



House of Commons
Science and Technology
Committee

**Industrial Strategy:
science and STEM skills:
Government Response
to the Committee's
Thirteenth Report of
Session 2016–17**

**Third Special Report of Session
2017–19**

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Science and Technology Committee

The Science and Technology Committee is appointed by the House of Commons to examine the expenditure, administration and policy of the Government Office for Science and associated public bodies.

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Committee staff

The current staff of the Committee are: Simon Fiander (Clerk); Dr Harry Beeson (Committee Specialist); Dr Elizabeth Rough (Committee Specialist); Martin Smith (Committee Specialist); Sonia Draper (Senior Committee Assistant); Julie Storey (Committee Assistant); and Sean Kinsey (Media Officer).

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Third Special Report

On 12 April 2017 our predecessor Committee published its Thirteenth Report of Session 2016–17, [Industrial Strategy: science and STEM skills](#) [HC 991]. On 11 September 2017 we received the Government’s response to the Report, which is appended below.

Appendix: Government response

Thank you for your predecessor Committee’s comments and recommendations regarding STEM skills and tackling these issues through the Industrial Strategy. I am now enclosing a formal response to the Committee’s report.

The Government recognises the importance of providing the skills that businesses need and are committed to ensuring we address shortages in STEM skills, along with supporting lifelong learning. Our Industrial Strategy will set out how we will provide the skills and talent we need to deliver on our science, research and innovation ambitions.

I look forward to working with you and the other members of the Committee on these and other matters as we move forward with our modern Industrial Strategy.

Jo Johnson MP, Minister of State for Universities, Science, Research and Innovation

Introduction

We recognise and understand the Committee’s concerns and recommendations about science, technology engineering and maths education and skills and would like to assure the committee that we are working hard to tackle these issues.

The UK has a proud record of achievement in science and technology; we have great strengths as the fifth biggest economy in the world with world-leading universities—three in the top ten—and world-leading industries—from car manufacturing and satellite engineering to financial services and the creative industries. However, we face challenges in maintaining and extending this advantage; growth has not been even across the UK. Prospects for people and businesses vary too much. We have world-class businesses and sectors—but some are not yet achieving their full potential.

We know we need to do more to provide the skills that businesses need. We are creating a world-leading Technical Education system, improving basic skills in English, maths and digital, addressing shortages in STEM skills, and supporting lifelong learning with a new national re-training scheme, to ensure people have the skills employers are looking for now, and in the future. Since we published the Industrial Strategy Green Paper in January 2017, we have announced £500 million of new funding for employer-designed Technical Education and £170 million investment to establish Institutes of Technology in every English region to deliver higher level STEM skills, and meet the needs of employers in local areas.

Our Industrial Strategy White Paper, which will be published later this year, will set out in how we will provide the skills and talent we need to deliver on our science, research and innovation ambitions.

1. **The welcome additional £2 billion a year of funding recently promised by the Government represents a valuable contribution to sustaining the country’s world-leading science status. It will help maintain the UK as an attractive location for science and research. *This should be regarded as a down-payment on a trajectory for increasing R&D investment—in private and public sectors together—to the 3% of GDP target which we and others have previously advocated. Within that context, the Government must be ready to ensure that its science funding makes up any net shortfall in research funding available through international collaborative research as a result of Brexit.*** (Paragraph 13)

This Government has set out its vision to meet R&D investment of 2.4% of GDP within ten years and 3% in the longer-term. Going forward, this ambition will be an important part of our Industrial Strategy and will require a concerted cross-government approach.

We have already increased research and development investment by £4.7 billion over the period 2017–18 to 2020–21. This equates to an extra £2 billion per year by 2020–21 and is an increase of around 20% to total government R&D spending, more than any increase in any parliament since 1979.

This came in addition to previous decisions to protect science funding with a total investment of £26 billion over the period 2016–17 to 2020–21.

This Government’s sustained and consistent investment in research and innovation is sending a clear message that the UK is committed to protecting the UK’s strength in science, maintaining the UK as an attractive location for science and innovation and R&D investment.

2. **It is clear from the Green Paper and from UKRI that the Government envisages a relative shift of focus in its funding towards innovation. To some degree that reflects a changing world with increasingly multi-disciplinary challenges, but it also reflects a Government desire to reassess the relative weight given in funding different areas of research. A responsive UKRI, and a multi-disciplinary approach to its strategies and science funding, will make changing research priorities easier to implement to reflect our post-Brexit opportunities. As such, it will be a crucial participant in making the UK’s industrial strategy a success, not least in terms of providing the coordinated support needed for innovation, including the Industrial Strategy Challenge Fund.** (Paragraph 19)

UKRI is a key partner in delivering science, research and innovation priorities as part of the Industrial Strategy. UKRI’s remit to strategically link science, research and innovation funding will be central to delivering our priorities to maximise the impact of research and support commercialisation and make the UK the global go-to place for science and innovation—with access to top skills and talent and world-class research and innovation facilities.

UKRI is delivering the Industrial Strategy Challenge Fund in line with UK strategic priorities and to help deliver the Industrial Strategy objectives.

3. **The broad innovation thrust of the Industrial Strategy Green Paper has been largely welcomed, including the Industrial Strategy Challenge Fund announced last November and the Government’s approach of allowing sectors to take the lead**

in making the case for ‘sector deals’. How well such initiatives translate into the improved productivity that the Green Paper seeks will depend on how extensively and imaginatively they are taken up. Their impact will only become apparent in the years ahead. *In the meantime, the Government should clarify in the next iteration of the industrial strategy the relationship between the sectors deals and ISCF, and UKRI’s role in these initiatives in the period before the organisation is fully up and running.* (Paragraph 30)

The Industrial Strategy Challenge Fund (ISCF) is a flagship policy of the Government’s Industrial Strategy; bringing together world class UK science and research with business to meet the R&D challenges that will transform existing industries and create entirely new ones.

The ISCF will help to deliver the Industrial Strategy by building our competitive advantage in key technologies and sectors that are important to the UK economy and in growing, sustainable global markets.

Partnership with industry is fundamental to the ISCF and developing innovative ideas which will transform industries. We will select challenges based on their potential economic and social impact, focusing on where innovation is most likely to deliver a productivity boost for key parts of the economy, and where the UK has a distinct advantage or opportunity. Government and UKRI are doing this through close partnership with the first wave of sector deals and potential sector deals in the future.

4. There are aspects of the Green Paper which are likely to facilitate the greater ‘supply’ of technology transfer from university research, including the prospect of a broadened SBRI. We welcome the Government’s decision to review the practices of universities’ technology transfer offices, and look to it to take forward the agenda for improvement that we presented in our recent report on managing intellectual property and technology transfer. If, as we hope, the Green Paper’s initiatives have a favourable impact on economic growth, that could in turn help improve the ‘demand’ that is needed from businesses for the outputs of university research. (Paragraph 39)

We welcome the committee’s report on “Managing intellectual property and technology transfer” and its broad agreement with the approach that the Government is pursuing. The Government made commercialisation of research a key focus in its Industrial Strategy consultation and was grateful to receive many responses from businesses, universities, sector-specific bodies and funders on this topic. As well as the formal green paper consultation, we have spoken directly to a wide range of stakeholders and have commissioned external research. This research, which will be concluded in autumn 2017, is focused on the formation of spinout companies and licensing of IP from Universities and looking at the roles of the University, the Technology Transfer Office, individual academics, investors and businesses. Evidence from this research, alongside the other discussions and consultations, is directly supporting the development of the Industrial Strategy, and we will ensure that evidence on best practice generated by this research is disseminated to universities, businesses and investors.

5. A regulatory regime that is well-crafted and relevant to our post-Brexit international research and trading relationships will be vital for a successful industrial strategy. *The next iteration of the industrial strategy must give a fuller indication of the*

relationship with the proposed post-Brexit regulatory environment, and present a closer and more explicit alignment with the Government’s Brexit strategic aims. (Paragraph 43)

Getting our approach to regulation right is crucial for business growth—ensuring regulation does not stifle innovation and block routes to market; providing clarity to help innovators develop products and build markets; and managing the social & environmental impacts of innovation to ensure long term confidence. Fast-paced technological change and the emergence of new business models present a range of challenges to our approach to regulation. Leaving the EU will also re-shape the regulatory environment, challenging us to ensure our regulatory regimes remain fit for purpose, but also presenting a range of new opportunities.

We will continue to work with Regulators and Businesses to ensure that our approach to regulation protects consumers, the public & the environment, supports business growth, and drives innovation & new markets.

6. Encouraging students from an early age to have an understanding of science needs to be a priority if the UK is to stay at the forefront of research and innovation. While there have been extensive reforms in the national curriculum, which will be difficult for teachers and students alike to absorb, it must be kept relevant for students’ STEM skills needs as they enter a continually evolving workplace. Continuing reforms will need to be evidence-based, however, to reflect not just what employers need but also the evidence on what initiatives—many at a local scale—are most effective in increasing and sustaining young people’s interest in science and what really influences their study subject choices. We recommend therefore that the Government review the initiatives that have been submitted to our STEM skills gap inquiry, and work with the learned societies, national academies and professional bodies to identify best practice and opportunities for scaling up their wider use and Government support. (Paragraph 61)

The Government recognises the importance of encouraging students from an early age to have an appreciation and growing understanding of science. We take a strategic approach in the programmes we support to inspire young people to increase their interest and uptake of science subjects and STEM related careers.

Our Industrial Strategy Green Paper committed the UK to addressing the STEM skills shortage. We are boosting STEM skills to meet employer demand and improving the quality of STEM teaching and take-up of subjects at GCSE, A-Level and degree levels.

We are also introducing new technical qualifications, T-levels, where employers are designing the qualifications and introducing new Institutes of Technology in every region to deliver higher technical education in STEM subjects. Further details will be published in the White Paper later this year.

The contributions to the Select Committee’s inquiry (in Box 1) provide some examples of the wide range of initiatives in the public, private and third sector, which aim to support STEM engagement for young people. We agree that it is important that schools and colleges have access to good quality initiatives that will help bring these subjects alive and fuel students’ interest and enthusiasm in studying them further, and consider a career in

STEM. Having a strong evidence base that shows how effective they are is important to achieving this, and will be a key factor in teachers' decisions about what initiatives they choose to engage in and are best for their students.

Many of the organisations responsible for these initiatives may wish to approach the Education Endowment Foundation (EEF) as a possible source of support for testing out the impact of these programmes on a large scale. The EEF is an independent charity that was set up in 2011 through a £125 million Government grant to identify what works to improve the educational attainment and other outcomes of children and young people—particularly from disadvantaged backgrounds—in early years, school and 16–19 settings. The EEF funds and rigorously evaluates innovative approaches, which have the potential to raise attainment and improve other outcomes, and disseminates evidence on effective practice.

Where the Government funds organisations to deliver initiatives such as these, we will work with them to ensure appropriate monitoring and evaluation, either through evaluation led by us or by them demonstrating evidence of impact in their interventions and outreach activities. This will help inform the future development of these initiatives and ensure they provide the support teachers and students need.

Our approach is to fund and support organisations that deliver national STEM initiatives targeting in particular under-represented groups and those who do not think science is for them.

The STEM Ambassadors¹ and CREST Awards² programmes are currently implementing reforms to their delivery mechanisms (for example, the development of digital platforms) to broaden their reach. This will increase engagement levels and longer-term impact beyond the classroom through to youth and community groups, museums, science centres and other non-school organisations.

We have announced capital funding for 5 UK science centres (in partnership with Wellcome Trust) through the Inspiring Science Fund. These investments will enable them to upgrade and create new, cutting-edge exhibitions and education spaces, whilst also developing outreach programmes to target wider audiences.

In order to address continuing sector-wide issues such as STEM diversity, and to share best practice between the many organisations we work with, the government will continue its dialogue with learned societies, Research Councils and National Academies, and others, including those represented on the National Forum for Public Engagement in STEM.

7. Degree-level programmes are not suited to everyone, nor is it always the most appropriate way to develop STEM skills. There have been too few clear and well recognised routes into skilled and highly paid roles in STEM-related areas as alternatives to university degree courses. The announcement of the new T' level is therefore a welcome development. (Paragraph 62)

1 <https://www.stem.org.uk/sites/default/files/pages/downloads/STEM-Ambassadors-impact-report.pdf>

2 Pro Bono Economics research report for the British Science Association, 2016

Applications to STEM subjects at university are growing, in some cases by well above average (18% growth between 2007 and 2016). For example, over this period applications for Engineering grew by 57%, Computer Science by 56%, Biological Science by 43%, Maths by 33% and Physical Sciences by 19%.

We agree that degree-level STEM programmes are not suited to everyone. The Government is committed to ensuring we have a strong skills system that can drive increases in productivity, improvements in social mobility and help make a success of Brexit. This will be essential to the success of our industrial strategy.

Post-16 education plays a crucial part in supporting future economic growth. Our reforms set out in the Post 16-Skills Plan will help meet the needs of our growing and rapidly changing economy, by raising the prestige of technical education so that it is sought-after by students, and so that employers recognise and value the skills and experience that it provides.

T Levels will ensure learners acquire the necessary body of technical knowledge and practical skills needed to progress into a wide range of employment including STEM sectors such as Digital, Engineering, and Health & Science.

T Levels in STEM will have real labour market value and credibility. STEM employers will be placed at the heart of our reforms, and we will work with them to specify the knowledge, skills and behaviours needed for each T-level, and to advise on how the qualifications and programmes should be delivered.

Prestigious Institutes of Technology will deliver the higher-level technical skills that employers need. The competition to establish these Institutes will launch in the Autumn and we will issue further guidance shortly. And the foundations for strong, higher technical skills are already being laid by the new National Colleges. Two are already open (Digital and Creative and Cultural) whilst two more will open later this year (High Speed Rail and Nuclear). These are trailblazing employer led colleges focussing on specific sectors or infrastructure projects, which are critical to the economy.

8. The Green Paper provides no new information on how the apprenticeship programme will be implemented, beyond previous announcements, nor how it will be further developed to fill emerging STEM skills gaps. *The next iteration of the industrial strategy initiative should address this.* (Paragraph 66)

In July 2016, the Department for Education (DfE) assumed overall responsibility for apprenticeship policy, having previously shared responsibility with the then Department for Business, Innovation & Skills. The Department is working across government, industry, education and with individuals to inform, deliver and evaluate the impact of apprenticeships reforms. The Industrial Strategy is an important route to ensuring apprenticeships are part of the Government's strategy to improve skills and productivity as one of the Government's reform agendas to which the programme contributes.

DfE are implementing apprenticeship reforms to continue to improve the quality of apprenticeships for all, providing the skills that employers need to reach our commitment of 3 million starts in England by 2020 [from May 2015].

Since 2013, groups of employers, representing their sectors or occupations, have been designing new apprenticeship standards to replace apprenticeship frameworks. This puts industry at the heart of the skills system. Science, Technology, Engineering and Mathematics (STEM) skills, occupations and sectors are well-represented in our move from frameworks to standards. New standards include laboratory technician at level 3, nuclear technician at level 5, and post-graduate engineer at level 7.

The apprenticeship levy came into force in April 2017 requiring all UK public and private sector employers with an annual pay bill of £3m or more to pay 0.5% of their paybill to invest in apprenticeship training. Both the levy and the new funding system, introduced in May 2017, are intended to encourage and support employers to offer more apprenticeships opportunities.

In April 2017, the independent, employer-led Institute for Apprenticeships began to operate. The Institute is responsible for setting quality criteria for apprenticeship standards and assessment plans; reviewing, approving or rejecting them; advising on the maximum level of Government funding available for standards; and ensuring all end-point assessments are quality assured. In line with the Post-16 Skills plan, the remit of the Institute will be expanded in 2018 to include college-based Technical Education.

Employers starting new apprentices, from May 2017, must now choose a training provider from the Register of Apprenticeship Training Providers. The register, first published in March 2017, will ensure that the Apprenticeship system is underpinned by a high-quality, flexible and responsive provider base, supporting a genuine increase in the quality of training for apprentices.

The ‘Get In Go Far’ campaign has inspired more employers to offer apprenticeships and more young people to take them up. In 2016/17 the campaign generated more than 2 million visits to the website and in turn more than 120,000 applications for apprenticeship places.

In 2017/18 we will be building upon these successes, whilst supporting the Government’s social mobility agenda and working to boost the country’s skills.

DfE are carefully monitoring the impact of our apprenticeship reforms as the new system beds in, including the impact on different sectors and regions, and will keep under review.

9. *In agreeing this report on the day that the Prime Minister triggers Article 50 of the Lisbon Treaty, we reiterate our earlier call for the Government to give a firm commitment to EU researchers working and studying in the UK that they will continue to have a secure position in the UK post-Brexit.* (Paragraph 69)

We want to give EU researchers in the UK as much certainty as possible, as early as possible. We have made a clear commitment in our offer for EU citizens that no EU citizen currently in the UK lawfully will be asked to leave the country when the UK exits the EU. Our aim is to reach a reciprocal agreement for EU citizens in Britain and UK nationals in Europe as quickly as possible and we have published our policy paper (Safeguarding the positions of EU nationals in the UK and UK nationals in the EU)—to outline our offer for EU citizens. We are confident that we can reach an agreement on this important issue early in negotiations. There is already much common ground between the UK and EU positions.

10. There is a weakness in the industrial strategy in that it could give more room for discussing or even acknowledging its links with Brexit. The industrial strategy must be configured to shape our Exit negotiations, but equally those negotiations will affect what can be achieved through the industrial strategy as well as how the different measures envisaged should be prioritised and re-prioritised. (Paragraph 74)

Leaving the EU allows us to make fresh choices about how we shape our economy and presents an opportunity to deliver a bold, long term Industrial Strategy that builds on our strengths and prepares us for the years ahead. The Industrial Strategy is also focussed on tackling long term structural challenges in the UK, such as our low levels of productivity growth and disparities within regions of the UK.

We recognise the importance of a close cooperative relationship between the UK and EU in science, research and innovation. We intend for this to form a key part of the UK's deep and special partnership with the EU.

11. The complicating factor of Brexit, which could in time render the industrial strategy over-ambitious or under-ambitious depending on the terms of the Exit and how well our new research and trading relationships with others turn out, makes it difficult to set a yardstick for judging the eventual success of the strategy—the possible scenarios are perhaps inevitably too difficult to map out at this stage. This is, nevertheless, an area that the Government must address as the Brexit negotiations get under way and the industrial strategy evolves in what we hope will be dynamic document. (Paragraph 75)

The Government plans to publish its Industrial Strategy White Paper later this year, which will look at the risk and opportunities presented by Brexit. However, the White Paper is just a stage in the process of developing and evolving our Industrial Strategy, which will help people and businesses across the UK to adapt to the changing landscape of the economy, whether that is relating to our departure from the European Union, globalisation or technological changes.