

Science and Technology Committee

Oral evidence: [Balance and effectiveness of research and innovation spending](#), HC 1453

Tuesday 26 March 2019

Ordered by the House of Commons to be published on 26 March 2019.

[Watch the meeting](#)

Members present: Norman Lamb (Chair); Vicky Ford; Bill Grant; Stephen Metcalfe; Graham Stringer.

Questions 387 - 501

Witnesses

I: Professor Sir Mark Walport, Chief Executive, UK Research and Innovation; and Rebecca Endean, Director of Strategy, UK Research and Innovation.

II: Chris Skidmore MP, Minister of State for Universities, Science, Research and Innovation; Jenny Dibden, Director, Science, Research and Innovation, Department for Business, Energy and Industrial Strategy; and Harriet Wallace, Director, International Science and Innovation Directorate, Department for Business, Energy and Industrial Strategy.

Written evidence from witnesses:

- [UK Research and Innovation](#)
- [Department for Business, Energy and Industrial Strategy](#)



Examination of witnesses

Witnesses: Professor Sir Mark Walport and Rebecca Endean.

Q387 **Chair:** Welcome, everybody. You are a long way away—apologies for the layout of the room. It is very good to see you both. Do you want very briefly to introduce yourselves?

Professor Sir Mark Walport I am Mark Walport, chief executive of UK Research and Innovation.

Rebecca Endean: I am Rebecca Endean. I work for Mark. I am the strategy director.

Q388 **Chair:** We have now introduced a process whereby we ask whether there are any interests that ought to be declared at this stage of the meeting. If either members or witnesses have anything that they want to declare, they should do so.

We have heard that the Government have not yet set out a clear vision for what they want to achieve by increasing investment in R&D, with the objective of hitting 2.4%. Will you explain what you understand the purpose of the increase and the setting of the 2.4% target to be? What should the increase seek to achieve?

Professor Sir Mark Walport I think there is a fairly clear vision, which, in a sense, is expressed through the industrial strategy. The 2.4% itself is not the end—it is the means to the end. The end is growth and productivity. The industrial strategy sets out the different elements that are necessary as part of that. Clearly, talent and people are an extremely important part of that. Place is important as well. There is a whole array of different things that need to be achieved.

Clearly, UK Research and Innovation plays an absolutely critical role in achieving the 2.4% target, but it is important to recognise that roughly two thirds of the investment in R&D in OECD countries needs to come from the private sector, with the public sector contributing one third. A significant part of our investments therefore need to be aimed at the big aim, which is to increase the business base of the UK very broadly.

You can look at our different initiatives and say that they are very much part of that. If you ask industry what it wants, it will say that, first and foremost, it wants people. It needs the infrastructure. Of course, part of that is research and innovation infrastructure. E-infrastructure is an important part of that. Industry also needs the general conditions for staff to come and work in the United Kingdom. It needs the friction for its work to be as low as possible. Of course, part of the 2.4% is fiscal incentives, such as R&D tax credits.

I think that there is a big picture. Obviously, an important part of the work of UK Research and Innovation is working with partners across



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Government to try to develop a road map. We are developing one, which we aim to publish some time later in the year.

Q389 **Chair:** Do you know when that will be?

Professor Sir Mark Walport It will be somewhere around the summer or autumn, I would say.

Rebecca Endean: The Government have said that they will publish their road map after the spending review. We are working very closely with them, gathering evidence and listening to stakeholders. We will think about sharing some of that evidence more widely as part of our preparations for the spending review.

Q390 **Chair:** How do we judge and measure success that comes as a result of the increased investment in R&D?

Professor Sir Mark Walport One needs to look at it at many levels. Evaluation and measurement of success is an absolutely critical part of our work. We need to look, first, at what the outputs from our funding are, both at the level of discoveries and at the level of innovation. Through Innovate UK, for example, £1 of collaborative R&D grant generates over £6 of industrial input. There are many different ways. Ultimately, at the 2.4% scale, the question will be at the level of the British economy and its distribution.

Q391 **Chair:** It is quite hard to judge cause and effect, I guess.

Professor Sir Mark Walport It is always hard, because there are multiple interventions. There are lots of interacting factors and moving parts. It is very difficult simply to say, "£1 of this is solely responsible for £2 of that."

Q392 **Chair:** Are you conscious of the data that you are collecting by which you can measure the impact of spending decisions?

Professor Sir Mark Walport I am sorry—will you repeat the question?

Q393 **Chair:** What data are you collecting by which you can measure the impact of spending decisions?

Rebecca Endean: As a starting point, UKRI has gathered together all our grant-funding data. That is the critical thing. Across all of the councils and Innovate, we now have the grant data on a coherent and consistent basis, so we know which grants are funded. We can then collect outputs from those grants, from the monitoring that IUK does and from how people report on them, through their grants and with Researchfish.

In order really to understand what the outcomes are doing, we need to link that grant data to a range of outcomes in firms. We can look at spin-outs, patents and business growth in firms. That allows you to do the evaluation consistently at a microeconomic level. You look at what you are spending the money on and what that actually leads to.



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Of course, the research says that not only the direct impact of the grants is important. There are big spillovers. If you start funding a particular area, there will be spillovers to a much wider range of firms in the economy. That is quite a difficult thing to measure, but a range of research has looked at those spillovers and suggests that they could be two to three times as big as the benefit for an individual private firm.

When it comes down to it, the real macro benefit will be to raise the rate of economic growth. The OECD and most academic economists would say that the future of economic growth will be based on the knowledge economy. It will come not through increased numbers of capital and labour, but through using that capital and labour in a much better way. It is widely accepted across the OECD that the knowledge economy is very important. That is why most other comparator countries have targets of this nature for R&D spend.

Professor Sir Mark Walport Obviously, another measure is the increase in investment in R&D by the business sector.

Q394 **Chair:** The leveraging.

Professor Sir Mark Walport We know that from looking at economies across the world. That will be a critical measure. If an increase in public funding is not accompanied by an increase in business R&D investment, that will be a rather dangerous sign.

Rebecca Endean: We are monitoring that very closely in relation to the industrial strategy challenge fund. We are looking at the extent to which our funding is matched by industry co-funding, which is a key indicator of success. We will continue to monitor how that happens.

Q395 **Chair:** Rebecca, you say that there is now a lot of research into the wider impact that you can have from R&D spend. Sir Mark, you made a point about UKRI's focus on evaluation. How much concerted effort are you making to deploy this research on really seeking to understand the full impact of the spending decisions that you are making?

Professor Sir Mark Walport One can look at that at two levels. One of the important roles of UK Research and Innovation is to fund research outside UKRI into the factors that contribute to growth. The Economic and Social Research Council, led by Professor Jennifer Rubin, is looking at external research support as well in the area of productivity. For us, it is extremely important to evaluate what we as taxpayers are getting from the investment that the Government are making through UK Research and Innovation.

Q396 **Chair:** What proportion of the new money goes into the evaluation of impact?

Rebecca Endean: I do not think that we can give you a precise percentage. What we can say is that, for every single big new programme of work that we have funded, we have put in place an evaluation



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programme, to make sure that we can both monitor what is happening on the ground and, subsequently, evaluate it. For example, for all the new challenges in the new industrial strategy challenge fund, there is an evaluation programme that we are putting in place now. We are checking that we can collect all the baseline information. Obviously, the impact from some of the new money will take some time to come through. What we want to be very sure of now is whether we are in a good place to be able to track and monitor that over time.

Professor Sir Mark Walport For the industrial strategy challenge fund itself, we have a specific evaluation group within UK Research and Innovation. Each of the challenge directors knows that a critical part of their work is evaluation. As Rebecca said, that needs to be built in from the beginning.

Recently we had a presentation from Tony Harper, who is the challenge director for the Faraday battery challenge. We have done a lot of work. As part of that challenge, which is about developing better batteries, we have a scale-up facility. We will need to see how that is used. We are thinking of the evaluation in a very rounded way. For all of the challenges, we have an external evaluation partner, so that we are not seen to be marking our own homework.

Q397 **Chair:** Is all the evaluation that you are facilitating published, so that people can see what the impact is?

Professor Sir Mark Walport It will be, in the fullness of time. We are still at an early stage of all the industrial strategy challenges, but we will make our evaluations available.

Q398 **Bill Grant:** It would appear that we are on a journey to achieve a 2.4% target by 2027. We are looking at the innovation funding required to achieve that aim and worthwhile goal. Where are we in the journey to achieve that goal of 2.4% and, thereafter, 3%? Where are we in the 2027 journey?

Rebecca Endean: A range of people have looked at it. The most recent figures were published last week or the week before that. They show that £34.8 billion is spent on R&D in the UK. To get to 2.4%, that number will have to double in nominal terms. CaSE has published some figures that suggest that you would have to take the £34 billion to around £70 billion. Obviously, it would be less than that in real terms and would be a slightly smaller increase as a percentage of GDP, but that gives you an idea of the scale of what you are talking about.

Thinking about it in money terms may not be as helpful as thinking about what it would actually mean on the ground. What would you need to see if you were to achieve the target? The answer is that you would have to see a substantial increase in the number of people and in infrastructure. You would need to see a growth in clusters of excellence across the UK, not just in the south-east.



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A lot of it is business and R&D. You would have to see a big increase in the extent to which current businesses fund R&D, in the extent to which new businesses grow and, in particular, in how attractive the UK is for internationally mobile businesses. All those things need to happen.

We need to think about what our offering is around place, infrastructure and industry support. A range of other Government policies will need to support and encourage the R&D, through tax incentives, regulation and stuff like that. What we are trying to do, working with BEIS, is to think about that road map in a very holistic sense. UKRI is very important, of course, but it is not just about UKRI. It is about how UKRI fits into that wider cross-Government initiative, where we look at all the policy instruments around place, infrastructure, people and supporting business.

Professor Sir Mark Walport The answer is that there is clearly a long way to go to get to the 2.4%. If you look at the numbers, you see that the Government have committed an extra £7 billion of investment in R&D between 2017 and 2022. If you look at the total R&D figures, you see that in 2017 R&D was equivalent to 1.69% of GDP. That has risen from about 1.67% in the past couple of years, so the trends are going in the right direction.

Q399 **Chair:** But slowly.

Professor Sir Mark Walport It is quite slow. Of course, with all these things, you also need to think about the denominator. What the overall economy does is very critical as well.

Q400 **Chair:** Do you think that it will be pretty critical that the spending review gives another significant boost?

Professor Sir Mark Walport In order to maintain the trajectory, we will be making a very strong case as part of the spending review, through BEIS, that we are heading in the right direction, but a lot more needs to be done. As Rebecca has said, this is a very multifactorial issue. Talent will be absolutely critical. We need people, and they need to be international.

Q401 **Bill Grant:** We need to win public support and to create the climate to attract business investment.

Professor Sir Mark Walport Absolutely.

Q402 **Bill Grant:** Systems across Government that seek to stimulate and support innovation appear to be fragmented. Is that correct? If so, how is UKRI mastering oversight of that or bringing it together?

Professor Sir Mark Walport It is true that the policies of a number of different Government Departments are absolutely critical. For people, it starts with education. Education policy is absolutely critical. R&D tax credits are clearly a matter for the Treasury, but it would be wrong to say that we do not talk to one another. When we produce UK Research and Innovation's road map document, I think that it will cover all these areas.



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Is the policy held in a single place? No, it is not. Is it joined up? I think that it is perhaps more joined up than it appears to be at first sight.

Rebecca Endean: It is really important that Government Departments fund innovation themselves. We want innovation in public services and public policy. It is very important that that is based in Government Departments and is not all in UKRI. It may be slightly more joined up than you have been led to believe. Innovate UK delivers a lot of policies on behalf of other Government Departments. It delivers the SBRI scheme and energy innovation schemes. People on the ground in Innovate and the research councils try to work very hard with their communities to make sure that there is no wrong door and to direct them in the right way.

That said, we do not think that this is a finished product by any means. There is definitely room for improvement going forward to ensure that businesses, especially small businesses, can access the best sort of support that is available.

Professor Sir Mark Walport I will give you another concrete example. Ultimately, it goes around the four grand challenges of the industrial strategy. The future of mobility is one of those issues. Electrification is an important part of the future of mobility when it comes to road, rail and, to some extent, air transport. There are groups that bring together BEIS and the Department for Transport, for example.

Around the industrial strategy challenge fund, Departments are joined up. Indeed, one of the motivating forces that Paul Nurse noted behind the development of UK Research and Innovation was the need for the agency that funds research and innovation to talk to Government Departments. For example, through the strategic priorities fund, we are working with Government Departments in a number of areas. Air quality is one of those.

I think it is joined up. It is necessarily a complex landscape, and I think we could do more.

Q403 **Chair:** Do you get very good engagement from all the relevant Government Departments, or are some better than others?

Professor Sir Mark Walport I think you have answered your own question, Chairman.

Rebecca Endean: I do not think that we are going to get up a league table.

Professor Sir Mark Walport Inevitably, it is variable. I do not have a mental table of which Departments are good, better and best, but there is a lot of opportunity. I think that there is a further opportunity around procurement. That has been said for a very long time.

Q404 **Chair:** Rebecca mentioned SBRI, which is a mechanism using



procurement. Innovate UK does a specific element of SBRI, with quite a limited fund, but do you go in to encourage Government Departments to use it? At the moment, most Government Departments are simply failing to use it.

Professor Sir Mark Walport The numbers are improving. In 2017-18, there were £104 million of SBRI contracts to businesses. It was £78 million the year before. Of course, the GovTech Catalyst fund has been launched as well. There are lots of attempts to do this. It is difficult, because the skills to procure innovation through SBRI are a scarce commodity, unfortunately. It is a tool. Through things like the GovTech Catalyst fund, the Government are exploring ways to expand it.

Q405 **Chair:** David Connell's review recommends a central fund for SBRI for Government Departments to bid into. Is that a good idea to expand the use of this, given that you have acknowledged that procurement is an important mechanism?

Professor Sir Mark Walport I think that simply creating the fund may not be the answer. The review is being tested, in a way, by trying the central fund in a specific area, GovTech, where there is obviously huge potential. That may be the way to do it—to start in one place and see how successful it is.

Q406 **Bill Grant:** The Committee has heard evidence that the balance on research is towards more problem-driven research over more investigator-driven research. Is that accurate? Is there an issue with that drift?

Rebecca Endean: You are saying that there has been a drift towards more problem-based or challenge-based research over basic research.

Bill Grant: That has been suggested.

Rebecca Endean: Clearly, there has been a move towards more challenge-based research. We got NPIF additional funding in the autumn statement of 2016 and used that to set up the industrial strategy challenge fund, which is across research and innovation, is very focused on solving problems and challenges, and has accounted for a substantial proportion of the additional funding that we have been given. We are very proud of it. We think that it is doing really important stuff. It is really helping to engage both the research community and the innovation community in solving some really important problems. Mark, do you want to talk a little about what we are doing?

Professor Sir Mark Walport Yes. There is no doubt that there is a strong economic aim associated with the new funding, which is part of the national productivity investment fund. As part of that, we have funds such as the future leaders fund, which is funding the people who will discover the things that are needed for application in the future. In a sense, we are going from discovery, at one end, to application. We need both of those.



It is slightly like asking, “How long is a piece of string?” There is no simple right answer to what the balance should be. Historically, the balance was very strongly towards discovery, with very little money spent on the innovation side of the fence. Indeed, Innovate UK is only 12 years old this year. It is a relatively new agency.

The other point is that sometimes the distinctions are a bit arbitrary. Sir Greg Winter won the Nobel prize last year. He is the most fundamental, curiosity-inspired researcher, but his research into the molecular aspects of the immune system has led to the development of monoclonal antibodies as therapeutics. That is a very important part of it. He sits on both sides of the fence without any difficulty at all. There are other investigators—people like David Payne in Southampton—whose work is—

Bill Grant: The two are very much intertwined.

Professor Sir Mark Walport Yes.

Q407 **Graham Stringer:** May I read to you paragraph 37 of the written evidence submitted by the Royal Astronomical Society? It says, “There seems however to be little more than a notional recognition that curiosity-driven research is a core part of the R&D ecosystem, underpinning and enabling many applications-driven research areas. It is also an area where the UK has modest investment by international standards. In the same consultation document on the industrial strategy, the UK is ranked 25th of 29 OECD countries considered by share of GDP invested in basic research. There is little evidence that this has been ‘protected’ as described, and there appear so far to be no specific plans to grow this to help meet the 2.4% R&D target.” Do you think that that is a fair assessment by the Royal Astronomical Society?

Professor Sir Mark Walport No, I do not think that it is a completely fair assessment. In addition to the funding through the STFC core budget, there have been investments from the science budget worth over £300 million for astronomy and particle physics in recent years. Through the fund for international collaboration, £11 million was recently awarded to ALIGO, which is a particle astrophysics gravitational wave project, working with America. Recently we agreed more than £100 million for the development of the world’s largest and most sensitive radio telescope, the square kilometre array. On 12 March last year, the founding treaty was signed, confirming the UK as the global headquarters, which will be based at Jodrell Bank.

Last year £65 million was committed to the long baseline neutrino facility, which is a collaboration with the Americans at Fermilab. We have committed £33 million to DiRAC, which is the integrated supercomputing facility for theoretical modelling. Through our subscriptions for CERN, we have contributed to the European Southern Observatory, which is the most astonishing collection of telescopes of different sorts, based mainly in Chile.



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All those projects are aimed at discovering the fundamentals of the universe. They involve both the astronomy community and the particle physics community. There is no question but that this research is important and fascinating. There will be major spinoffs from it, but we are funding and investing heavily. Increasingly, the instruments that astronomers want are global instruments and can be located only in parts of the world where—if you are interested in optical astronomy—there is optical silence. That is why they are built at altitude and in remote facilities. Equally, radio telescopes require to be built in areas of radio silence. We are doing an enormous amount in those areas.

Has there been a relative shift towards innovation? Yes, some of the new money has gone in that direction. I will not pretend that the discovery research grants have been going up in large amounts, but we are still a very major funder of discovery research. That shows in the outputs from those communities.

Q408 **Graham Stringer:** I think that you were prepared for that question.

Professor Sir Mark Walport Yes. I had seen it coming.

Q409 **Chair:** May I now deal with the dual support system? Is the balance within the dual support system of any relevance to the objective of hitting 2.4%, or is it entirely separate from that discussion?

Professor Sir Mark Walport I will kick off. I will ask Rebecca to come in in a minute.

The dual support system is an important feature of the UK funding landscape. For the first time, it is enshrined in legislation, as part of the Higher Education and Research Act 2017. It has the great advantage that it gives universities the flexibility to initiate pieces of research, to employ people and to build their own infrastructure so that they can compete effectively.

The balance has been fairly stable at around 65p in the pound for research, on the England side, over the past five to 10 years—65p of QR to every £1 of research council funding. The question is obviously one of sustainability. In England, we work with OFS on the sustainability of the sector. Of course, we are interested in the sustainability of the sector, because the universities are a critical part of our national infrastructure to conduct research—indeed, they are jewels in the UK crown.

We are looking at the balance question. David Sweeney, the executive chair of Research England, is reviewing that at the moment. It is important to say that we work very closely with the devolved Administrations as well. Eight of our nine councils are reserved for the whole of the United Kingdom, but the way in which higher education is funded means that QR funding is distributed in a devolved fashion. It is absolutely critical. The sustainability of the system as a whole is very important. It means that the movement in funding in one place has the potential to have unforeseen consequences in another part of the system.



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Q410 **Chair:** Professor Fagan, from the Russell Group, says that the value of QR “has fallen by 30% over less than 10 years. It makes it much harder to do the things we do very well in this country in science and innovation, building early career routes and facilitating challenge-based interdisciplinary team building and capacity building.” Does that not rather conflict with your assertion that it is stable?

Rebecca Endean: Professor Fagan should have qualified her remarks by saying that it has fallen by 30% at her university—at Manchester. That is correct.

Q411 **Chair:** That does not reflect the position—

Rebecca Endean: No, it is not the national position at all. You may need to qualify that position. The level of QR resource spend that goes to Research England has stayed pretty constant in aggregate, at about £1.8 billion or £1.9 billion. To be honest, from 2010, it may have gone down a little in real terms, because everything was flat cash between 2010 and 2015, but we got additional money from the autumn statement in 2015. On advice from UKRI when it was in shadow form, before it started, Ministers took the decision to keep the 65p in the £1 ratio constant in relation to the new funding. That is what we have done. We have invested more in HEIF. We have given more additional QR—this year, an additional £88 million—and some additional charity support fund grants.

One of our jobs is to consider this going forward. We will look at it again, especially in the context of the spending review. We do not want to mess around with it all the time, because one of the things that the universities really value is stability of funding—knowing how much they are going to get and what it is going to be like. We will look at it again, but the critical factors will be what outcomes we achieve in the sustainability of universities—what it looks like.

Q412 **Chair:** Ultimately, is the share that you determine arbitrary? Is there any science behind it? Do you collect data to try to get the correct balance, or ultimately is it just weighing it up and thinking this is about the right balance?

Professor Sir Mark Walport It is based on track methodology. An accounting system enables us to look at sustainability across the sector.

To pick up Rebecca’s point, the total amount of QR available is a zero-sum game over a period, so where one university loses other universities gain. One of the questions is about some of the smaller institutions.

Q413 **Chair:** I was going to ask about that.

Professor Sir Mark Walport If you look at the changes, although the numbers are much smaller, Northumbria, for example, gained between 2014 and 2015 £3.2 million, so how you distribute the money across the sector is a constant balancing act.

Q414 **Chair:** Some smaller institutions do not receive QR funding, as I



understand it, and there is an argument that that limits their capacity to grow as they become more successful. With the REF being determined every seven years, there is quite a period during which there is no shift in the funding model for the smaller institutions. Is there a need to look at how that might need to be adapted to facilitate growth in those smaller institutions?

Rebecca Endean: It is not just smaller institutions but a range of institutions. We want to fund excellence wherever it is and grow it across the whole piece, whether it is small, large or whatever. We have just announced the successful 22 institutions that have got strength in places funding, and the purpose of that is to grow excellence across the whole of the UK. We funded one London EOI, which was also a small institution—I believe it was a school of art somewhere—so we are interested in doing that.

Research England also has a couple of very interesting schemes that are targeted here. There is a scheme about emerging excellence in England. We have also announced the connecting capability fund, which is how universities can join together to grow their own capabilities. All these approaches are good ways to develop capacity in particular areas.

Q415 **Chair:** Is it fair to say that this is work in progress and you continue to look at how you can best facilitate the growth of excellence, perhaps particularly in smaller institutions?

Professor Sir Mark Walport That is absolutely right, and also through collaborative arrangements, such as the connected capability fund. The strength in places fund is still at the short-listing stage, and 24 bids have been given seed corn funding to develop full bids. The bid in Greater London was from the University of the Arts London around a new cultural and educational—

Q416 **Chair:** This is the strength in places fund.

Professor Sir Mark Walport Yes.

The answer is that we are looking across the system. Part of my job is to get out and about. Last week I went to the University of Falmouth, which again is strongly based on the creative industries and arts. It has a very interesting entrepreneurial scheme. The science and innovation audits are also very useful in that area. Part of our job is to understand the national landscape in detail. One of the things you rapidly learn—I have had the privilege since 2003 of getting out and about a lot—is that there are very significant strengths widely distributed around the country. They tend to be in rather focused areas and inevitably in smaller institutions.

Research council grants are also quite widely distributed; it is just in terms of numbers one tends to think of big places.

Q417 **Chair:** Part of the dual support system is devolved and part is UK-wide. What processes or structures are in place to ensure that co-ordination



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between UKRI and the devolved nations is hard-wired into how UKRI operates?

Professor Sir Mark Walport The answer to that is at two levels. Research England has as part of its brief to work very closely with its counterparts in the devolved Administrations.

Q418 **Chair:** Do you think it does that?

Professor Sir Mark Walport Yes, it does. That is helped by the fact that, first, David Sweeney, the executive chair, previously had an equivalent role in HEFCE and so has long-standing relationships.

Secondly, the UKRI board has met in Scotland and will meet in the other devolved Administrations. John Kingman and I had meetings in Edinburgh recently. I have been to all the devolved Administrations. We have run launch events for UKRI in each of the devolved Administrations, and the funding councils can have access to the London office for desks as well.

Rebecca Endean: I did not do this on purpose, but I was in Wales yesterday at a Royal Society event. At Cardiff University I talked to members of HEFCW, the funding body in the devolved Administration. I saw the chief scientist for Wales last week.

We have very strong links. We have to respect the devolution settlement, which is that research grants and Innovate grants are national UK grants, but Wales has its own QR funding. I think both devolved Administrations are looking quite intelligently at how they are going to approach their QR funding.

Q419 **Chair:** It is quite a different picture in Wales and Scotland.

Rebecca Endean: Yes. The beauty of devolution is that they get to decide. Wales has just done a review and it is doing some interesting thinking about how it can take forward the response to the Graeme Reid review, which looks at how it does QR funding.

Q420 **Chair:** And to increase QR funding.

Rebecca Endean: Yes, but in an intelligent way. They are taking the same approach as we are. It is not just giving money to universities but growing excellence across all Welsh universities. Cardiff and Swansea are world-class universities.

Professor Sir Mark Walport If you look at institutions in terms of the total receipt of QR and research council grant funding—I have the figures for 2016-17 in front of me—fifth on the list is the University of Edinburgh with over £200 million; seventh is the University of Glasgow with £121 million. Cardiff is further down the list—18th—but these are very important universities in the devolved Administrations, and we work with all of them, so it is in UKRI's interests to make sure we are well joined up.



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Q421 **Stephen Metcalfe:** I want to get some clarity about the figures. I think you said that total R&D spending in the UK is £34.8 billion, which represents 1.7% of GDP.

Rebecca Endean: It is 1.69%—these are the figures from last week, so they are in my head.

Q422 **Stephen Metcalfe:** I have 1.69% written down. You said that to reach the 2.4%, that needs to double.

Rebecca Endean: In nominal terms.

Q423 **Stephen Metcalfe:** Over the next eight years or whatever it is.

Rebecca Endean: There is a 10-year period. In nominal terms that figure of £34.8 billion needs to get to about £70 billion. I think that CaSE, which has also given evidence, has come up with a very similar figure. Part of that will be the effect of inflation and part will be the effect of keeping up with GDP. If GDP grows by 2% per annum, you would have a 2% per annum GDP effect. Therefore, in nominal terms it is twice as high. Obviously, the difference between 2.4% and 1.7% is 0.7%, so that is less than double, but that is roughly where the figures come from.

Q424 **Stephen Metcalfe:** Even at 2% growth that would not require us to get to £70 billion.

Rebecca Endean: It is 2% in prices per annum and 2% in GDP per annum, and 4% per annum over 10 years is 40%. If you compound it, it is a bit more than that as well. The nominal figure needs to take account of rising prices and rising GDP.

Q425 **Stephen Metcalfe:** The current split, from memory—I do not have the figures—is that Government and publicly funded research accounts for about 0.65% of that 1.69%.

Rebecca Endean: Yes.

Q426 **Stephen Metcalfe:** The rest comes from other sources, but mainly from business. Is that right?

Rebecca Endean: Yes.

Q427 **Stephen Metcalfe:** At the beginning you said that the OECD average is two thirds private and one third Government. We are not meeting that. That split is not the same in the UK as the average for the rest of the world.

Rebecca Endean: The public-private split is broadly similar: 72% is private and about 30% is public. That is quite typical for a large range of similar competitor countries. What is different about the UK is that the private sector is made up of three components. Of the £34 billion, £25.5 billion is private sector. That is split three ways: £19 billion comes from the business sector; £5 billion comes from overseas; and £2 billion comes from private non-profit, which is charitable.



What is different about the UK is that we have a relatively high level of charitable spend. We have some big charities in this country. We also have a relatively high level of overseas spend. Most of that £5 billion is overseas business spend, so it should be added to the business enterprise figure.

Q428 **Chair:** That suggests our domestic business is not contributing as much—

Rebecca Endean: The quid pro quo is that we are phenomenally good at attracting internationally mobile companies that specialise in R&D. About half of our business spend comes from companies that might be based in the UK but are owned overseas. Compared with other countries, we are very dependent on what is known as foreign direct investment. Our big pharma or auto companies account for a big chunk of R&D, but quite a lot of them are owned outside the UK.

That is an advantage, but it is also a risk because we need to make the UK competitive and the place where these companies want to do their R&D and business. It is important that we keep our world-class research base because that is a very important draw.

Professor Sir Mark Walport All of that is correct. There are some very interesting trends. In 1993, 73% of UK business R&D expenditure was by UK-owned business but by 2017 that had gone down to 48%, so foreign direct investment, which, as Rebecca has said, has a very strong cup-half-full aspect to it—which is that we are a place to invest in—has increased.

The other thing to be aware of is the global concentration of business investment. The top 20 firms account for 33% of business R&D; the top 50 firms account for almost 50%; and the top 100 firms account for 60%. That is global as well, so there is a great deal of concentration.

In sectoral terms, in 2017 pharmaceuticals were about 18% of the total—so, £4.34 billion—and automotive was 15%. The interesting new sector that is emerging is research and development services. That has increased by over 600% since 2007; it is now 5% of the total of £1.1 billion. I think that computer programming, information services and software development have gone up, so there are some quite important changes in not only the shape of the economy but how the R&D is being done.

Q429 **Stephen Metcalfe:** That is all very welcome. I think we all accept that 2.4% is an ambitious target in financial terms or as a percentage of GDP. To get to that, do we need to change the way we allocate funding? If we put in our fair share, will the rest follow? Do we need to try to stimulate particular sectors? How does the balance shift from the breakdown as it is now to get to 2.4% by 2027?

Professor Sir Mark Walport It is a good question. I do not think it is quite as simple as shoving in money at random and getting out investment, which is why I think it is very important that we work closely



analytically, as we discussed with the Chair at the beginning, to understand what the changes are, because there are not only sectoral changes but changes in the way businesses do R&D. Increasingly, some big companies are outsourcing their R&D and, for example, working through corporate venturing to develop small companies as a way to diversify and reduce their risk. I think it is important that we understand that.

There are some low-risk strategies. Talent has to be critical. It does not matter what lens you look through—talented individuals who come through both research and innovation pathways will be absolutely critical.

Q430 **Stephen Metcalfe:** If the aim is to get there by 2027, do we need a stable, incremental increase in funding so that year on year we can see it is getting closer to that, or do we need to lay some foundation blocks in the early years—encourage more investment in infrastructure and people particularly, so that when we get to that 2.4% there are enough people available to deliver that amount of research?

Professor Sir Mark Walport Infrastructure is absolutely critical, and that is one area where we have been very proactive. Mark Thomson, the executive chair of STFC, is doing a 2030 road map for our infrastructure. That takes a long time to plan, and a critical element of that infrastructure is going to be our e-infrastructure—how you move around not only people but bits and bytes. Therefore, for our infrastructure we need to take a long-term view.

The other critical thing, frankly, is policy stability, which is one of the things businesses look at. We need a stable policy environment that recognises the long-term importance of research and innovation. I do not think there will be any evidence one way or the other, but the danger of a big policy is that you suddenly grow and then you have to be able to maintain it. I suspect that steady policies are probably better than huge policies, but it is a mixture.

Rebecca Endean: It is important to look at not only funding but the overall environment. What attracts businesses to the UK is the quality of the world-class research base; the quality of the people, because our people are very important; and the fact that we have some world-class research infrastructures across the whole country. But it is also about whether the UK is a good place to do business—the environment, regulation, planning permission and all those sorts of things.

This is not for UKRI, but it is well set out in the industrial strategy. We need to tackle all those things as well, and it has to be a fairly joined-up process. That is why we are working very closely with our BEIS colleagues to draw up a road map in the context of the spending review.

Professor Sir Mark Walport Picking up that point, there is quite a lot of research on what motivates companies. Some of those things are in our control—for example, the location of headquarters is not of overwhelming



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importance, but it does help. If your headquarters are here you are more likely to invest, and access to markets is not a trivial issue either.

Q431 **Stephen Metcalfe:** I think you touched earlier on the UK shared prosperity fund. How do you envisage that will operate to help deliver these targets?

Rebecca Endean: Is that the strength in places fund?

Q432 **Stephen Metcalfe:** No; the shared prosperity fund.

Rebecca Endean: This is the replacement for the central funds. That is not a UKRI policy. We are in a position to do the underwrite guarantee for potentially domestic alternatives to Horizon 2020, but there are cross-Government plans to work up a new shared prosperity fund, which is being developed by DCLG. We know that parts of the country—for example, Wales, where I was yesterday—have benefited hugely from structural funds. It has made a real difference because structural funds have been used to invest in science and innovation infrastructures.

We would hope that a replacement—the shared prosperity fund—would also recognise the critical importance of research, science and innovation to grow capacity and capabilities. If you go to somewhere like Swansea, you can see the benefit of those funds. We would want that to continue, and we have been having discussions with colleagues across Government to make that point.

Q433 **Chair:** Do you think the plan is to continue what the structural fund does, or, if we were taking back control, would we seek to change what it does? What is the view?

Professor Sir Mark Walport I do not think that is a question we can readily answer, unfortunately. This is an MHCLG area. We are talking to MHCLG. There is no question, as Rebecca says, but that those structural funds have been important for research and innovation in Wales, Northern Ireland and the west country. I saw some of that last week. Those are ultimately policy questions for Government. We are working with MHCLG and we will make our views known, but these are ministerial decisions.

Q434 **Chair:** Sir Mark, you gave some figures in answer to Stephen's question that seemed to indicate quite a concentration of investment in R&D among bigger companies.

Professor Sir Mark Walport That is true, but SME investment is also important and growing.

Q435 **Chair:** Are you satisfied with the balance of investment in terms of where it is taking place? You do not think there is an issue that we need to address in how we increase R&D spend, particularly in SMEs?

Professor Sir Mark Walport That is a good question. If you look at the UK economy, 80% of it is the service sector. If you look at the business



R&D spend, it is 18% for pharmaceuticals; 15% for automotive; 6% for aerospace; and 4% for machinery and equipment; but you can probably start to see service spend in computer programming, information services and software development. That is 14% and it has grown by 120%. If we are to grow the economy, it has to be through small businesses as well as importing large businesses and growing large businesses. One of the areas we will work on, although I cannot give you a magic bullet answer, is how we can support the services sector.

Another issue, if you are looking at place, is that there is a problem of diffusion of innovation. That goes to the point that, if you look in every sector of our economy, the gap between the most productive and the least productive companies in the UK is greater than in most other OECD countries. That is not primarily a research and innovation question; it is about the diffusion of research and innovation. That has to be one of the things that would go to the shared prosperity fund and other opportunities like that.

Q436 Chair: When Sir John Bell gave evidence to us in the autumn of 2017 he talked about how the US had tweaked the prudent investment rules on pension funds to release private investment in innovation, which had been very effective. He argued that we should do the same here. I think that the Treasury has looked at that. Do you know where it has got to? Is there any progress on that front?

Professor Sir Mark Walport I cannot tell you where the Treasury has got to, but, as you know, it is doing a lot of work on the whole question of patient capital investment. It is a critical issue, but I cannot answer that question.

Rebecca Endean: I think there are wider issues about the difference in venture capital between the States and the UK in knowledge and capability to invest in R&D and tax incentives to business. Sir Patrick Vallance has some interesting ideas about ways in which we could improve things. Part of the policy mix going forward is that we need to ensure businesses can access the capital they need to scale up, and that will be very patient. I am not sure we know the answer to whether the pension fund position is more advanced in the US than it is here, but we will take it away and check.

Q437 Graham Stringer: Prior to the creation of UKRI and the Paul Nurse report, the allocation of funds between the seven research councils had been frozen, basically; there had not been a change in the allocation over many years. How will you go about deciding between the different research councils now from the entirety of RI?

Professor Sir Mark Walport The opportunity is through the new funding opportunities. You are broadly correct that the balance has been fairly stable within a percentage point or two over the past five to six years. Funds such as the strategic priorities fund are now offering opportunities to alter the balance of funding somewhat, and we are



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taking those opportunities. There is no single right answer to what the balance should be across the different disciplines.

Q438 **Graham Stringer:** It is the approach I am looking for. I realise there is not an absolute answer to how you invest in particle physics, genetics or whatever. How do you approach it?

Professor Sir Mark Walport We are looking at an approach through opportunity, as it were; in other words, we now have opportunities to fund new areas. A specific example is quantum technologies, where the UK's investment in both basic and applied science has increased very significantly over the past three to four years. It is a combination of the opportunities that come through, for example, the industrial strategy challenge fund, coupled with some of our other funds as well. I particularly cite the strategic priorities fund as an opportunity.

I would like to be in a world where the research community in the broadest sense is on the front foot; in other words, we are an open door through which people can come with the very best ideas rather than, as it were, sitting around and waiting for an opportunity for some additional funds at short notice. We have to do it by working with the research communities—horizon scanning the opportunities and using funds such as the strategic priorities fund, where we can inject significant tens of millions of pounds into several areas to take the advantage, but in a rigorous process that always looks at quality, because in terms of value for money we get more good publications per pound than almost every other country in the world.

Rebecca Endean: It is also worth looking at what Sir Paul said. One of the things we need to do is to be agile and responsive to exciting new opportunities. The AHRC is our smallest council. It has a very broad range of disciplines. Under the strategic priorities fund we funded a couple of interesting projects. One is funding on modern anti-slavery, which we developed in conjunction with the Home Office because it is a topic with a lot of interest and is really important. There is a lot that the academic community can do to help in that area.

The other really exciting one is about digitising all our collections. For example, if you take the museums and HEGs, digitising items and providing them as a resource to researchers is probably the most important thing you can do for historians. We think this is a slightly more intelligent way of going about distribution between the councils than just saying there is a magic formula based on the weight of citations, indices and so on.

Pretty much all the councils have responded to this challenge and come up with some interesting and ground-breaking proposals, which we are proposing to fund through the strategic priorities fund. We have announced one round of it and at the moment we are looking at another round.



Professor Sir Mark Walport Another area of obvious importance that has changed research more than anything else is data science. We have made a very big investment in centres for doctoral training around artificial intelligence and data science more broadly. There is really no discipline that is not going to be affected by that.

I think the answer is that our methodology will be essentially constantly to horizon-scan and look and see where the opportunities are. Interdisciplinarity is also a very important element. It is important not to look simply through the single buckets of the research councils. A very interesting proposal that emerged in the first round of the strategic priorities fund was on the physics of life. As it says on the tin, that is physical science in understanding biological mechanisms in the life sciences. The human cell atlas is an extraordinary global programme in which we have been able to invest.

The way to do this is to look at where the opportunities are. Frankly, it is much easier to do that in the context of a rising budget than a fixed or falling one. In the context of a fixed or falling one, you are on a hiding to nothing in trying to switch funding around significantly.

Q439 Graham Stringer: Would it be fair to characterise that as saying that any change in the funding of the research councils will come from either bidding for brand new funds or bidding for funds that have been created by top-slicing funds from the seven research councils?

Professor Sir Mark Walport I think that will be the dominant mechanism. One of the jobs of the UKRI board is to advise Ministers on the balance of funding. One of the other things we need to do is look extremely carefully at the portfolio we are funding and work out what the outputs and outcomes are. If any obvious disparity appears in the portfolio, we would look at that as well.

One of the things we have the opportunity to do is evaluation. Jo Peacock in Rebecca's team is building new databases that bring together a portfolio. For the first time, she is starting to track the outputs and outcomes from a 10-year-old cohort of research council grants. We are looking at the 4,000 grants that started in 2010 and 2011. I think it is the first time we have been able to do a complete portfolio-wide analysis. That led to over 66,000 publications, nearly 7,000 further collaborations and 84 spin-outs.

We are starting to look at the portfolio right across the board in a way that simply was not possible before. That will start to give us information that may help us to look at that portfolio balance, but at the moment simply taking the core of the funds and saying we need a bit more physics, a bit less chemistry or a bit more biology will be very difficult to do and probably will not be productive.

Rebecca Endean: To go back to your question, before we received the additional funds in the 2016 autumn statement, which we have allocated



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to 2021-22, the majority have been through the ISCF or SPF, which has been competitive, but we have also funded more PhDs and future leaders schemes as well.

We have made some adjustments to core budgets. In particular, we partially restored in the 2015 spending review the open competition budget and Innovate's cut and replaced it with loans. We have partially restored that. It is the case that quite a lot of this is challenge led, but, at the same time, we have looked at core budgets and pressures and made sure we keep them under control.

After the spending review, our job will be to provide advice to Ministers on how best to allocate the settlement we get. We will look at core pressures on core budgets while we are doing that; we will take that into account.

Professor Sir Mark Walport At the end of the day, one of the most important features of the UK research and innovation landscape is the ability of our researchers to make important discoveries in all areas of scholarship. It is absolutely vital that we preserve that, and things like our future leaders or fellowship competitions—it is important to recognise that some of those budgets go through the national academies as well—are able to support the most talented researchers in whatever field they are working, so it is an important part of the landscape.

Q440 **Graham Stringer:** To go back to the astronomers, when PPARC and the Central Laboratory of the Research Councils were abolished, the funds were not transferred to the STFC for the revenue funding of some of the astronomers' kit. Has that historic mistake been rectified over the following years? The astronomers in their evidence do not mention that, but they feel badly done by in spite of the very comprehensive answer you gave us earlier. Has that mistake in the funding ever been rectified?

Professor Sir Mark Walport Going back to the question raised before, in 2018-19 and 2019-20 we did allocate an additional £5 million per annum to STFC's core budgets, of which £3.2 million was allocated to particle physics. The answer is that we do recognise the pressures on particle physics and the astronomy community. In the world we have now, where we need to look across the whole portfolio, we will continue to look at that carefully.

Q441 **Graham Stringer:** To change the subject, do you see regional imbalance in investment in research and development as a problem? Money follows excellence in research. As you have just said, you want to support the best researchers. That creates a virtuous circle, but because the money tends to go to Oxford, Cambridge, Imperial, UCL, or wherever, it leads to declining funding of other areas. When BIS existed, it did research showing that funding to the golden triangle had increased by 8% more than to the other regions. Do you think that is a problem, and what can be done about it?



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Professor Sir Mark Walport It is right that there is very strong funding in London and the south-east, but I have here a list of the top 27 universities in terms of their QR and research grants.

Q442 **Chair:** Do not read all of them out.

Professor Sir Mark Walport Five of the top 10 are outside London and the south-east. They are focused in big institutions: Edinburgh, Manchester, Glasgow, Southampton and Bristol. Coming in at No. 11 is Nottingham, Leeds, Sheffield, Birmingham, Warwick and Liverpool. It is widely distributed. Is there a predominance in the south-east? Yes, there is. Is there a predominance of GVA per head in the south-east? Yes, there is. Is that ultimately a problem? Yes, it must be a problem because we need the economy to thrive in all parts of the country, which is why we constantly look at funding in institutions in the broadest sense. Part of that is going out and finding out what is going on. The science and innovation audits that have been conducted through BEIS have been very important in helping different parts of the country; the strength in places fund is very specifically designed for spreading.

The answer is that it is a problem, but what we do not want to do is destroy the economy of the south-east, either. This is not a zero-sum game where you can shuffle it around the country. At the end of the day, businesses will make their own choices about where they invest their R&D, so it is about other features such as infrastructure. It goes back to the shared prosperity fund, which we were talking about earlier; it goes back to local growth strategies.

It is something we are very conscious of, but equally it is important that the taxpayer's money is spent in ways that are likely to contribute to discovery and innovation. We do not simply spread it around for the sake of it—there is also a capacity issue. We have to build on that excellent capacity wherever it is found.

I think you can look at it through the lens of clusters. For example, on the UKRI stand at the AAAS meeting in Washington this year there was a group of gaming academics from Abertay. If you look at the four features of a cluster, first and foremost it is about leadership. It is very difficult to develop clusters if there are not strong leaders. The second is an area of business strength; thirdly, it is a combination typically of universities that can provide the range of skills needed; and, fourthly, it is local support. That is what we are looking for in the strength in places fund. If we are going to grow the economy in other parts, that is what we have to be looking for.

Lincoln is an interesting case study. It has a very strong relationship with Siemens. Siemens has built a turbine hall in the university; it has a new engineering department. Agritech is also important in that part of the country.



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That is the way you need to look at it rather than simply saying there is too much in the south-east and we have to move it over.

Q443 **Graham Stringer:** I would not want to damage the excellence in the south-east. As you say, across the country we have many world-class universities.

Professor Sir Mark Walport Absolutely.

Q444 **Graham Stringer:** It is how you improve the Sheffields and Manchesters to get them to the same level as Oxford and Cambridge. At the moment, the balance of funding is going in the opposite direction. I asked whether it is a problem and you said yes. How do you rectify that?

Professor Sir Mark Walport It is worth saying that the University of Manchester is No. 6 on the list at £177 million in 2016-17. It is a little behind Edinburgh at £204 million, and Imperial is at £208 million. These are relative, but Manchester is strong by any standards. Glasgow comes next.

Q445 **Graham Stringer:** You are preaching to the choir on that one as far as I am concerned. You mentioned the strength in places fund. You put out a press release last week about the initial announcement of funding. What is the totality and source of that funding?

Professor Sir Mark Walport The strength in places fund was announced in the White Paper in November 2017. The budget was originally announced at £116 million, which covered the three years to 2020-21, and it was extended in the 2018 Budget by one year to 2021-22, and the allocations increased to £236 million.

Q446 **Graham Stringer:** How much of it have you allocated?

Professor Sir Mark Walport The answer is that we have not allocated any of it yet. What we have allocated is seed funding of £50,000 to 24 bids, which will go through to a final assessment, and funding will be awarded to those.

Q447 **Graham Stringer:** When the money is spent, how will you assess its impact?

Professor Sir Mark Walport We will have to assess it by the local effects. I do not imagine we will be able to do a full economic evaluation until a little while after the scheme has started, but ultimately this is the 2.4% argument; it is about growth and innovation and broadly the flourishing of the places that the funds are awarded to.

Rebecca Endean: The specific criteria are about narrowing the productivity gap across the UK. We want to fund excellence; it has to be really good stuff. We do not want to fund stuff that is not good, but for the first time ever in any of our UK-wide funding schemes one of the key objectives is raising productivity in local areas. That is the key thing we will look at when we assess the bids.



Q448 **Chair:** You have indicated that the concentration of funding in the golden triangle is a problem, while recognising that we do not want to damage the vital work that goes on in those areas, but, if we are to grow the strength and excellence that exists elsewhere in the country, is the strength in places fund the mechanism to do that, or are you thinking of other ways in which you can tweak the allocation of resources to grow excellence in other parts of the country?

Professor Sir Mark Walport Can I frame it slightly differently? It is a problem in the sense there is an imbalance. It is a sign of the enormous success of the south-east of the UK in terms of its economic impact that this R&D is associated with such a powerful economy.

Q449 **Chair:** We have seen the impact of that, but we want to see that—

Professor Sir Mark Walport We want to see it happening elsewhere. If you like, that is about taking the Manchesters, Leeds, Glasgows and Cardiffs and growing them on what are already by global standards extremely good universities.

Q450 **Chair:** The question is: what is the key mechanism to do that?

Professor Sir Mark Walport Ultimately, it relates to how we achieve the 2.4%. We would not be able to grow the whole country to the level of investment in the south-east on our existing funding. It goes back to the spending review and the trajectory that will take us to 2.4%.

Chair: Thank you both very much indeed.

Examination of witnesses

Witnesses: Chris Skidmore MP, Jenny Dibden and Harriet Wallace.

Q451 **Chair:** Welcome. Chris, I am sorry you are such a long way away, but I am relieved you are still in your job this morning after the night before. Would you like to introduce your colleagues?

Chris Skidmore: On my left is Harriet Wallace, who has recently started in the Department covering our international work on science and innovation, and on my right is Jenny Dibden, who attended the Committee with me last time as director of science and innovation in BEIS.

Q452 **Chair:** Welcome, all of you. We have heard evidence from various people that the Government's ambition to get to 2.4% is not ambitious enough. Indeed, you have yourself spoken about the absolute need to increase investment in R&D. How do you respond to the charge that getting to the OECD average in 10 years is not ambitious enough?

Chris Skidmore: My single biggest challenge as a science Minister—I explored this in my previous attendance before the Committee—in this critical year is the spending review, issues surrounding Brexit and the



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future of our immigration programme going forward from 2020-21. Within that triumvirate of the key issues for science, if we do not get it right this year we will struggle to get to 2.4% by 2027.

Q453 **Chair:** Therefore, the spending review is completely critical.

Chris Skidmore: Absolutely. When you look at the 2.4%, wearing my historian's hat, I am also looking at commitments by previous Governments. I do not want to say this in a critical, party-political fashion, but there was the ambition to take R&D up to 2.5% between 2004 and 2014, from what was then about 1.8% of GDP. It went up by only 0.12%, and there was also a recessionary period.

I think that the lessons we have learned from that attempt is that there was a lack of public investment. There was a hope that the private sector would help fill the gap. We know that private investment in R&D is currently 68%. We will have to look at how we can leverage in more private investment by effectively working out as a Government where we know the emerging technologies have the greatest return on investment.

I am also chastised by the fact that, when you look at figures published on 14 March by the ONS, total R&D expenditure in 2017 represented 1.69% of GDP, up from 1.67% in 2016. We put an additional £7 billion into R&D between 2016 and 2021. To hit 2.4% is going to be a challenge and I want to make sure I can commit to meeting it effectively by a 0.1% uplift every year.

We have a longer-term ambition of 3%. This is just about standing still in the context of other OECD countries. For anyone who says we should be putting this money elsewhere—I am preaching to the converted in this Committee—we all know about the opportunities for investment to make the UK a world leader, but we are competing against other countries like Israel and China. They have recently made their own commitment to 2.5% of GDP.

The other point is that the nature of the target is such that we do not know whether GDP will be going up or down within that decade. Reflecting upon that, the target is itself a slightly perverse one, because if there is a large downturn in the economy and we continue to invest at a flat rate we will reach the 2.4% without having to do anything. We do not want that to happen; we want to have a strong economy and recognise that investment in R&D can deliver that strong economy.

As science Minister, to answer any criticism that 2.4% is not ambitious enough, in the face of the strong headwinds we are facing as a result of leaving the European Union, aiming for that and making it an absolute priority in the spending review is not only deliverable but realistic.

Q454 **Chair:** Along with those who say it is not ambitious enough, there are others who say we will not achieve it unless there are changes in the mechanisms to deliver it. You have already pointed out the failure of the



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target set in the previous decade. How do you answer that? How are you planning to make sure that we have a route to get to 2.4%?

Chris Skidmore: There are several contexts in which we need to look at other countries and the lessons learned from them in raising their R&D target. Fourteen countries—I do not have the names to hand—achieved at least a 0.7% increase in R&D in recent years. Exploring what is happening elsewhere internationally, we are looking within that global context through the lens of leaving the European Union and all the debates around the Horizon programmes.

We also need to look more broadly internationally at how we leverage in international investment. We commissioned Sir Adrian Smith to take forward a piece of work—I hope that you have received in advance a copy of the terms of reference published today as a written ministerial statement—to look not only at potential alternatives to the Horizon Europe scheme. Our ambition is to associate to Horizon Europe, but we want to make sure that we explore alternatives if that is not possible.

Equally, we want to ensure going forward that we can look at new methods of delivering international investment opportunities and international R&D partnerships, and that is what Sir Adrian Smith has been tasked with.

Moving away from that international context, the other question is about the long-term viability of the industrial strategy and an evaluation of the success of that strategy. With the RPIF money that has gone in as part of the industrial strategy, £40 billion has been allocated. We have seen sector deals and money being placed in emerging technologies as part of an R&D strategy.

We need to make sure for the longer term whether that is the right direction. When we look at the industrial strategy challenge fund, the strength in places fund, which was touched on at the end of the conversation in the previous session, and the Industrial Strategy Council, we have reached that moment where one year on with the industrial strategy we will need to make sure we can assess and re-evaluate where R&D funding is going in the longer term before we get to 2027.

Through the lens of the industrial strategy, looking at the spending review, for example, as Minister I am keen to be articulating why 2.4% is critical, but in the run-up to the spending review bids we will have to do things differently. In the past, BEIS has been tasked with being the host Department for 2.4%. I want to see a cross-Government approach where every Department takes responsibility for delivering 2.4% on its agenda. We can do that through some of the grand challenges, which I have been tasked to look at with Sir Patrick Vallance from the Government Office for Science. We have a grand challenge delivery board, whether it is for healthier ageing, clean growth or looking at what we do to encourage future mobility. We will want to have cross-departmental bids into the spending review around those grand challenges. We have begun deep



dives with the Department for Transport and shortly with the Department of Health to look at how we can frame bids that are joint departmental ones.

Q455 **Chair:** Is this all about the public funding element of the 2.4%?

Chris Skidmore: Yes.

Q456 **Chair:** We know that the bulk of the R&D spend comes from non-Government sources, so to what extent are you looking at the mechanisms to ensure that the leveraging of private investment works effectively and, if possible, increases? Are you satisfied that the incentives we have in place are optimal, or are you looking quite robustly at whether you need to change any of them? We talk about the R&D tax credit. We have heard evidence from David Connell on that. How much are you looking at how we can optimise the impact of the incentives to grow private R&D spend?

Chris Skidmore: R&D tax credits have been an immense success and have provided £3.5 billion-worth of relief. The number of companies claiming tax credits is 39,000, four times the number compared with 2010. I am interested in looking at what further levers there might be. Pension funds were mentioned earlier, and obviously the Treasury is taking work forward.

Q457 **Chair:** Do you know where that has got to?

Chris Skidmore: I do. If I can just find it in my brief, I can give you an update on the specific issue of patient capital. In the 2018 Budget, the Government announced a pensions investment package to help defined contribution pension schemes to invest in patient capital. The Government and regulators are going to bring forward a range of measures to ensure that the UK's regulatory environment enables pension schemes to invest in patient capital as part of a diverse portfolio. A number of leading pension providers have committed to undertaking a feasibility study with the British Business Bank to explore options for pooling patient capital within a joint investment vehicle.

In terms of a broader patient capital action plan, that is over a 10-year period, but the business bank is on track to commit about £330 million in investment funds in its first year of operation. Those are new models, but I am interested in looking at the incentives and what future work can be done alongside. For R&D tax credits, Treasury has policy ownership, but there is no denying that they have had a success and we need to make sure we can provide the incentives for businesses going forward.

There is an important issue here in terms of what used to be called the valley of death. I think there is now an understanding that there are several valleys of death. Where do you ensure that start-ups, particularly those that might be based in universities, are fostered and are able to grow and stand on their own two feet? The Treasury Minister, Robert Jenrick, and I announced the allocation of funding to create up to 10 new



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university enterprise zones about three weeks ago in Nottingham. I have been to several other university enterprise zones since then. On Friday I was at the University of the West of England to see one. It was set up in 2016 and already it has 43 companies, run mainly from student enterprises—people who have taken their PhD research.

When looking at tech transfer, how to support that environment is equally important, as well as some of the hard levers run from Whitehall and the Treasury. I met representatives from Stanford and MIT recently to look at this issue. I am particularly keen about recognising there is not a uniform policy approach to how we spin out the best R&D-intensive tech companies from universities. There is variability about who owns the rights to the IP. I have been to 25 universities. One of the things I ask every laboratory that does have these spin-outs is what element of the IP is given to the students to hold. Some say 30%; some say 60%; some give the entirety of the IP to the students setting up their companies.

There is also a point about the future talent element. We have a central Government mechanism whereby we have future leaders fellowships and doctoral training centres, which I am sure we will touch on later, but creating the climate for that escalation in home-grown talent brings in international companies and venture capitalists. You will not find venture capitalists wanting to invest in a company five years after its establishment; they want to be in at the beginning. That was the message given to me at the meeting with representatives of MIT and Stanford. It is that critical moment at the beginning of a company's life cycle that will bring in international VC investment, if it is able to do it. We know that traditionally we have done that very badly, so I am particularly interested in how we come up with a wider national strategy. It works very well in terms of my brief as universities and science Minister to be able to achieve that.

Q458 Chair: You want to try to put more flesh on the bones of a strategy both to get to 2.4% but also how you get there and ensure you get value from it. Is that right?

Chris Skidmore: Yes. You had UKRI before you this morning. It will publish its own road map on how it thinks it should be establishing a path to 2.4%. It has already done work in looking at where critical scientific and technological infrastructure is based in this country and how we need to support that for the future. That also comes off the back of looking at some of the reviews that have taken place. I am trying to think of the technical terms of some of the reviews that have been published recently to look regionally at where the best is.

Jenny Dibden: The SIAs.

Chris Skidmore: These are the science and innovation audits that have been published. As a result, we will have a piece of work that has been done by the scientific community in recognising where it thinks investment needs to come from in the future. We have seen some of that



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continued investment in the spring statement and the £60 million for the Joint European Torus, for example. We will want to look at other future emerging technologies—for example, fusion and the spherical tokamak project, which might come on the back of our investment in ITER in Marseilles.

We will be publishing our own road map post the spending review when we know exactly how much money we have in the bag from the Treasury, but in the present period, which is a critical timeframe of six months or so, we have to work with Treasury Ministers and officials in BEIS and Treasury to look at some of the grand challenges bids and future funding of the industrial strategy challenge fund waves.

I am also struck by the fact that there are lots of different pots of cash working broadly to the same endpoint, which is 2.4%, but how can we make sure that the UKRI is there to help iron out duplications so we have that strategy? As a Minister I am keen to have oversight of the 2.4% envelope and how we will be able to deliver that. I have just set up a monthly internal committee in BEIS to be able to work with officials so that in this approach all the different component parts of the Department are hands-on and I am able to signal, in a series of speeches I am planning for the future, what we are going to do about international collaboration.

Where will we be going? Very shortly, the international research and innovation strategy will be published. The international education strategy has been published. There is an artificial divide between our education and research strategies—the universities do not distinguish between them—but the fact is that we recently published the international education strategy and the RS has been published.

I also need to look at the role of universities as critical hubs and as a magnetic approach to generating research in the future. I am very struck by the work Glasgow University is doing on quantum and to see companies locating in Glasgow because of the university's impact.

Q459 **Chair:** To be clear, will there be a road map within UKRI and a road map within Government?

Chris Skidmore: That is correct.

Q460 **Chair:** There are no gaps; they sit side by side. Are they going to be pointing in the same direction?

Chris Skidmore: I would entirely envisage that being so. Certain royal societies, like the Royal Academy of Engineering, and the national academies are already beginning their own work in looking at 2.4%. We have been working with them to look at our own approach. We have had a significant number of sessions with them—I do not have the numbers; it is somewhere in my pack here—to look at the engagement we need to begin here. I run the high-level group on exiting the European Union that



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is now critically moving on to a post-Brexit future and how we can deliver on 2.4%. The UKRI road map will be published in the summer.

Q461 **Chair:** When will yours be published?

Chris Skidmore: I hope it would be shortly after the spending review.

Q462 **Chair:** How do you ensure that we will have the capacity to spend the increasing investment effectively in terms of infrastructure, skills, people and so forth? Will it be very much part of your road map to build the capacity to spend the money effectively?

Chris Skidmore: Yes. One of the things I noticed early as science Minister was that you could set envelopes for spending across these waves and maybe set a wave across a spending review. The interesting challenge we have is that the spending review period will be three years rather than, traditionally, four years. But science and innovation, particularly large infrastructure projects, do not work over a three-year period, so how can we ensure that some of the future waves of industrial strategy challenge fund may be established over a slightly longer period to provide certainty so that those coming forward have the ability to realise the investment and recognise that it can be taken up at a pace that they see as realistic? The last thing I want to happen is that funds are made available and then not spent because, somehow, they do not meet an artificial timeframe set by Whitehall.

Q463 **Stephen Metcalfe:** Currently, the ratio of spending between research and innovation is about 10:1. Some countries have a ratio of 1:1. Do you think our balance is correct, or does it need to change, and why would you give us that answer?

Chris Skidmore: When it comes to innovation spending, I think we still have significantly more to do. If you look at the amount that has been spent on innovation, in 2011 it was £340 million per annum and by 2018 it was £519 million per annum. We have the Frascati manual for looking at how we define our research. The OECD suggested that we had 18% basic research, 44% applied research and 38% experimental development. That is not atypical for other countries, but we are taking on emerging technologies like quantum where we simply do not know their commercial capacity. I have seen graphs. There is an almost exponential increase in the demand for the realisation of quantum. Therefore, there is a question here about how you take those emerging technologies, which are not quite market-ready, and ensure that you have an innovation strategy for them in place.

We know that, traditionally, the UK has been great at inventing and very bad at commercialising inventions for the future. On issues like quantum, the question is whether we continue the traditional pattern of what we have done, which is to invent and realise significant milestones in science and innovation in technologies and let some other country take the commercial opportunities.



One of the things I am interested in looking at is innovation versus science spending. By tradition, science funds are ring-fenced; innovation spend has not been ring-fenced. There are key starter funds where we have been looking at how to encourage scale-up.

Q464 Stephen Metcalfe: I am sorry to interrupt. I think I have understood the point. I want to draw your attention to the fact that the Campaign for Science and Engineering, by way of an experiment, spent two hours pretending to be entrepreneurs or innovators in its office looking for public sources of support for its research. In that time it found 28 different websites offering Government support for research and innovation. They may all serve a very unique and specific purpose, but who is providing the strategic overview for how that particular group, or those various streams, operate?

Chris Skidmore: Ministers set strategic policies, and their implementation is done under the umbrella of UKRI, beneath which Innovate UK sits. There is that opportunity to have a single portal to communicate effectively. It can be done effectively; maybe we need to be looking at how we can do it better. For instance, with the Horizon 2020 bids, having that portal, testing it and trying to make it reach out to SMEs has been difficult. I think that is indicative of the fact that SMEs often just get on with the job. They do not have the time to fill out large-scale applications and make that investment, so we will be keen to look at greater flexibility in some of these processes and a more effective one-stop shop.

Jenny Dibden: We have already talked about the road map. The key thing about the road map is the systematic approach to it. This is about policy development across the piece, including things like understanding access to innovation schemes, but also deliverability. You talked about scaling up capacity. We can bid for sums only where we are absolutely certain we can deliver. UKRI is not responsible, as was said this morning, for all innovation schemes. It is absolutely right that other Departments have them, but there is something about the creation of UKRI and the fact that Innovate delivers on its behalf, which means you can begin to get more coherence, and that is absolutely a question we are looking at as part of the 2.4% road map.

Q465 Stephen Metcalfe: At the moment the Government appear—I do not know whether this is fair—to be focusing on increasing the supply of innovation rather than the demand for it. First, do you think that is a fair comment? Secondly, if it is, what steps can Departments take to generate more demand for innovation?

Chris Skidmore: When you say demand for innovation, do you mean establishing broader recognition of some of the opportunities or challenges where innovation can help fill that gap?

Stephen Metcalfe: Yes.



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Chris Skidmore: In going around the country I have been struck by how many organisations are willing to take up some of the opportunities involved in the grand challenges, looking at them as significant areas of growth, because the challenge will grow with the clean growth challenges and the specific missions in ensuring we have carbon-neutral housing by 2030 or 2040 and looking at issues around clean vehicles and healthy ageing.

There is a huge opportunity for companies' innovation to fill a gap and ensure we put in place measures to allow people to have five extra years of healthy life, which is one of the missions in the grand challenges. I visited Bristol Robotics Laboratory at UWE last Friday. Some of the spin-outs did not apply for some kind of big UKRI grant scheme, but they saw an opportunity to invest. This is just one anecdote to give you a sense of where I see demand and technology pairing up with innovation to meet that demand.

A company run by students uses 3D printing effectively to revolutionise artificial limbs. That company is now about to leave the university enterprise zone and establish itself. It is highly successful and fills a gap in the market where there is enormous demand from the NHS. I think grand challenges will help to provide a lens to focus understanding on where demand will need to be met in future.

Q466 **Stephen Metcalfe:** You mention the NHS, which is a huge procurer of services. Presumably, public procurement can have a big role in driving innovation.

Chris Skidmore: Yes.

Q467 **Stephen Metcalfe:** How is that being communicated to those who are doing the procurement?

Chris Skidmore: I see huge opportunities in looking at where, through public procurement, we can deliver potential opportunities for co-investment in future R&D. It has been tried before; it has not always been so successful, and I am trying to understand why. Look at HS2 and the opportunities that have come out of that, not just in terms of physical R&D but training and research that leads to an increase in human capital and capacity, which is also important.

When it comes to procurement and what more we can be doing, I made a speech yesterday at Wonkhe at the Royal Institution looking at student experience. One of the things I have been struck by—for example, at the University of Northampton—is social value in procurement. I know that our former colleague Chris White, who is now at King's College London, did a lot of work on social value and the legislation he took through as a private Member's Bill. I am very keen to push universities with big budgets to ask, "Where can we realise the potential for procurement spend to be important not just in R&D but for the benefit of local communities?" That is where the knowledge exchange framework will be



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important in providing a boost. You can come up with these schemes, but how do you evaluate and assess them, not judging universities and organisations but reflecting and highlighting the successful opportunities that arise?

Q468 **Chair:** David Connell has been helping your Department with its thinking on how you get to 2.4%. He was responsible for the review of the use of SBRI. This Committee has very much endorsed his argument that there should be a central fund for SBRI for Departments to bid into so we get Departments spending money on procurement and building the demand for innovation rather than focusing only on supply.

Jenny, I know that you have been engaged with David on that. Where have we got to? It seems to me that the spending review is critical. We continue to have the view that the Government need to establish a fund such as David Connell recommended. Chris, are you going to be articulating the case for that? Jenny, can you tell us where the work has got to? Are plans being developed? I met the Secretary of State, Greg Clark, who appeared to be very positive about it, but I want to know where it has got to.

Chris Skidmore: We are currently testing that recommendation for a central fund through the implementation of the GovTech Catalyst fund. There is a sum of £20 million over three years to support the development of digital solutions to the public sector. In terms of the governance of it, that reports to Oliver Dowden in the Cabinet Office, Liz Truss and me. We have a meeting shortly with Oliver Dowden to continue to discuss this work, and we are working with David Connell to explore the scope of SBRI and public procurement as part of the development of our 2.4% road map.

Q469 **Chair:** Chris, I would urge you to meet him because I think he has some very useful ideas and thinking on this. It is a mechanism by which we can get all Government Departments to engage in procuring services from innovation companies and help build innovation companies, keeping them in the UK but also helping to solve Government problems. It is highly attractive for that reason.

Jenny Dibden: The GovTech Catalyst is really important here.

Q470 **Chair:** But it is tiny.

Jenny Dibden: It is small, but it demonstrates to people that it can work. There has been a huge amount of interest from a whole range of public sector organisations in receiving this money. We have announced three waves of projects that are being funded. Because the spending review is an evidence-based process, it is an important bit of the jigsaw to demonstrate to both the Treasury and other Government Departments that this sort of approach can work.

There is a lot of experience on SBRI. David brought it together in his review, which we are also feeding into the 2.4% mechanism, but with



that additional evidence, given SBRI has been patchy—it has worked quite well in some places and less well in others—showing that it can be a success is really important.

Q471 **Chair:** Chris, you mentioned your written statement today. You say, “The UK remains committed to ongoing collaboration in research and innovation with partners across Europe. To this end, the UK would like the option to associate with Horizon Europe, and has continued actively to shape the development of that programme. However, we are also exploring in parallel credible and ambitious alternatives to deliver positive outcomes for science research and innovation in the event that the UK chooses not to associate.”

There is a shift in language from the previous position—that you want to be part of Horizon Europe. Now, it is “would like the option to associate,” and you are actively exploring an alternative. What do we read into that? Do we read into it that there is a drift away in Government thinking from a plan to participate to the development of an alternative programme?

Chris Skidmore: I do not think there is any change in tone, apart from the fact that as Minister I can be more personally enthusiastic about the need to work with our European research partners. I always say we are leaving the European Union; we are not leaving our science and research networks behind.

Q472 **Chair:** Does it remain your objective to be part of Horizon Europe?

Chris Skidmore: When looking at Horizon Europe, the regulations have now effectively been finalised, and obviously there is final approval. I was at the Competitiveness Council on 18 February. I am happy to give you the text of a speech that I gave there, which was extremely warm about making that commitment, saying we wanted to be part of shaping the regulations and be able to look at whether then to associate. The association process is square-bracketed at the moment, so we cannot begin even to look at association until probably later this year, as I think I mentioned in my first appearance. I am keen to make sure that it represents full value for money, so once we have final regulations that will be part of the discussions with the Treasury about CSR. Does Horizon Europe association become a central part of our international collaboration work? I hope that it does.

Q473 **Chair:** Is your central thinking that when the dust has settled you anticipate we will be part of Horizon Europe, or do you think the centre of gravity now shifts to it being more likely that we have a parallel programme?

Chris Skidmore: If we were in a position to have a deal signed, I think it would have sent a stronger message to our European partners about the close and special partnership that we want to deliver. A no-deal scenario does not preclude us from association because other countries like Canada, South Africa, Israel, Norway and Switzerland are seeking



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association. I have so far met the South African, Norwegian and Swiss science Ministers.

Q474 **Chair:** On the assumption we do not leave with no deal, which Parliament appears to want to avoid—implying that it is likely we will leave with a deal—do you anticipate that the most likely scenario is that we are part of Horizon Europe?

Chris Skidmore: My anticipation is that that should be the case, but it will obviously depend on the value-for-money arguments that the Treasury might want to look at. I am not the only person in the UK Government who gets to make a single decision on this, but, from what I have seen in the current regulation and the frameworks that have been established for Horizon Europe, it represents an opportunity and value for money for us to do so. You cannot replace these networks that have been built up over decades.

Q475 **Vicky Ford:** Is there anything in the regulation as it stands that leads you to question that it could be value for money?

Chris Skidmore: Harriet will be able to touch on some of the work that has been going on behind the scenes. I know there have been meetings going on into the night and not finishing until 1.30 am on some of the specific terminology within the programme. The Horizon Europe programme is a lot bigger than Horizon 2020. Its aims are more ambitious and there are tensions, even within the Horizon EU 27, on the direction of Horizon Europe. Is it towards widening participation in looking at some of the eastern bloc countries and what they might see as their priorities on infrastructure developments? Western European countries are keen to continue to focus on excellence. We have been part of that group in the past. I took part in a friends of excellence breakfast when I was in Brussels on 18 February. I think we can still play quite a critical role as one of the most significant members.

Q476 **Chair:** Does your judgment about whether you want to be part of it depend on the outcome of the internal discussion about whether there is increased emphasis on eastern European development and so forth, as opposed to continued focus on excellence?

Chris Skidmore: I think that is where we can play a key role as an associate member in focusing on excellence. There is also a separate point about some of the regulations and frameworks concerned with added value. Harriet might be better able to explain it than I can, but there is a question over whether the programme as a whole demonstrates added value to the European Union or whether specific projects have written into their regulations that they need to demonstrate added value to the EU, because we feel it would discriminate against association members if they had to sign up to partnerships that were simply about having that metric of added value to the European Union.

Q477 **Vicky Ford:** Given that Horizon Europe starts reasonably soon, running from 2020 onwards, and that whatever you decide about association



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membership of that project is not a forever decision, because clearly it is a seven-year project with mid-term reviews, have you considered being part of the project for a shorter time, or, if you have question marks about how it will evolve over that seven-year period, imposing some constraints on the type of association to allow you to have some control and to give our scientists some certainty right now about what could be happening in two or three years' time, perhaps with a transition to something different over the longer term?

Chris Skidmore: My immediate priority has been to ensure we get the best possible framework. One of the advantages of a delay to leaving the European Union is that I have just received an invitation to go to Bucharest on 3 April to continue the inter-ministerial informal Competitiveness Council. We were not sure whether we would receive that invitation if we were no longer members of the European Union. Fingers crossed, if I can get the slip from the Whips to be able to go, I will be keen to attend that meeting to continue to demonstrate our commitment going forward.

It is really important that as science Minister at this moment in time I can reach out and have as many ministerial bilaterals with my European colleagues as possible to be able to demonstrate to them our commitment. I have spoken to about 14 European science Ministers either in person or on the phone. It is interesting that, for example, Portugal has invited us to be guest of honour at its science conference in early June. It is part of wanting to make sure that those European Ministers are aware of the underwrite guarantee.

What struck me when I went to the friends of excellence breakfast was that very few Ministers understood the nature of the guarantee going forward. All projects signed before Brexit are guaranteed for the life of the project, and extensions to all projects we have taken part in as a non-member state will be guaranteed up until the end of 2020 for the lifetime of the project. I have written to every science research Minister in the EU 27 personally setting out the Government's position, and I am happy to share a copy of that with you as well.

Q478 **Bill Grant:** I think we are all clear that achieving the 2.4% investment in research and development by 2027 will depend heavily on the private sector investing. What areas of the private sector are best placed to achieve that target, and how is the Department engaging with them?

Chris Skidmore: That is a good question. There is a challenge around identifying the technologies in which we see ourselves as being world leading and reflecting upon that in a global conversation, because if we can attract tech companies to the UK all the better. Jenny or Harriet might want to come in on this when it comes to some of those technologies.



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From my perspective as a Minister, I have been struck by robotics. For example, as part of our first robotics strategy we put in £315 million. It attracted well over £1 billion-worth of private sector investment.

I am extremely keen to ensure that we support our space sector and UKSA in delivering strategically on a sector where every £1 spent delivers £13 of investment. I went to Northern Ireland recently to meet the satellite company, Thales. It has moved some of its satellite operations base from Caen to Harwell because of the satellite testing facility built with our £9 million spent there.

By using the Catapult centres and the ability to connect areas of excellence across the country and make those strategic investments, we can bring in companies. When it comes to medicines, we can have a huge impact in pharmaceuticals, where traditionally we have done well in Cambridge, Oxford and the London area. In Glasgow, for example, the applied medicines research centre near Strathclyde is drawing in significant investment from pharmaceutical companies that recognise the change that is happening. Large companies are not now doing the R&D themselves within their own bases; they are looking to work in partnership with the university sector and where the researchers are. Therefore, making sure we still have that human talent in this country is also important. We should never forget that companies are not necessarily investing in the technology but in the people who are inventing the technology.

Q479 Bill Grant: Do you see the automotive industry, which is important to the UK with the massive changes driven by the need for lower-emission and electric vehicles, as something to engage with?

Chris Skidmore: The automotive industry is a classic example of where the so-called triple-helix model can work most effectively, because you have an industry with an investment strategy that it needs to put forward, but it wants certainty, which the Government can provide in being able to make investment; it wants knowledge, which obviously universities can provide, and the talents to be able to fill those centres, and obviously it will come in with another third.

One of my personal projects is that I have looked to establish with the University of Bath a £50 million automotive manufacturing centre. Three years ago, in a previous guise, I managed to get Government funding of £13 million, but that is for the whole £50 million centre. I will be attending the groundbreaking ceremony in early May. That is looking to revolutionise the service industry, as it were, of the automotive sector.

We also have to recognise that there are real opportunities not just in technology but the application of technology to be able to create things faster. That is where the automotive sector recognises the profit and value that can come from R&D, which means it can get more cars out of the door.



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Jenny Dibden: ISCF is a large microcosm of all the work that went into the industrial strategy White Paper, where we could identify the challenges that will be relevant to the economy. If you take just future mobility projects under ISCF, you have Faraday; you have self-driving vehicles; the future fly-drive electric revolution; and things like a national space test facility.

The homework went into the White Paper, with lots of engagement with businesses. We are continuing that engagement with business as part of the programmes we put in place, but also as part of the development of 2.4%.

You have seen the contribution from CST. We have been working with the CBI. Therefore, there is systematic working with all the relevant people, whether it is the private sector or Government, on how you can get a plan that is deliverable for 2.4%.

Q480 **Bill Grant:** Universities and research institutions tell us that they are having to self-fund indirect costs, which are not covered by the charity research support fund. Does your Department have any plans to change support for genuine indirect research costs that are unavoidably incurred by universities and research institutions?

Jenny Dibden: Are you talking about the full economic costs of research?

Bill Grant: Yes.

Jenny Dibden: Earlier you talked to UKRI about the dual support system and the contributions that the different sorts of funding make. It is true that the research council projects do not fund a full economic cost. That decision was taken some years ago—ironically, to get better traction on whether universities were sustainable and to do that costing activity.

As we have talked about before, the dual support system and the money that comes from QR are a huge opportunity for universities to invest how they want, but also to look to be efficient, as well as effective. We will look—and UKRI is looking—at dual support. That is always a question that you have under review, in a sense, particularly at spending review moments, but there are significant benefits to the existing system and to not funding full economic costs through the research councils. Giving universities, which are substantially autonomous institutions, the ability to make their own decisions and invest where they want has been of huge value to the system that we have in this country.

Q481 **Bill Grant:** So the answer may lie in the provision of QR, and you would be happy to review the situation.

Jenny Dibden: In the spending review, you look at all the big questions, in a sense. As UKRI talked about this morning, David Sweeney is already looking at these sorts of questions. Clearly, as a Department, we will look



at them, too. I am sure that the Treasury will have a view on them as well.

Q482 **Bill Grant:** May we move on to incentives? Is there evidence that research and development tax credits are effective in the United Kingdom? Is there a case for using tax credits in a more targeted way, perhaps so that they are targeted on regions, sectors, SMEs and so on? I note that that could be done in parallel with what I understand to be the strength in places fund, which tends to push support out to the regions. Do you see changes or a bit of wiggle room in the use of tax credits for that?

Jenny Dibden: As you will know, there are already two tax credit schemes: the tax credit scheme that is aimed at big companies, and the one that is aimed at SMEs. Evaluation by the Treasury shows them to be effective. We are looking at tax credits as one element of how you might build to 2.4%. We are in discussions with the Treasury, which is on our official steering group for 2.4%. But those two schemes—for large and small enterprises—do exist.

Q483 **Bill Grant:** You are content with the current schemes. You do not see any need to change them to incentivise the regions or smaller organisations.

Jenny Dibden: We know at the moment that the current schemes work. With any policy, there are ways in which you can look to improve. There were a raft of changes around how tax credits were delivered. HMRC did a significant amount of work around communication of tax credits, so that companies knew that they were available.

Q484 **Chair:** Is any debate going into the spending review about whether any further tweaks or changes might happen? Is that an active discussion?

Jenny Dibden: We have a strand of work, under 2.4%, on tax credits and the role that they might play. Obviously, it is not our policy—it is a Treasury policy—but they are part of the 2.4% work. It would be impossible to do the 2.4% work without considering whether tax credits are working as appropriately as they could for the 2.4% journey or whether there are any adjustments that we would like to propose.

Q485 **Chair:** That is an active discussion as we move towards the spending review. You are not saying that they are going to be changed, but it is something that you are doing.

Jenny Dibden: Yes. It is a strand of work in 2.4%. By definition, it is unavoidable, because they play such a significant role already.

Q486 **Bill Grant:** Finally, I want to look briefly at student fees and how they may or may not be used to support R&D at universities. Submissions to the Committee suggest that university finance will be unsustainable in the future and that that may trigger changes to student fees. Do you think that it is possible to distinguish or separate R&D from tapping into



other university funding, such as student fees? Do you think that you can separate those two issues? Will they continue to be interlinked?

Chris Skidmore: As the universities Minister, I am keen to ensure that we protect the financial sustainability of universities. When it comes to looking at fees versus research and the whole ecosystem by which universities have to balance their budgets, we have the latest TRAC or transparent approach to costing data. There are four key sections. You have publicly funded teaching, which broadly breaks even. We have spoken about research activities. Roughly 70% of full economic costs are recovered from the research councils, so they need to cover the remainder.

Mainly, the TRAC data shows that the surpluses that are needed to cover the 30% shortfall in research funding come from international teaching and other non-teaching activities. OFS data that was published in January 2019, for the latest TRAC data, has the breakdown. I am happy to share that with the Committee. Basically, the figure for the full recovery of costs for teaching is 99.7%, so it pays for itself. The international students and some of the other fundraising activities that universities undertake, such as hiring out halls, pay for the shortfall.

Q487 **Bill Grant:** Would it be fair to say that the 30% figure may vary significantly from university to university when it comes to the actual finances? Some of them have a bigger burden than that.

Chris Skidmore: Again, I have figures somewhere. The top 25 universities take up nearly 60% to 70% of all funding activity, so there is quite a high spike, going down to a long tail. After that, you have teaching-only universities, which do not have that sort of research matrix.

When it comes to the publication of the Augar review, which I have not seen personally, there will be questions around what happens if there has to be a reduction in the tuition fee. If that is topped up by the Treasury and remains cost-neutral, it is fine. If it is not cost-neutral, it will disbalance the 99.7% figure and the ability of the tuition fee to pay for tuition.

Obviously, representations have been made to me on my journeys across the country. I go to every city. I try to meet not just one vice-chancellor in a city, but all of them. In Manchester, I met every single vice-chancellor. My point is that we need to make sure that we protect that delicate balance. It balances at the moment. We just need to make sure that we keep an eye on that, to sustain universities' financial viability.

Q488 **Vicky Ford:** Some research organisations—particularly public sector research organisations—talk about problems with year-on-year funding and not being able to port money from one year to the next. How does one address that concern?



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Jenny Dibden: A range of end-year flexibilities are available from the Treasury. I am not aware that the PSREs have any less flexibility than UKRI has. Do you have a specific example?

Q489 **Vicky Ford:** Yes. We were given examples by research organisations. I think that this would be worth looking into.

Jenny Dibden: The examples would help. People may think that it is not flexible enough, but there are a range of flexibilities. The examples would be really helpful.

Q490 **Vicky Ford:** This is still a real issue, particularly for public sector research laboratories, national laboratories and companies limited by guarantee. They perceive that it is a real issue, so it is a real issue for them. There may be solutions, but it is real.

How can communication between UKRI, BEIS and the Treasury be improved when there are perceived issues of that sort?

Jenny Dibden: As you might expect, we work very closely with the Treasury—literally, on a day-to-day basis, if not by the hour—so we have very good lines of communication. We deal with the Treasury on a whole range of issues, including where things are not thought to be working as effectively as we might wish. The reason I mentioned that end-year flexibilities were changed a few years ago was that there was an issue around end-year flexibility that affected the research councils, as well as the PSREs and other organisations. We sought that increase in flexibility, which was granted.

It may be that organisations are telling you that there is insufficient flexibility. We know that, over time, a number of research organisations in the public sector have moved into the private sector or charitable sector or become companies limited by guarantee, to gain the flexibilities that they can get in the private sector. Specific examples would allow me to work out exactly where there is an ongoing problem.

The governance requirements around all budgets, including NPIF, require us to work with the Treasury. There is no reason for us not to work with it. We need it on side to argue through the policy around 2.4%. Again, I wonder whether there is a specific example—

Q491 **Vicky Ford:** I am just surprised. We have been told this by organisations in public evidence sessions, on the record, to which you will have had access before you came here. Those organisations are saying that they have year-end issues. We will go back to their evidence and look at it again, but they are telling us this very clearly. One of them said in evidence, "I spend far more time on making the numbers add up than on working with industry. You get cliff-edge year ends and cannot port money from one year to the next."

Jenny Dibden: As I said, we have introduced some flexibilities. When it comes to such a significant amount of money as the science budget, it is



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important to exercise some sort of financial control. One of the things with budgets generally is that they have a tendency to move right. We need to be very careful about letting spend slip too much to the right. If every organisation wants to move expenditure to the right, we end up in a really unsustainable position. We spend a huge amount of time trying to make the budget balance, both over the spending review period and in-year.

As I said, I am quite happy to look at some more specific examples, but we have introduced more flexibilities, precisely because people were flagging that they had end-year issues. I do not think that we would ever be in a situation where you would want to say that it is completely flexible. That would make the management of such a sizeable budget unworkable.

Q492 Graham Stringer: Minister, you said previously that a large percentage of the research money goes to a relatively small number of universities. A lot of those universities are in the golden triangle. Is expenditure on science a partial cause of the country's regional disparity, or can it help to be the solution to that?

Chris Skidmore: A point was made in the previous session around the self-fulfilling prophecy of the golden triangle. How do you define the golden triangle in the first place? If you define it as all higher education institutions in London, Cambridge and Oxford, you also have the problem that it is employing 30% of full-time research-active staff. It is not just a concentration of funding—it is more that the funding has not changed, which is a slight problem in itself. Forty-five per cent. of all funding went to the golden triangle in 2011. In 2017, the figure was 46%. It has just stayed flat. That is because the researchers are there. They are the ones who are putting in the bids and attracting funding, rather than institutions.

Q493 Graham Stringer: On those figures, about three or four years ago, BIS did some figures showing that from 1997 to 2015 the balance had changed. There had been an increase of 8% and a decrease in funding to universities in the regions. The funding is going the wrong way.

Chris Skidmore: I have the figure for 2011 to 2016-17. In five years, it has gone from 45% to 46%, so there has been a slight increase. Obviously, we want to try to—

Q494 Graham Stringer: From 1997, there was a bigger jump. It was an 8% increase.

Chris Skidmore: There is that tension. If you are going to raise the overall amount of money, uplifting the R&D spend by £7 billion and having science spend of £26.3 billion between 2016 and 2021, you have this disproportional potential effect. Obviously, if it stays at 46%, it is 46% of a bigger amount, so a large amount of investment goes into that particular area.



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We have the strength in places fund, which is nascent and is looking at seed capital at the moment to establish funds. It is about how you build the capability. That is just as important as having these pots of money.

With the northern powerhouse, we are looking at how we can create strategies for future investment. It is very keen on issues around public procurement and trying to leverage R&D into projects that there may be in areas of the country.

It is also about the longer-term strategy of investing in people, to be able to create the climate for advanced research. We cannot throw away our reputation internationally for excellence, so we have to make sure that projects we invest in across the country still have that excellence framework at their heart.

How do we make sure that that is the case? Our doctoral training centres have been established. The frustrating thing about the political process at the moment is that, over the past three months, we have seen about £1.5 billion of investment go out the door, of which £850 million was for 75 new doctoral training centres across the country. That is reflective of the fact that there are pockets of expertise in places such as Manchester, on cancer, in Leeds and in Newcastle, on healthy ageing. They are beginning to establish themselves as world leaders in specific sectors. The Government's responsibility is to turbo-charge that sector-led approach.

There is a longer-term framework that we need to operate here. We will not be able to turn this imbalance around within a spending review period, but we need to lay the groundwork to ensure that those centres of excellence develop and people want to move to Newcastle, to live there and to invest in the local economy, because it is world leading. The worst thing that we could do would be to pick an area and say, "This is an area that has not had its share of R&D. Therefore, we are going to pick a project, invest in it and hope that it all works out for the best." The only way in which it will work out for the best is if we bring the people there and make sure that we take the whole local economy with them. We need to create the supply chain behind some of the big infrastructure projects so that it works, because internationally it is recognised as being world leading. For me, that is an absolute priority.

Q495 Graham Stringer: I do not think that anybody on this Committee has ever argued against supporting excellence. Nobody wants to downgrade the very best universities. There are two questions that follow. The way in which the money is being spent is exacerbating the regional imbalance. How, within the funding that we have, do we get universities that are very good, but not quite the best in the world—Manchester, Leeds, Sheffield and Edinburgh—up to the standard of Oxford and Cambridge? That would help to sort out the regional imbalance. The strength in places fund is welcome money, but it is a relatively small amount. Do you accept that more needs to be done to build the capacity and excellence in those



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universities, rather than just following a virtuous circle in Oxford, Cambridge, Imperial and UCL?

Chris Skidmore: Yes. As a new universities Minister, I am always conscious of coming in, telling universities what they need to do and then swanning off, having turned up late at the party. Actually, there is some fantastic work already happening among universities to develop these networks. I think that the future of those successful operations will be university partnerships, mirroring the way in which the Catapult centres have worked. For instance, robotics in hazardous environments received a £93 million investment from the Government, but that was a project involving seven universities, including Leeds, Manchester and Bristol. I am trying to think what other places it covered. It was not necessarily the traditional Oxbridge or London institutions, although I think that Imperial was there, as part of the mix. It is about how we can use some of the emerging technologies and partnership bids to raise the level at which all those universities operate, because there is mobility within those universities for researchers to work between them. I see that as something that is developing and want to be able to strengthen it.

I agree absolutely. You can take a northern powerhouse approach to the north and say, "By developing a better, stronger transport corridor, linking up those cities, you will be able to develop a stronger regional economy." There is almost an equivalence in universities. It is about ensuring that northern universities—the N8—are given the opportunity to develop and work in partnerships.

We can look at the Natural Environment Research Council and the work that it has given to Leeds and York around carbon capture, because the Yorkshire moorlands are a unique place where restoring peats will allow for far better experiments in how we can deliver on carbon capture, which can then be replicated in the Amazon rainforest.

I have seen examples not only of regional strengths by virtue of the natural environment, but of regional strengths from research partnerships that develop over time—for instance, on cancer and health ageing in Manchester and Newcastle.

Q496 **Graham Stringer:** May I ask you a very specific question? How are you going to evaluate the impact of the strength in places fund?

Jenny Dibden: This question came up in the first session, with UKRI. For any policy, there are stated objectives. The strength in places fund was about increasing economic growth in areas that are behind. By definition, that is the way in which you would go about evaluating it. As Sir Mark and Rebecca said, for all the programmes that they are putting in place, they are putting in place arrangements for monitoring and arrangements for evaluation. Economic growth is the key measure.

Q497 **Graham Stringer:** That is definitional, isn't it? Whatever Sir Mark said, it is just a restatement of the definition. How will we do it? There are a lot



of different influences on economic growth in an area. How would you relate the expenditure of the fund to any impact?

Jenny Dibden: As they said in the first session, it is incredibly difficult. In any evaluation, establishing the counterfactual is very difficult. It is particularly difficult where you are doing a place-based activity, because of the interaction. It is about establishing what your success measures are and then working out the best way in which you can establish the counterfactual and the appropriate measures to allow you to understand whether you have achieved your objective. You are absolutely right. For any place-based policy initiative, it is very difficult to do, but we and UKRI are very keen to make sure that we do our best with that.

Chris Skidmore: That sits alongside science and innovation audits as well. Effectively, they have categorised and evaluated the longer-term impact of existing research infrastructure and capability in those areas. The very seed-based approach that we are taking with the strength in places fund allows for an interim evaluation of projects going forward. They have the £50,000 to enable them to make the case before the money is spent. I would not want the money to go out the door immediately and its value then not to be realised. Having this staged approach is also important.

Q498 **Graham Stringer:** What do you think are the key features of the UK shared prosperity fund? What should they be in respect of supporting science and innovation?

Chris Skidmore: The shared prosperity fund is delivered from DCLG. It is a domestic programme to tackle inequalities between communities by raising productivity. The fund will target challenges faced by those places. I guess that is a question of the nature of the challenges that are driving inequalities.

There will be a question of how we can ensure that those areas that recognise challenges, and the inequalities that come from those challenges, can access the fund in the first place. That will be the No. 1 policy priority. In the past, EU structural funds have been difficult to access for these areas, creating a continuing imbalance. We are looking at how to co-ordinate investments in these areas to try to increase productivity. The issue is how we can reduce bureaucracy and deliver a fund that is simpler to access and cheaper for local areas to be involved in. That will form a key part of the consultation on the UKSPF in due course. Unfortunately, I think that final decisions on detailed operation will be made during the spending review. The fund is not within the remit of my Department. In terms of an update, I think that that is as far as I can go.

Jenny Dibden: Yes.

Q499 **Chair:** My final question is on the strength in places fund and the issue that Graham raised—how we get from good to great or good to excellent.



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Will this be part of your bid to the spending review, as you seek to get more money to hit the 2.4% target? Are you hoping to grow the strength in places fund and, within that—or, indeed, separately—to grow a “good to great” concept? What work are you doing for the spending review in that regard?

Chris Skidmore: A key principle in setting out a narrative for 2.4% is that we will not hit 2.4% if we continue to operate our investment in R&D within the golden triangle. Alongside the wider productivity question of how we realise the potential of every region of this country, we must make sure that we do not create a policy environment that exacerbates the current situation. We must create a virtuous circle so that, by raising productivity and the strength of the local economy, we also uplift private investment in R&D in the regions. It cannot just be about the public investment in those regions—it has to be about taking international business and simplifying the ability of SMEs to invest. Stephen raised the issue of how to realise the potential value of R&D for the return on investment that happens.

I do not want this single fund to be seen as the only answer—a magic-bullet solution. It has to sit within a portfolio of investment that we, as the UK Government, need to make. Obviously, that includes other things to do with universities, such as the higher education innovation fund—the HEIF—which has gone up from £180 million to £250 million, and how we go forward with some of the industrial strategy challenge fund. It is about building capacity, so that universities will also be able to bid into the larger funds for the future. That is equally important.

Q500 **Chair:** Is there any update from the Treasury on extending the Horizon 2020 underwrite to cover ERC grants?

Chris Skidmore: This was raised recently by Universities UK. The delay in leaving the European Union will be beneficial in the sense that, while we remain a member, the next wave of in-flight applications will be eligible. When I came here in January, I talked about being in a Catch-22 situation with some of the uncertainties around no deal or deal. We are still in that uncertain situation, where I am not able to look for updates.

Q501 **Chair:** So we do not have any update with regard to those that are not resolved by the leave date.

Chris Skidmore: That is correct.

Harriet Wallace: That is correct, but in the event of no deal we will set out further details on a host of questions that we are getting around the underwrite and how it would operate. UKRI now has very high levels of registration to the portal, so we will be able to give detailed updates directly to the people in all the participating institutions who will need to get them.

Chair: Thank you very much. We appreciate your time.