

Research & Development funding across government

Campaign for Science and Engineering submission | 22nd January 2018

Introduction

We're pleased to see the Committee considering R&D across government. This submission includes some background to R&D funding across government to inform the Committee, including our analysis of R&D funding by department in the last decade. Over 2018 CaSE will be undertaking a programme of work looking at R&D funding across government, including how we can ensure the uplift in funding is spent well. This submission sets out some key questions for those with oversight of R&D funding in different parts of government. These questions include:

- Is there strategic oversight of cross-government decisions on R&D funding levels and priorities?
- How have cross-government shifts in R&D spending profile been informed by evidence?
- Where does accountability or responsibility for coordination of cross-government R&D spending sit?
- What is the role of departmental Chief Scientific Advisors, and the network of CSAs, in supporting or informing such coordination?
- How will UKRI's forthcoming strategy consider other R&D activity, strategies and priorities across government?

About CaSE

The Campaign for Science and Engineering (CaSE) is the leading independent advocate for science and engineering in the UK. CaSE works to ensure that the UK has the policies, funding and skills to enable science and engineering to thrive. It is funded by individuals and around 100 organisations including businesses, universities, learned and professional organisations, and research charities. Collectively our members employ 360,000 people in the UK, and our industry and charity members invest around £34.9bn a year in R&D globally¹.

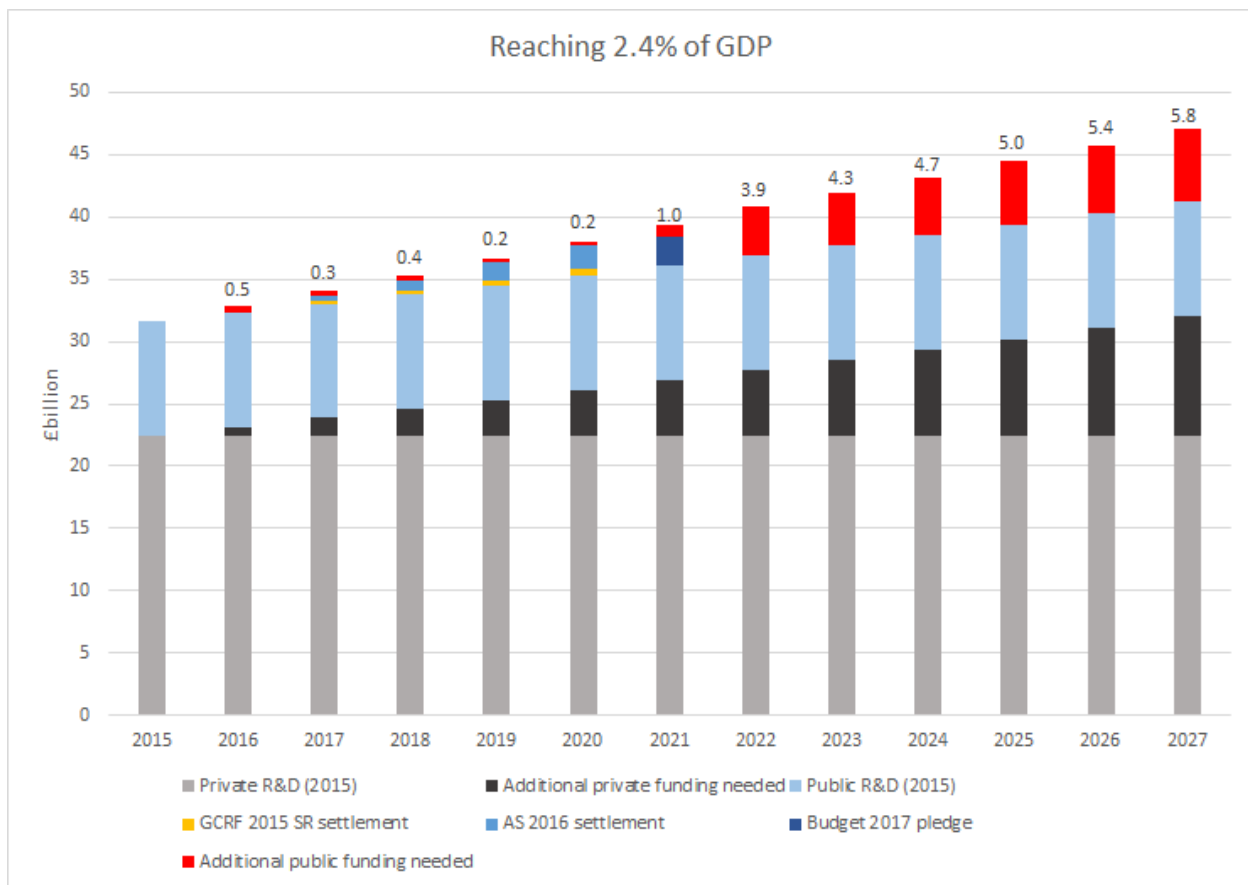
Meeting Government's commitment to invest 3% of GDP on research and development

In their election manifesto, the Conservative party committed to a long-term target of investing 3% of GDP on R&D, with an initial target of 2.4% by 2027. CaSE welcomes this pledge, building on the platform of the £4.7bn boost in investment in R&D announced in the 2016 Autumn statement. Investment in R&D has long proven to be an investment that brings returns to the economy, to productivity and to society. Sectors that are the most R&D intensive tend to have considerably higher Gross Value Added (GVA) per worker compared with the average across the UK. For example, the R&D-intensive pharmaceutical industry has one of the highest GVA per employee, at £155k in 2014.

¹ Figure calculated in October 2016 from latest available data

Total R&D spend is dominated by private investment, making up just over 70% of the total spend on R&D. Assuming the balance of public/private investment will remain steady for the foreseeable future, CaSE is able to roughly² show what an investment of 2.4% of GDP by 2027 and later 3% of GDP on R&D would look like.

Our estimations take the 2015 GERD figures as a starting point, build in public R&D investment announced since then (from the 2015 Spending Review and the 2016 Autumn Statement) and estimate an increase in private investment to maintain the public-private ratio. The figure above each bar in the below graph relates to the bar in red which shows the additional public investment then needed to reach 2.4% of GDP by 2027. In total, to reach 2.4% of GDP in R&D and come in line with the international average, an uplift in annual public investment of a further £3.8bn is needed by 2027.



Set an interim milestone to increase public investment in R&D to 0.7% of GDP

While pledges have been made to increase the UK's expenditure on R&D to reach 3% of GDP in the long-term, private and charitable investment will be expected to make up roughly 70% of total investment³,

² It is a rough look as our figures do not account for changes to GDP over time (which will be impacted by external factors as well as by the level of R&D investment itself) or inflation.

³ <https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/datasets/ukgrossdomesticexpenditureonresearchanddevelopment>

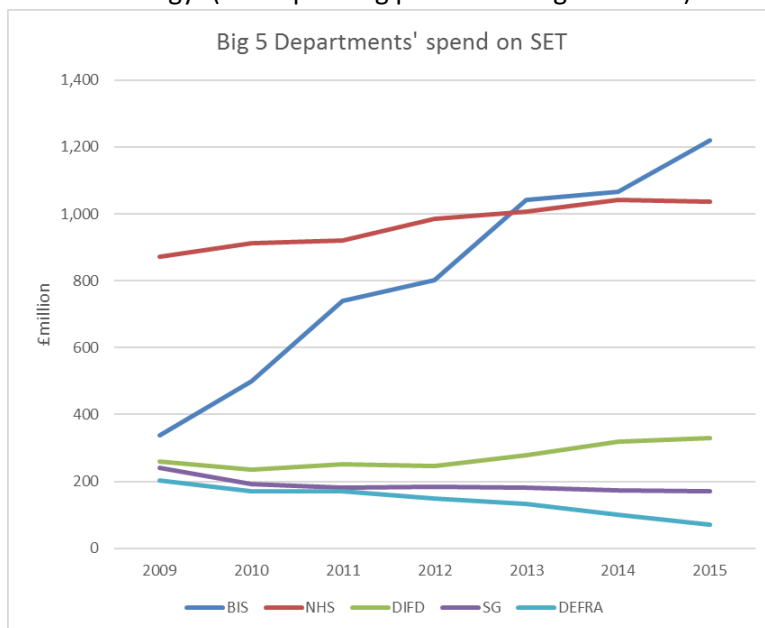
based on current UK and international norms. To have any chance of reaching the Government's 2.4% target, private and charitable investment must increase by 50%, from around £22bn in 2015 to £32bn in 2027.

Public investment is a reliable driver of private investment in R&D. Research commissioned by CaSE found that public investment 'crowds in' private investment, attracts overseas investment, and every £1 of public investment in R&D raises private sector output by 20p each year in perpetuity⁴. Based upon the evidence presented in the report, a virtuous circle can be proposed in which additional public investment in research leads to increased private sector research, which leads to an increase in absorptive capacity of the private sector to make use of public sector research, hence amplifying economic benefit.

This interim milestone equates to an ambitious increase in public investment and frontloads the public investment portion of the Government's overall target of 2.4% by 2027. However, for UK and foreign businesses considering their global R&D investment decisions, the UK must do more in the next five years than it has in the past to actively attract investment to counteract major risk factors and uncertainties in the external environment arising from the Brexit process. Increasing public investment further is certainly not the only lever the government has to increase private investment, but it is an essential part of the package, without which the Government's 2027 target will not be met.

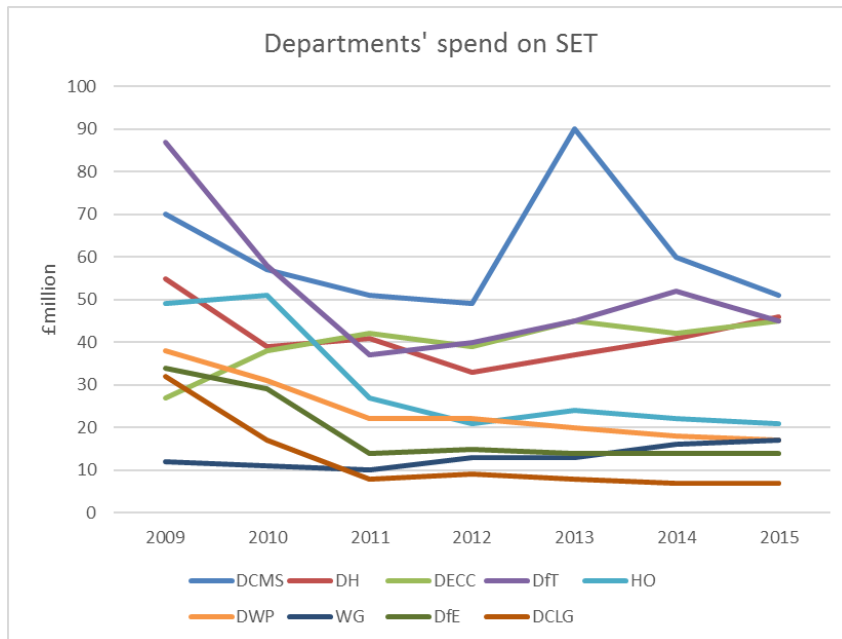
Cross-government R&D funding

The Committee's inquiry and the National Audit Office's report highlight the cross-government nature of R&D funding. The R&D funding levels across government Departments have fared very differently in recent years. The below graphs depict latest figures on government spending on Science, Engineering and Technology⁵ (R&D spending plus knowledge transfer).



⁴ The Economic Significance of the UK Science Base, Haskel et al for CaSE, 2014

⁵ UK government expenditure on science, engineering and technology, 2015 (Published 15 June 2017)



The latest figures are for 2015 and so do not yet reflect changes in departmental structures. What they show is significant cuts to R&D funding in many departments from 2009-2011 in particular. Our analysis at the time demonstrated that R&D spend in departments had suffered [disproportionate cuts](#) compared with total Department Expenditure Levels. The figures also show large increases to the budget in BIS, in part reflecting a shift in how and where R&D funding is distributed by government. These figures raise a number of questions pertinent to the Committee's inquiry;

- Is there strategic oversight of cross-government decisions on R&D funding levels and priorities?
- How have cross-government shifts in R&D spending profile been informed by evidence?
- Where does accountability or responsibility for coordination of cross-government R&D spending sit?
- What is the role of departmental Chief Scientific Advisors, and the network of CSAs, in supporting or informing such coordination?
- How will UKRI's forthcoming strategy consider other R&D activity, strategies and priorities across government?

Challenges around commissioning research were a repeated feature of discussions and interviews for this project, from those on both sides of the process. There are concerns that demand for research is too low. This could be because of insufficient in-house capacity to identify where research is needed or would be beneficial. There is also the challenge of ensuring there is sufficient funding available. In general, government investment in science via departmental spend on R&D receives much less attention than the 'science budget'. Departments' R&D spend is used to invest in research to develop and evaluate new ideas and existing policies. In recent years, CaSE has analysed fluctuations in departmental spend on R&D, calling attention to periods of widespread disinvestment. For example, between 2009/10 to 2011/12, half of departments reduced R&D expenditure by over 20%, some by 50% or more, in disproportionate reductions compared to overall departmental budget changes. This contributed to a reduction in total government spend on R&D in 2011/2012 to its lowest level in real terms for ten years. There were significant cuts to departmental spend following the 2010 Spending Review but cuts to R&D

budgets were disproportionate in many departments. Levels of R&D spend then broadly levelled off towards the end of the spending review period. We will continue to monitor investment levels to see whether there was a similar effect following the 2015 Spending Review.

Internal demand for research and the level of research budgets are linked. When CaSE questioned departments about reductions to R&D budgets in 2012, some responded that R&D spend levels were a reflection of a drop in internal demand, rather than a cut to the budget⁶. There is very real tension within departments that every pound spent on research could be seen as a pound less spent on frontline support – whether that be schools, disability support or investment in transport links. Cutting R&D on this short-term basis could be counterproductive as relatively small amounts of spend on research can lead to better front line provision and increased cost effectiveness in the long-term. This means it is particularly important in times of constrained public finances that government departments prioritise investing in R&D. However, this requires an understanding of the value and role of research and good leadership and oversight of the research budget.

The CSA guidelines dictate that the CSA should be involved in any decisions that affect departmental research budgets⁷. Further, there is a requirement that ‘departments should consult the GCSA and HM Treasury in advance of any potential cuts to research budgets or expenditure, including those that have implications for the funding of cross-cutting research’. In 2012, CaSE asked each department if their CSA had been consulted about changes to R&D budgets in line with recommendations from GO-Science and found that none of the CSAs were consulted⁸. The CSA should be involved in overseeing the department’s R&D budget and in a position to help ensure decisions are taken in an evidence-based and strategic way, resisting the political imperative to divert resources to services and programmes more likely to deliver short term ‘wins’.

It can be difficult to get a picture of how funds are used across some departments, let alone a cross-government view. It also suggests that in the past top-level messages on R&D funding haven’t always trickled down, with the ‘science budget’ being protected but R&D funding based in some other departments appearing as an easy target for cuts. With the Government’s commitment to public and private investment reaching 2.4% of GDP by 2027, and the urgent need for research to inform the significant decision-making arising as we plan and prepare to leave the EU, there is room to better understand and be more strategic in use of R&D funding across-government. We also have raised the need for government to assess how possible changes to EU R&D funding levels will affect research capacity across the range of government departments’ activities?

Transparent, trusted processes for setting priorities

Public R&D funding serves a range of functions and so what these principles and processes are, or should be, will not be uniform across all aspects of government R&D funding. For instance, some of the R&D budgets in Departments will be rightly used to fund research to answer a specific question related to a live policy or funding decision. Such R&D spending provides the evidence base for policy development, helping to develop new ideas as well as evaluate existing ones. This serves a different primary function to research funded through the research councils. However, there is still work to do to

⁶ [Science and engineering in government, CaSE, 2014](#)

⁷ [Chief Scientific Advisers and their officials: an introduction, Government Office for Science, 2015](#)

⁸ [Departmental R&D analysis, CaSE, 2014](#)

ensure the principles, tools and processes for making funding decisions are robust and transparent, suitable for the diverse purposes they serve.

As the inquiry sets out, the creation of UK Research and Innovation (UKRI) provides an opportunity for clear strategic direction for research and innovation funded through BEIS. This must include embedding transparent and trusted processes for setting research and innovation priorities to inform high-level funding decisions.

The future of Quality-Related (QR) funding remains a concern of much of the scientific community, providing platform funding that supports excellence, scientific careers, leverage of business and charitable funding and creative exploratory research in new and emerging fields. As UKRI gets up and running, it must increase QR funding in proportion with total UKRI funding levels to maintain the dual support system and uphold the balanced funding principle written into law through the Higher Education and Research Act in 2017.

Maximising benefit derived from government research

Another aspect of good stewardship of public research funds is making the most of the research that is funded. There is significant work that has been done to promote the impact agenda within academic research, and there has already been some significant changes within the remit of UKRI. Thinking beyond the remit of UKRI, retaining corporate memory is difficult even within departments, let alone across government. Some departments have their own databases where research is registered and progress to publication is tracked. Other departments list published studies. But some do not have their commissioned research in one accessible place. This can lead departments to revisit policy questions unaware of research the government has previously commissioned or undertaken. Despite the recognition of the benefits of greater join-up, in practice it can be difficult to access research carried out or commissioned by other departments. At a basic level, some arm's length bodies even face barriers accessing the research database of their sponsoring department. The inability to access information and 'reinventing the wheel' has led to wasted efforts which could cost the government £500m a year⁹.

There is a real opportunity for digital records to be used better to improve institutional memory¹⁰. CaSE has previously recommended that all research performed or commissioned by government departments must be freely, publicly available in a readily-searchable, online archive¹¹. After highlighting the absence of a comprehensive account of how much government research is commissioned and how much of it is published, a recent report by Sense about Science made a similar recommendation for government to create a standardised central register of all externally commissioned government research¹².

Ideally a shared database would hold a register of in-house and commissioned research including information on who is carrying out the research, expected outcomes, current stage of development and expected timeline of delivery. In addition, it would be useful to have details of the lead department and person responsible added to the database both for easing contact as well as for promoting accountability. For it to be sustainable, it is important that creation of the database is carried out in a

⁹ Better information for better government, Cabinet Office, 2017

¹⁰ [All Change](#), Institute for Government, 2017

¹¹ [Science and Engineering in Government](#), CaSE, 2014

¹² [Missing evidence](#), Sense about Science, 2016

way that does not increase the logistical and bureaucratic burden for civil servants. This proposal raises a range of technical and practical challenges, but a good first step would be to tackle commissioned research.

There is already a move towards modernising data infrastructure within government in part through the work of the Government Digital Service (GDS) in the Cabinet Office. In 2016, CaSE worked with the Cabinet Office on plans for the findings of government commissioned research to be made more easily accessible across departments in a searchable database, following our engagement with them on the anti-lobbying clause and new standards for Government grants. This endeavor should be properly supported and be done with the involvement of the wider research community where there is also significant effort being put into making data and research outputs more openly available.

A second phase could then be to include all government research in the database with the ultimate aim of making a version of the database publicly searchable. This would not only help improve transparency and accountability but also government research makes up a large body of evidence of great interest and significance to the wider research community.

There are enormous gains to be made from getting this right. And with the ever-increasing opportunities technology provides for easy and safe storage and access of vast amounts of complex data it will be increasingly unacceptable for government to be unable to account for the research it has undertaken and not to maximise the use of the body of knowledge created by government. We have recommended that Cabinet Office should oversee the creation of a cross-departmental database of government research.

We have made a number of further recommendations on how to ensure government can better access and use research and evidence in a recent report, *Improving use of evidence in UK government policymaking* (2017), some of which may be of interest to the committee in relation to this inquiry. The report can be found on our [website](#), and the recommendations are in Annex A below.

Annex A: Recommendations

Advice Architecture

- 1: The GCSA and GO-Science should be located centrally in the Cabinet Secretariat, alongside other cross-cutting government functions.
- 2: Each government department must appoint a CSA who sits on the department's board and put in place succession planning to ensure the post is continuously occupied.
- 3: Establish robust science advice structures in the Department for Exiting the EU and Department for International Trade.
- 4: The House of Commons Science and Technology Select Committee should undertake an inquiry to review the uptake of and adherence to government guidelines on 'the use of science and engineering advice in policymaking'.

Supply and Demand

- 5: The CSA should oversee and publish an annual update of their department's 'areas of research interest'.
- 6: The Cabinet Office should develop UK procurement guidelines for commissioning research informed by best practice.
- 7: The Cabinet Office should oversee the creation of a cross-departmental database of government research.
- 8: Chief Scientific Advisors, in consultation with Heads of Profession, should monitor the skill needs of the department and make recommendations for training.
- 9: UKRI should expand and encourage exchange programmes and secondments into departments.

Evaluation and Accountability

- 10: Departments should establish and publish an evaluation strategy and report annually to their Departmental Board on progress.
- 11: Robust plans for evaluation should be a requirement for business case approval by government departments and should be published.
- 12: The remit of Scientific Advisory Councils should be expanded to include independent scrutiny of evaluation.
- 13: When policies are announced, the underpinning body of evidence should also be published.
- 14: All independent evaluations should be published within 12 weeks from the date of completion.