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DEPARTMENT OF TRANSPORT
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01-212 3434

David Barclay Esq
Private Secretary
10 Downing Street
LONDON SW1

1 October 1984

NBPM

JR

1/10-

Dear David

ANNUAL REVIEW OF GOVERNMENT FUNDED RESEARCH AND DEVELOPMENT

Thank you for copying me your letter of 6 August to John Gieve.

The Secretary of State has asked me to say that he welcomes the Annual Review and the actions put in hand by the Prime Minister relating to the Review and ACARD comments. His Chief Scientific Adviser and colleagues will take an active part in developing proposals for action through the Sub-Committee of Chief Scientists.

I am sending a copy of this to Richard Hatfield.

yours sincerely

Henry Derwent

H C S DERWENT
Private Secretary

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Foreign and Commonwealth Office

London SW1A 2AH

24 September 1984

JMB
24/9

Dear David,

Annual Review of Government Funded Research and Development

The Foreign Secretary was grateful to have his attention drawn to the latest Annual Review on Research and Development and the views of the Advisory Council for Applied Research and Development (ACARD) thereon (your letter of 6 August to John Gieve at the Treasury). He continues to be concerned over the high proportion of R&D expenditure devoted to defence. The fact that we spend less on civil R&D than our main competitors, both absolutely and as a proportion of total R&D, inevitably affects our ability to participate in useful international collaboration and our standing as a technologically advanced nation.

Sir Geoffrey notes that the Prime Minister has asked Sir Robert Armstrong to advise how this issue might best be examined interdepartmentally, and hopes that because of the international repercussions the FCO can be represented on any interdepartmental machinery that is set up for the purpose. He would also be glad of the opportunity to comment at a later date on any recommendations that may be made.

I am sending copies of this letter to the Private Secretaries of members of the Cabinet and to Richard Hatfield.

Yours Sincerely,
Colin Budd

(C R Budd)
Private Secretary

D Barclay Esq
10 Downing Street

Science Budget: Science & Tech. H2.

Division of Community Affairs

London SW1A 2AA



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MINISTRY OF DEFENCE
MAIN BUILDING WHITEHALL LONDON SW1

Telephone 01-~~830X7822~~ 218 2111/3

MO 26/1

10th September 1984

amb
10/9

Dear David,

ANNUAL REVIEW OF GOVERNMENT FUNDED RESEARCH AND DEVELOPMENT

My Secretary of State has seen your letter of 6th August to John Gieve on this subject.

Mr Heseltine has noted that the Prime Minister has asked Sir Robert Armstrong to advise her on how the issues raised by ACARD in respect of defence research and development expenditure should be examined inter-departmentally; he will expect any such examination to include a critical examination of the economic arguments put forward in support of ACARD's comments in this area. Officials here will of course be ready to play a full part in the further work.

I am sending a copy of this letter to Richard Hatfield (Cabinet Office).

Yours etc,
Denis

(D BRENNAN)

D Barclay Esq

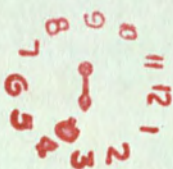
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Science & Tech Budget

MINISTRY OF DEFENCE
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PT2



9 JUN 1984

WITTHALF
LONDON

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2 MARSHAM STREET
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01-212 3434

My ref:

Your ref:

JMB
3/9

3 September 1984

Dear David

ANNUAL REVIEW OF GOVERNMENT FUNDED RESEARCH AND DEVELOPMENT

Thank you for copying to me your letter of 6 August to John Gieve.

The Secretary of State has asked me to say that he welcomes the Annual Review and the actions put in hand by the Prime Minister relating to the Review and ACARD comments. Officials in DOE are investigating the potential for encouraging the construction and allied product industries to become more involved with R&D and to stimulate innovation. The Secretary of State will be pleased for his Chief Scientist and colleagues to take an active part in developing proposals for action through the Sub-Committee of Chief Scientists.

Yours ever

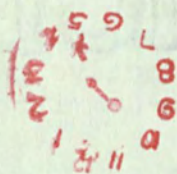
Andrew

A C ALLBERRY
Private Secretary

David Barclay Esq

SCI + TECH : Budget

AZ



SEP 3 1988



With DB?

CABINET OFFICE

This is the minute referred to in paragraph 13 of my minute to the Prime Minister of July 27.

With the compliments of

ROBIN B NICHOLSON

Chief Scientific Adviser

CF: Please pa. This relates to the 2nd Annual Review of R&D.

Emb

16/8

70 Whitehall, London SW1A 2AS
Telephone 01 233 7089

W.0577

15 August 1984

MR BAILEY, H M TREASURY

R & D EXPENDITURE BY DEPARTMENTS

1. Several times this year, I have promised the Chief Secretary a set of personal comments on Departmental R & D programmes. These are given below and are intended as an addition to the ACARD comments on the Annual Review, a copy of which you have seen.

2. The comments are personal impressions based on the close scrutiny of Departmental R & D objectives and expenditure plans which my Secretariat have made while preparing the 1983 and 1984 Annual Reviews. But I cannot substantiate the detail of some of my comments so I have tried to make them in the form of questions which I believe Departments could reasonably be expected to answer. For the same reason, I am sure you will understand if I ask for copying of this minute within Treasury to be limited and for the source of the questions to be protected in bilaterals with Departments.

General Comments

3. Generally the overall picture is one of rigidity and lack of change to meet changing circumstances. I believe that the form of Treasury/Department interactions (both during the PES round and in the course of business throughout the year) may be substantially responsible for this. It is easier for Departments to defend the status quo than to close an R & D programme which is no longer needed and reallocate the resources to a new high priority area. I would cite the almost total absence from this year's Report by the PES Committee of any bids for new R & D, and of any proposals to Treasury for offsetting savings on existing R & D as evidence of the increasingly defensive approach Departments have to R & D planning. Any private sector company which operated in this way would go out of business. With the Government responsible for half the nation's R & D and nearly half its economic activity, this is, or should be, a chilling thought. I think Treasury needs to adopt a stronger line against long running programmes and a more positive approach to Departments'

proposed use of freed resources to initiate new programmes, especially those offering potential for cost reduction and wealth generation in the future. Presently the main control mechanism used by Treasury seems to be an indiscriminate attack on all new programmes.

4. This year Departments were asked for improvements in the statements of objectives of their R & D programmes. They were asked particularly to describe their R & D objectives at a strategic level, in quantitative terms wherever possible, and in terms of the primary purposes listed in the Annex to this minute. While some improvements were noted, the general standard of the statements remains low. ACARD industrialists found it almost impossible to relate individual expenditure plans with components of the statements of objectives. This made it very difficult to analyse the value for money being achieved by Departments' programmes, and it called forth critical comments from the Council with which I agree. There seems to be a widespread approach to setting Departmental R & D objectives which runs along the following lines - "There are far more research proposals likely to be cost-effective than we can possibly afford to fund, therefore we will simply support the best of them. The R & D objectives of the Department as a whole are, therefore, simply the aggregate of the objectives of these individual programmes". In my view research programmes should be much more closely driven by Departments' strategic aims than this. My Secretariat will work with Departments on this problem during the preparation of the 1985 Review but you may wish to consider if other action is necessary.

5. Total UK expenditure on R & D (ie by industry, Government, public and private sector, etc) is in the 2-2.5% GDP bracket and is comparable with that of our major industrial competitors, US, Germany, France and Japan. UK Government expenditure on R & D is also probably reasonably comparable (although the direct expenditure by the Japanese government appears to be a smaller proportion of GDP and the substantial US government figure excludes most of the cost of R & D in universities). But UK total expenditure only gets into these brackets because of our enormous defence R & D expenditure. If that were cut, as I believe it should be, there is therefore a strong case for reallocating resources to other areas of R & D rather than taking the benefit of the cut in the form of reduced public expenditure. The areas which I believe are under-funded are long-term and strategic research where the adverse effects of under-funding take a long time to show through (hence their political

advantage). Our competitor countries are more far-sighted and our failure to follow them will have severe future economic consequences for the development of a strong science- and technology-led industrial economy.

6. In instituting the Annual Review, Cmnd 8591 stated that one of its purposes was to take an overview of the balance of Government funded R & D. Many areas of science and technology range across several Departments and a coordinated view of these must be taken, especially in the important area of strategic research, a subject which featured strongly in the House of Lords debate on 10 February. Further, R & D requires people and one Department can knowingly or unknowingly preempt too large a share of the resources available in scarce skills such as microelectronics. But some Departments still argue that they and they alone can determine the size and scope of their R & D programmes, and have not yet accepted the possibility that the Annual Review process may involve a re-allocation of R & D resources between Departments although this is clearly the intention of paragraphs 19-21 of Cmnd 8591. It will be for Departments themselves to consider and propose changes during the survey in the light of the results of the Review process. But if they are not receptive to suggestions for revising their plans, it may be necessary for the Prime Minister to exercise her "co-ordinating role" in science and technology (paragraph 27, Cmnd 8591) to aid the implementation of the Review's findings.

7. In the context of public expenditure, Cmnd 8591 clearly implied transfers of resources broadly within the current fraction of GDP spent on R & D and for the Review process to succeed, it must be accepted by Treasury that cuts in one area of R & D or in the resources of one Department may well need to be complemented by increases elsewhere.

8. On a presentational point, it is not at the moment possible to identify the R & D programmes of some Departments as separate PES lines. Ministers are not, therefore, able to gain an impression of total bids for R & D. Some quite major changes in R & D programmes that Departments may propose may not be apparent at all in the PES process. It might therefore be helpful to discuss, when the present PES round is completed, how the machinery of the PES and Annual Review processes might be better integrated for next year.

9. The Annex to this minute illustrates one way of looking at the balance of Government funded R & D. It shows that last year the Government spent nearly £4

billion on R & D. Fractionally more than half was spent supporting procurement programmes, the vast majority by the Ministry of Defence. Approximately 17 per cent was spent on each of the advance of science and the improvement of technology for industry. Most of the rest, 12 per cent of the total, was spent supporting Departmental policy making and policy implementation.

10. On current plans, MOD will spend a further £380 million cash in 1986/7. In so doing, its proportion of the total Government will spend on R & D will increase by 1%. By the same year, expenditure on advancement of science will have declined by 3% in real terms, and by nearly 1% of the Government total. R & D in support of Government policy making and implementation will decline by 4% in real terms.

Ministry of Agriculture, Fisheries and Food

11. ACARD has pointed out the large proportion of Government-funded R & D which is spent by MAFF and the regional Departments. In addition MAFF's R & D objectives seem to relate more to an era when increased self-sufficiency rather than surpluses was the problem, when 75% of the agricultural produce went straight to the consumer rather than 75% being processed into food as it is now, when private sector R & D and technical advice on fertilisers, pesticides, herbicides etc was a fraction of what it is now, and when the farming industry consisted of a myriad of small, unsophisticated farmers whose technical hands needed to be held by ADAS at considerable public expense.

12. MAFF can reasonably be asked how they can justify the continuing high level of expenditure in view of the radical changes in the agricultural industry. They could also be asked what steps they are taking to bring their R & D objectives into line with current and future trends in the industry. Since UK accession to the European Community, the farming industry has received massive EEC support under the Common Agricultural Policy. Yet the industry continues to enjoy the benefits of all the domestic public support systems such as R & D, advisory services and training schemes set up before accession to the EEC.

Ministry of Defence

13. ACARD has drawn attention to the high opportunity cost of pre-empting an

apparently ever-increasing fraction of the nation's R & D resources in defence technology, and to the extraordinarily high ratio of R & D expenditure to expenditure on defence products. I support their analysis. The trend of more widely spaced orders for fewer pieces of more expensive equipment with the gaps having to be increasingly filled by more R & D contracts "to keep development teams together" must stop eventually.

14. On the 'development' side of their expenditure, MOD could be asked how they decide on the proportion of total expenditure to be spent on development, what proportion of development contracts lead to equipment which is then purchased, what is the export performance of equipment whose development is funded in this way and what progress is being made in persuading industry to fund the development work itself through the pricing of its products. Incidentally, one would assume that progress on this last point would lead to a substantial reduction in the size of the Procurement Executive since MOD's relationship with its contractors would become closer to a normal commercial one.

15. On the 'research' side of their expenditure, MOD could be asked on the extent of the interaction of their basic and strategic research with DES funded research and on how they monitor the quality of their intramural work in comparison with industrial laboratories, Universities and Research Councils.

Department of Education and Science

16. The annex shows that expenditure on the advancement of science accounts for some £675 million of the 1983/84 total expenditure on R & D which is carried out mainly at Universities and Research Council institutes and establishments. Funding of advancement of science is planned to decline by 3% in real terms by 1986/87 and of the major funding agencies, only the Science and Engineering Research Council (SERC) is likely to maintain its expenditure. However, the effects of increasing international subscriptions, increasing superannuation costs and other factors mean that even the SERC is likely to be supporting less basic research in real terms by 1986/87.

17. The UGC leg of the dual support system contributes more than half of the science total. The general view, which I support, is that this estimate overstates the University input to science. ACARD commented last year on the

need to get a more accurate figure and this need remains. There is mounting evidence that the 1981 UGC cuts have hit research proportionately more than teaching and thus the squeeze on basic research is even greater than is suggested in paragraph 16.

18. The House of Lords debate on 10 February indicated widespread concern on the health of basic and strategic research which was acknowledged by the Lord President in his summing up. I also believe there is real damage being done to our University and Research Council research. Does this matter? It is true that the past excellence of this research seems to have had little influence on the economic performance of the country. But one does not solve that problem by reducing the excellence of basic research. At a time when the Government's policies have led to encouraging progress in the application of our scientific and technological skills to producing marketable goods and services, it would indeed be ironic if the same Government were to damage irreparably the very source of those skills and so inhibit the future development of a strong science- and technology-based industry. This is also an area where, in all countries, Governments are the main providers of financial support because of the long-term nature of the research and because of the link they see between the health of basic research and future economic prosperity in an increasingly technological environment. For all these reasons I support the DES bids for extra resources.

19. Of course there remains scope for extra resources for research to come from improved efficiency but the Research Councils in particular are moving quite rapidly and yet the rate of release of resources is too small to meet the problems I have outlined above. The real financial benefits from the current restructuring will not be felt until the post-PES period. DES can be asked if they are satisfied that UGC resources are being spent in truly competitive laboratories rather than spread around too thinly. They can also be asked whether the current structure of the Research Councils is still the right one when so many new areas of science such as biotechnology and remote sensing seem to be picked up by several different Research Councils who then have to form a 'directoriate' to co-ordinate their activities. The Dainton report (Cmnd 4814, 1971) had some persuasive arguments for a single 'National Research Council' which read even better 13 years later. Finally, the Research Councils' plans for funding capital equipment, especially large equipment, in the future are unclear and DES could be asked about this and the status of international cost-sharing on future capital projects.

Department of Energy

20. The Department of Energy won first prize from ACARD for the clarity of its R & D objectives and the ease with which these could be related to expenditure. Nevertheless ACARD queries the continuing very high expenditure on fast reactor research and I would broaden this query to nuclear energy research as a whole. The UKAEA has a unique pre-Rothschild status in which it both advises the Secretary of State on what research should be done and then does it. It is not clear whether hard questions have been asked on the balance between this research, R & D in the public utilities (where the Secretary of State also has responsibilities), non-nuclear research and the development of offshore technology.

21. The Department of Energy could be asked (as the House of Commons Select Committee has asked recently) whether they can justify the R & D balance between nuclear, public utilities and non-nuclear, whether they are satisfied with the quality, scope and size of R & D by the utilities and whether the current line of public and private sector R & D in offshore technology is going to leave us with a world competitive high technology offshore industry as North Sea oil declines.

Department of Environment

22. Long-term and strategic research on the environment is seen as a major responsibility by most Governments. The uncertainty of the technical background behind many recent policy decisions on subjects such as acid rain and disposal/storage of radioactive waste suggests that DOE has been failing in its responsibility to do adequate R & D to provide the technical back-up for policy-making in this area. DOE could be asked whether they are satisfied with the quality of their technical knowledge in the major environmental problem areas and, if not, what they propose to do about it.

23. DOE are also responsible for public sector research on building and construction. The technical quality of much building and construction in the UK seems to be appallingly low, eg high-rise flats, and the very large financial and social consequences of this are increasingly apparent. Responsibility for

this stage of affairs is presumably shared between DOE with its statutory duties for approval of methods and materials of construction and the private sector which traditionally spends a minuscule fraction of turnover on R & D. What plans do DOE have to improve the situation?

Department of Health and Social Security

24. Technology has an increasing role in the Health Service. It offers many opportunities for cost reductions and hence meeting the requirement of Cmd 9189 that "the Health Service needs to achieve continuing efficiency improvements". There must be a role for increasing R & D devoted to that end. Yet there is little sign that this is appreciated in DHSS other, perhaps, than in the area of Information Technology. It is not clear who, if anyone, is doing applied R & D on the scope for diagnostic aids to reduce hospital admissions and on the use of the new developments in clinical treatment to reduce the length of hospital stays. The expenditure by DHSS on R & D of some £25m seems small in comparison with the cost of the Health Service and the potential benefits. One problem is that some of this work may be funded by NHS area boards but is unidentified as R & D.

25. DHSS could be asked what they are doing to ensure that the full opportunities for cost reduction of the Health Service through application of new science and technology are being properly assessed and implemented. They could also be asked about the basis on which they decide the level of their R & D spend.

Home-Office

26. As in DHSS, the Home Office has substantial opportunities from new technology to reduce the cost and improve the quality of its services. But the administrative staff of the Department seems to have a low level of appreciation of what technology has to offer and their in-house R & D staff have used the security excuse to become notoriously inward-looking.

27. The Home Office could be asked how they bring science and technology into their policy-making decisions and so make use of the R & D they are paying for. They could also be asked about the extent of interaction of their own R & D with the world outside and how they assess the quality and value of their programmes.

Department of Trade and Industry

28. A significant proportion of DTI's substantial spend goes on R & D. In comparison with other countries I have the impression that relatively little is used to pay for well focussed programmes which are designed to assist industry to utilise science and technology in order to establish itself in developing world markets. Too much is spent on industries which are in terminal decline and thus limited resources are less available for R & D programmes. The fiefdoms of individual sponsor divisions in DTI are very well defended so that it is virtually impossible to find funds for new programmes of even modest size, viz the current discussions on UK participation in the ESA slice of the Manned Space Station programme.

29. ACARD found it hard to detect a strategy behind DTI's R & D programme. A plethora of small development projects are supported which seem to involve almost every type of technological advance and companies in almost every sector of industry. There seems to be little concentration on areas in which real market opportunities exist. 'Support for Innovation' is just a convenient box and does not seem to include an effective set of objectives against which existing and new projects can be assessed. In addition these projects take up an enormous amount of official time since they are carefully evaluated before a grant is given and are closely monitored thereafter. Undoubtedly a more focussed programme would require less people to administer it - hence perhaps its unattractiveness in some quarters of DTI.

30. DTI have a mixture of programmes. They could be asked to assess the relative benefits to industry from R & D project grants, from research programmes carried out at DTI research establishments, from demonstration projects and advisory services. There must be a strong argument in favour of DTI providing assistance with high risk long-term R & D (such as the long-term Alvey programme) and providing awareness and advisory services to industry, but for industry to undertake its own investment in new technology for improved products and processes. From a wider viewpoint, DTI should also be monitoring the relative effectiveness of regional aid and of selective financial assistance (such as Support for Innovation) in creating a healthy, wealth-creating industrial sector. The balance between aid for manufacturing

industry and for service industries could also be addressed against a knowledge of their likely future contributions to the UK economy.

Conclusion

31. Following the PES bilaterals, the Chief Secretary may well wish to consider whether and how both the general and specific comments in this minute might be further examined. I would be happy to advise.

32. I am copying this minute to Sir Robert Armstrong and to David Barclay.

RBN

ROBIN B NICHOLSON
Chief Scientific Adviser

Total Government Expenditure on R & D by Primary Purpose,
£million cash

	1983/84 Estimated Outturn	1986/87 Plan Cmnd 9143(1) (change in real terms from 1983/84)
Advancement of Science	675	740 (- 3%)
Support for Policy Making	485	525 (- 4%)
Improvement of Technology	655	810 (+ 9%)
Support for Procurement Decisions	2005	2360 (+ 4%)
Support for Statutory Duties	65	75 (- 2%)
Support for Other Activities	65	75 (- 1%)
TOTAL	3950	4605 (+ 3%)

These figures are consistent with the Government's expenditure plans to be found in Cmnd 9143: the details in this table are not to be found in that White Paper.

16 AUG 1984