed by the President of the Royal Society, and would not require a burdensome assessment procedure.

55. The second element of triple support would be the bulk of the rest of the available funds, which would be distributed prospectively by the Research Councils; they would pay at least 100% of the full economic costs of the work they supported. There would be no ambiguity or possibility of blaming others for the underfunding of research projects, and all projects would therefore be funded on a sustainable basis. The onus would lie squarely with the Research Councils to pay full costs. Depending on available resources and political will, they might pay more than 100% of full costs, to ensure that the best people were rewarded for their excellence with unencumbered funds to pursue their own ideas.

56. The third element would be small in magnitude but hugely important. Distributed according to a very simple formula (perhaps nothing more than a capitation based on a headcount), it would allow institutions a small pot of money for entirely novel and blue skies research. Because it would be identified as a separate stream, it would not be possible for Governments to blur the boundaries, as they can under the current dual support system, allowing "blue skies" funds to be diverted to prop up unsustainable funding elsewhere.

57. Because the amount of money in the third element of triple support would be relatively small, there would be no need for a complex research assessment process, and because it would be distributed simply, there would be no possibility of particular groups and individuals demanding "their" shares (these demands should in any case be met by the second element of the scheme). This would leave local managers with genuine flexibility to pursue unfashionable, novel and untested avenues of research.

58. There is no doubt that such a scheme would need refining, and there is also no doubt that the political establishment must stop passing the buck and decide whether it wants to provide more money or accept less research. The current volume of research is not sustainable on current funding levels.

Q6. What are the main barriers or challenges to the achievement of a sustainable public research base in the medium term? What further action could the Government take, in partnership with universities and other funders of research, to create robust incentives for all parties to work together to deliver greater financial sustainability of the UK's research base?

59. It is unfortunately true that a low-price culture has grown up in the universities, in which the proper costs of research are not recovered. Partly, this has been the fault of Government funding schemes, although the institutions must bear their own share of the blame.

60. We believe that our system for triple support of research funding, set out in paragraphs 53 to 57, would solve a major problem in the existing system which is the "lack of clarity at the heart of the dual support system" identified in the *Cross-cutting review of science and research.*[13] Research Councils can claim that Funding Councils funding should meet the unpaid costs of their projects, irrespective of the level of funding available from the Funding Councils, either to a particular institution or to the system as a whole. Universities are forced to collude in a system that is opaque and which allows all parties to pretend that some costs do not exist until the deficit becomes entrenched, as it has recently, at the level of billions of pounds a year.[14]

61. We wholeheartedly welcome the general principle that Government agencies must all now pay the full costs of the research they commission.[15] However, as we explain in paragraph 33, we do not understand why the Government has chosen to exempt some of its own agencies and schemes, including the National Health Service, postgraduate studentships and academic fellowships.

62. If the Government is serious about wanting sustainable funding, it can no longer exclude its own agencies from the necessity of paying the full costs of the research they purchase.

63. Funding from the European Union Framework Programme (hundreds of millions of pounds a year)[16] is particularly bad at paying the full costs of the research projects it funds.

64. It is likely that, on existing trends, the UK will win grants totalling perhaps €2.5 billion over the course of the Framework 6 Programme. Using conservative ratios of the level funding received to

the full costs of the work done, we estimate that the research work will actually cost €3.14 billion to perform. This represents a shortfall of €160 million per year, equivalent to £100 million.[17] For a university, the only realistic source of funds from which this subsidy can come is the relevant Funding Council, the budgets of which are already stretched.

65. If British researchers are more successful in winning grants than our estimate, this subsidy will need to be larger. If they are less successful, there will be less pressure on the budget. Under current circumstances, the universities and Funding Councils therefore have no way of preparing and budgeting for this problem.

66. By far the most sensible way of solving the problem would be for European grants to pay for the full costs of the work they are meant to be funding, and we would urge the British Government to fight for this in the next round of negotiations.

Q10. What is the emerging evidence on the prospects for the supply and demand of science skills? What further steps could the Government take to ensure that the supply of these skills is responsive to the demands of the economy?

67. By far the most worrying issue in this regard is the shortage of science and mathematics teachers. In mathematics, the Smith Report[18], which is one of the inputs to the current review, provides a basis that many people largely support, and its recommendations should be implemented immediately. Its recommendations should not necessarily be perceived as being restricted to mathematics. At least some of them would be equally valuable in other subjects.

68. There is a plethora of evidence about the other problems of secondary school science education, many of them highlighted in SBS's recent survey of science teachers.[19] Many of these problems would be simple to address, as we describe in paragraphs 12-13.

69. More generally in the field of secondary level education, although we support the widening of the sixth-form curriculum, because it allows people to develop experience of science, arts and humanities before committing themselves to a particular career choice, we find the Tomlinson Report on a new curriculum[20] to be deeply flawed. It offers no really substantive proposals, rehashes platitudes from previous reports, and is extremely vague about any detail. A rigorous baccalaureate style of examination would be far better for young people themselves and for the nation's supply of skilled people than either the current system or whatever it is that is supposed to be envisaged by the 14-19 Working Group.

70. Current changes to the funding of undergraduate student courses could have serious effects on the supply of trained scientists.

The beginning of a marketplace in higher education could reduce the number of people choosing to study science at university. For example, fees for science courses may become more expensive than those for other subjects, simply because the cost of teaching laboratory-based subjects is more than that of teaching library-based disciplines. As the Science Minister has said, because universities must "make certain that [they] can cover their costs of doing a subject" they cannot say "We will charge virtually nothing [to study physics]"" in order to encourage more applications.[21]

71. If it happens that young people are turned off doing science courses because of additional courses, the Government should intervene to correct the failure of the market to provide the skilled workforce the country needs.

Q11. Do UK business leaders and managers have the necessary skills and knowledge to exploit new technologies and research to maximum effect?

72. One of the big problems with existing structures is that businesses often have problems that have already been solved by researchers studying them for other reasons, but the industrialists have little chance of knowing which researchers or what the solution is.

73. Reliably matching existing knowledge with novel problems remains one of the unsolved difficulties of the knowledge economy.

Q12. What should the role of Government be in improving the interaction between science and society? How can we improve public confidence in the Government's use of science?

74. Generally, apart from offering funding support for relevant activities (as it does through the Royal Society, Research Councils and British Association), the Government should concentrate exclusively on the second part of this question. Attempts by Government to influence public opinion in favour of science in general or technological developments in particular generally backfire, partly because the constraints of politics are incompatible with the uncertainties that are an inherent part of scientific research.

75. The second part of the question – improving confidence in the Government's use of science – is of fundamental importance. The Government should start by investing appropriately. In real terms, the research budget of the Department of Environment, Food and Rural Affairs is 6% lower than the budget of the old Ministry of Agriculture was in 1987[22] despite the fact that it has responsibility for more policy areas and that it is responsible for high-profile political issues such as genetically-modified foods, dwindling fish stocks, and tuberculosis in wildlife.

Q14. Part 1. What are the research aspirations and funding plans of the medical charities over the coming decade?

76. This is a matter for the charities themselves.

Q14. Part 2. How best can Government and charity funders work together to enhance the impact and complementary research efforts on national and global health outcomes and contribute to the development and maintenance of a sustainable UK science base?

77. One reading of this question is that the Government wishes to treat charity funding as a replacement for funding that ought properly to come from public funds.

78. As properly defined, the "science base" is research in the universities and Research Council laboratories. It is not the job of charities to fund this basic infrastructure, although they of course make a major contribution to the "science base" as it might be more widely understood, to include the charities own laboratories.

Q15. Are there ways in which the Government support for medical research could be better structured. What should...the NHS be doing over the ten years of the science and innovation framework to ensure successful partnership working in medical science in the long term?

79. It is regrettable that the NHS has been excluded from the rule that Government Departments and agencies should pay the full economic costs of research they commission from the science base.[23] This derogation is hardly likely to create a "successful partnership" with the universities.

Q18. How can Government best secure greater synergies between research funding, investment and strategies across different public programmes, and link the Government's overall objectives for research outputs with the capabilities in the UK science base?

80. For decades, successive Governments have refused to accept that science is one of the things that affects all manner of political decisions, and that its importance is out of all proportion to the prominence it is given in Government decision-making.

81. It is plain from a series of recent Parliamentary Questions that existing mechanisms for dealing with science across Government are not taken seriously by many departments. When asked about their responses to a recommendation from the Council for Science & Technology that they should expand their skills base by bringing in scientifically-talented people on short-term secondments,[24] most departments either did not know what action they had taken in the previous five years, or had done nothing. Even the Department of Trade & Industry, which has responsibility for science policy, did not know how many scientific secondees it had employed, while the

Department for Education, which spends £1.4 billion each year on research and development, had not employed a single secondee with a scientific background.[25]

82. Science policy should be more effectively dealt with across Government, perhaps by the creation of a Ministry of Science with a Cabinet Minister whose *primary* responsibility would be for science and technology.

83. This would allow more effective investment and strategies in relation to those parts of science that are currently dealt with in other parts of Government. For example, the British Library, an essential part of the UK's knowledge infrastructure, is housed in the Department for Culture, and it can hardly hope to receive the attention it deserves when the relevant Secretary of State's attitude to science summed up by her comment that children whose school has no qualified drama teacher should not be "palmed off with the fat chemistry teacher".[26]

Q19. How can the Government and the RDAs and their equivalents in the devolved administrations help integrate funding of science research on a predominantly national basis with development and delivery of regional economic strategies? In particular, how can Government and RDAs strengthen partnership working to facilitate more effective knowledge transfer and research collaboration?

84. This question is surely fundamental to a national science investment programme, and in SBS's opinion, this question is better addressed before most of the other questions.

85. As in our answer to question 18, we believe that a lack of real-joined up thinking on science policy is harming the nation. Just one example is the statement by the Science & Technology Committee of the House of Commons that it has "no confidence" that higher education policies with respect to science "are being considered by Government in a coherent manner" because the Science Minister apparently "takes no responsibility for representing [the Research Councils'] views within Government."[27]

86. The plethora of RDAs, devolved administrations, individual Government Departments and agencies, Research Councils, and Funding Councils mean that this kind of problem is magnified and exacerbated throughout the system. That is one reason why we believe that a Cabinet Minister with primary responsibility for science is necessary.

87. With respect to the RDAs, the current formula for allocating resources appears to be unclear about whether money is best directed to areas that are already strong, or whether it is better to invest in

building capacity where it is currently weak. Both are of course valuable aims, but if both are to be pursued, this should be done explicitly.

Q20. Are there barriers facing business and the science base in effective engagement with EU research programmes? How can the UK more effectively influence and benefit from EU research funding and policies?

88. As we outline in paragraphs 63 to 64, European funding is currently distributed using the least sustainable method of all public funding. If the UK Government cannot successfully argue in Europe for the rules to be changed, so that Framework Programme grants pay the proper costs of what they are intended to achieve, then there is no choice but for the British Government to follow the suit of other member states, and explicitly to meet the shortfall with new money from other sources.

89. We recognise that this is a less than ideal situation, but the only other options are either (i) to turn down European grants that would be paid for out of British taxes or (ii) to allow universities to continue accepting unsustainable sources of funding.

90. In general, although EU funding is explicitly said in the Treaty of Amsterdam to be concerned with "strengthening the scientific and technological bases of Community industry"[28], and although the criteria for the selection of projects is supposed to be scientific excellence[29], many people remain convinced that the *explicit* purpose of EU funding for science is the transferring of knowledge and skills from richer to poorer countries. For example, one Cambridge Professor believes that it "is certainly true, and it is deliberate" that applications are "not necessarily judged purely on absolute peer review" because "it actively forces us to build collaborations with developing communities, where people are talented but they do not have the resources".[30]

91. If he is right, everyone is openly and deliberately breaking the rules. It would be an admirable political aim for richer European countries to assist the poorer ones in developing their scientific potential, but we should admit that this is a different objective from funding excellent science.

92. It would then be possible to develop separate programmes for investing in excellence and for developing capacity in the southern and following expansion, eastern, countries. A single blunt instrument cannot achieve both ends simultaneously.

April, 2004

Notes and References

[1] *Delivering a return on scientific investment,* Supplement to Save British Science Newsletter No 40, 2004.

[2] *SBS Survey of secondary school science teachers,* SBS, 2004 [SBS 04/01].

[3] *The 2003 R&D Scoreboard: Commentary and Analysis – Part 1,* DTI, 2003.

[4] *Science policies for the next Parliament: Agenda for the Next Five Years,* SBS, 2001 [SBS 01/03].

[5] For example, *The Allocation of the Science Budget 2003-04 to 2005-06,* OST, 2003, describes how a large sum of money has been appropriated to the study of the rural economy, irrespective of the relative quality of applications received and despite the fact that such research is properly the job of the Department of the Environment, Food and Rural Affairs.

[6] *A Vision for Research,* RCUK, 2004, gives a list of these questions, which include such specific items as "What does it mean to be a citizen of an expanding European Community [sic]?"

[7] According to successive issues of the *Forward Look* [latest issue, 2003, Cm 5877], in the mid 1980s, for every £1 of investment in specific projects by the Research Councils, universities received about £1.27 to cover the indirect costs of research and leave something left over to use "at the institutions' discretion" [in the words of the 1993 White Paper *Realising Our Potential*]. This year, the comparable figure is 69p, and, as the *Cross-cutting review of science and research,* [HM Treasury, 2003] has shown, there is a substantial funding gap, of well over £1 billion per year, so that there is no longer any such flexibility.

[8] *The sustainability of university research,* OST, 2003.

[9] *Academic Fellowships: OST Official response to the consultation on implementing the new academic fellowships,* OST, 2004.

[10] Letter from the Head of the Science & Industry Team, HM Treasury to the Director of the Science & Engineering Research Base, OST, dated 13 Feb 2004, published at http://www.hefce.ac.uk/research/funding/dual/HMTletter.pdf

[11] *Joint consultation on the review of research assessment: Consultation by the UK funding bodies on the review by Sir Gareth Roberts,* 2003 [HEFCE 2003/22]

[12] *The UK's dual support system: Time for a fundamental review?* Anniversary Address by the President of the Royal Society, 2003.

[13] *Cross-cutting review of science and research,* HM Treasury, 2003.

[14] *Cross-cutting review of science and research,* HM Treasury, 2003.

[15] Letter from the Head of the Science & Industry Team, HM Treasury to the Director of the Science & Engineering Research Base, OST, dated 13 Feb 2004, published at http://www.hefce.ac.uk/research/funding/dual/HMTletter.pdf

[16] Although the EU refuses to publish data on how much research money ends up in each member state, the UK almost certainly gets back slightly more than its annual contribution of approximately £400 million (see *The Funding of Research through the Framework Programmes of the European Union,* SBS, 2002 [SBS 02/07]).

[17] *UK Science and Europe: Value for Money,* Sixth Report of the House of Commons Science & Technology Committee, 2002-03 Session, Volume 2 [HC 386-ii].

[18] *Making Mathematics Count: The Report of Professor Adrian Smith's Inquiry into post-14 maths education,* The Stationery Office, 2004.

[19] *SBS survey of secondary school science teachers*, SBS, 2004 [SBS 04/01]

[20] *14-19 curriculum and qualifications reform: interim report of the working group on 14-19 reform*, DfES. 2004.

[21] *The Office of Science & Technology: Scrutiny Report 2003*, Fourth Report of the House of Commons Science & Technology Committee, 2003-04 Session, [HC 316].

[22] *Forward Look 2003: Government-funded science, engineering and technology,* DTI, 2003 [Cm 5877]

[23] Letter from the Head of the Science & Industry Team, HM Treasury to the Director of the Science & Engineering Research Base, OST, dated 13 Feb 2004, published at http://www.hefce.ac.uk/research/funding/dual/HMTletter.pdf

[24] *Review of science & technology across Government,* Council for Science & Technology, 1999.

[25] *Hansard* [House of Commons] 20 November 2003, and subsequent letters in the House of Commons Library.
[26] Reported in the *Guardian,* 24 September 2002.
[27] *The Office of Science & Technology: Scrutiny Report 2003*, Fourth Report of the House of Commons Science & Technology Committee, 2003-04 Session, [HC 316].
[28] *Consolidated Version of the Treaty Establishing the European Community,* Article 163 [known as The Treaty of Amsterdam, or The Treaty of Rome as amended by the Treaty of Amsterdam].
[29] See, for example, *Research and Technological Development Activities of the EU,* Annual Reports from the Commission.
[30] *UK Science and Europe: Value for Money,* Sixth Report of the House of Commons Science & Technology Committee, 2002-03 Session, Volume 2 [HC 386-ii].