1. **Executive Summary**

1.1 The government welcomes the opportunity to update the Committee on the education and skills policies it has in place to support equipping people with the education and skills they need to take up careers in the Science, Technology, Engineering and Maths (STEM) Careers.

1.2 If the UK is to remain a world leader in research and technology, we will need a future generation that is passionate about, and skilled in, science, technology, engineering and maths (STEM).

1.3 People with STEM skills add flexibility and resilience to the economy and help us generate and take advantage of the new opportunities that technological change presents. For the UK to reach its full potential, we must draw on all the talents available to us by improving diversity in the STEM workforce, and inspiring more young people to study STEM subjects.

1.4 This evidence examines STEM policy in:

- Schools
- Apprenticeships
- Further Education
- Higher Education
- The Workforce
THE STEM SKILLS GAP

1.5 There is a Skills Gap at level 4 and 5 in STEM. Industry demand for these skills expected to grow – especially given the rapid pace of technological change. By 2020, we will need around 300,000 trained technicians entering the labour market annually.¹

1.6 These skills shortages are acute in STEM based occupations e.g. manufacturing, engineering and construction. This has contributed to the productivity gap with our major international competitors and an over-reliance on migrant labour

1.7 Few people are undertaking higher-level skills training. Of the 75,000 people participating in Advanced Learner Loans in 2014/15, only 5,000 were at Level 4²

1.8 We fare poorly in comparison with international competitors: Only 10% of people hold higher-level technical qualifications – places England 16/20 countries³

1.9 Each year, the UK only produces around a third of people trained at technician level compared to Germany.

1.10 The following analysis is based on the UK Commission for Education and Skills (UKCES) Survey form July 2015: Reviewing the requirement for high level STEM skills.

1.11 Analysis indicates that professional level skills relating to engineering and IT occupations are the leading priority. Occupations in both of these broad groups score consistent highly against all labour market indicators and are therefore positioned in the upper reaches of the ranking.

1.12 The category of manufacturing production managers is also a key occupation in view of its economic significance (reflected in high pay) and the scale of its recruitment needs, although skills shortages are less in evidence.

1.13 The level of labour market need associated with Science, engineering and production, technicians is lower than for engineering and IT professionals. The size of future recruitment needs is limited by moderate prospects for job growth and pay levels are lower, even though the prevalence of skill shortages is comparable to the professional groups.

1.14 For scientist occupations, pay levels and the prevalence of shortages are both relatively modest, whilst their comparatively small size in terms of jobs limits the scale of future recruitment needs.

1.15 Skill shortages are most significant among engineering professionals, followed by IT professionals and then Science, engineering and production technicians.

¹ Estimate based on OECD and IPPR data

² SFA/DfE (Oct 2016) Further Education and Skills Statistical First Release

³ OECD (2014), Skills Beyond School: Synthesis Report
1.16 High level STEM skills are of key importance to the performance of the UK economy in terms of productivity and competitiveness. They also contribute a significant amount of employment: around 2.8m UK jobs based on a fairly tight definition of STEM occupations. High level STEM skills are also demonstrably important to the future development of many of the priority sectors identified in the Government's industrial strategy.

1.17 Focusing on priorities within high level STEM, engineering professionals and IT professionals represent strong priorities in terms of labour market need, based on modelling work. Production managers in manufacturing could also be seen as a priority occupation, due to the scale of its employment and its economic significance, although evidence of market failure is less strong.
1.18 The Government wants to make Britain the best place in the world to study STEM subjects and is doing much to support that. We are taking action across education and training to create a strong and diverse STEM workforce; from inspiring more young people to take STEM subjects to addressing quality of teaching in STEM subjects and reforming the school curriculum.

1.19 The national curriculum, GCSEs and A levels in STEM subjects have been reformed so they are benchmarked against those in the highest performing education jurisdictions in the world and prepare young people better for further study and employment.

1.20 The new curriculum has been introduced from September 2014 and has to be taught in maintained schools (academies are required to teach science and maths as part of a broad and balanced curriculum). It includes more challenging content, for example, the new primary science curriculum includes content that has been added to raise the level of challenge and ensure grounding in key topics such as evolution and inheritance.

1.21 A new computing curriculum has been introduced to replace the ICT curriculum which had been widely regarded as outdated and unchallenging. It has been designed to ensure that pupils acquire the knowledge and skills they need to become active creators of digital technology; and includes coverage of the hard elements of computer science, how computers work and the basics of programming. The maths primary curriculum places a particular emphasis on fluency in mental and written calculation. Every pupil will be expected to be taught multiplication tables up to 12x12 by the end of year 4.

1.22 The new science, maths and computer science GCSEs are also now in place, as are new A levels, except for mathematics which will come on stream from September 2017. To ensure all pupils have a solid grounding in science by the age of 16 and the foundation they need to study science at A level we have removed the single science GCSE option. In future all pupils will take either combined science or the three separate sciences.

1.23 The new mathematics GCSE contains greater breadth of mathematical content, with greater depth in some areas. This is delivered through a single GCSE which requires greater examination time and greater teaching time than other GCSEs. The new computer science GCSE requires students to understand mathematical principles and concepts such as data representation, Boolean logic and different data types. Students will also have to understand the components of computer systems, and write and refine programs.

1.24 We have in place programmes and measures that specifically aim to increase take-up of maths and science at GCSE and A level. Part of the work of the Science Learning Partnerships is to continue to support schools to increase their GCSE triple science provision; we know that those pupils who study this option are more likely to study science at A level. Computer science has been included within the science strand of the English Baccalaureate school accountability measure to encourage take up; and to emphasise its close relationship with the natural sciences as well as the importance of the subject to further study and to careers both with the technology industry and the wider economy.

1.25 Provisional 2016 data\(^4\) shows that since 2010 pupils entering for biology GCSE have increased by 16,164 (13.9%), chemistry by 16,940 (15.0%) and physics by 17,152 (15.3%). Pupils entering for computer science GCSE continue to rise quicker than any other subject, with 33,500 entries in 2015 rising to 62,100 in 2016, which is an increase of 85.3%.

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\(^4\) GCSE and equivalent results: 2015 to 2016 (provisional), DfE, October 2016
1.26 The Stimulating Physics Network and the Further Maths Support Programme have been working with schools to improve take up of physics and maths A levels through CPD and other activities. Both these programmes focus on schools with low take up of these subjects at A level many of which are in disadvantaged areas. Isaac Physics delivered by Cambridge University, offers support and activities through an online study tool and face to face events to improve A level physics students’ problem solving skills that should help improve their A level grades and better prepare them to apply for and study physics, and related subjects such as engineering, at university. Currently over 1,800 schools are using this resource. Cambridge University has also delivered the Cambridge Maths Education Project (Underground Mathematics) which aims to bridge the gap between mathematical study at school and university by supporting students to develop deeper and more complex mathematical thinking. The project has developed innovative web-based A level mathematics teaching resources and has worked directly with 45 early adopter partner schools to develop teaching approaches. Currently 580 affiliate schools and colleges are accessing the material which was publicly launched in November 2016. Provisional 2016 data\footnote{A level and other 16 to 18 results: 2015 to 2016 (provisional), DfE, October 2016} shows that take up of maths, science and computing A levels has increased by 27,000 (13%) since 2010. Maths is now the most popular A level and computing A level has seen the biggest increase in entries in 2016 in any subject (up 16% since last year).

1.27 To improve the maths skills of young people with a grade C or above at GCSE at age 16 but who do not progress to AS/A level, we have introduced Core Maths qualifications. The first exams were held in 2016 and taken by almost 3,000 students. We are continuing to invest in the Core Maths Support Programme to increase the number of Core Maths Teachers and we expect entries to grow significantly in the future.

1.28 There is still more to do to ensure more young people study maths post-16. In March 2016 the government invited Professor Sir Adrian Smith to review the case for how to improve the study of maths from 16 to 18, to ensure the future workforce is skilled and competitive. This includes looking at the case and feasibility for more or all students continuing to study maths to 18, in the longer-term. The report will be published shortly year.

1.29 We also introduced the requirement that every 16-18 year old that achieved a D grade or below in GCSE English and maths continues to study these subjects, resulting in a significant increase in young people retaking their GCSEs.

1.30 Last summer, 51,200 maths exams sat by students aged 17 and over were graded A*-C – up from 30,000 in 2012, before we introduced our 16-18 English and maths requirements.

1.31 This has played a part in increasing the proportion of young people achieving a Level 2 maths qualification by age 19 – in 2015, over three quarters (75.6%) of young people had achieved a level 2 maths qualification by age 19. This is a 12.8 percentage point increase since 2010.
**STEM Inspiration**

1.32 BEIS funds and collaborates on a number of programmes to inspire the next generation of scientists and engineers, including the STEM Ambassadors programme and the Inspiring Science Fund. The approach to improving the diversity of the STEM workforce is to focus these efforts to those who generally don’t engage with science or think it is for them. This is based on the concept of “science capital” which was found to be a major factor in young people deciding whether to study science. Those with low science capital are often the most disadvantaged in society.

1.33 The STEM Ambassadors Programme is a network of over 30,000 volunteers from 3,500+ employers from industry and academia who engage in inspirational and stimulating activities with young people to increase their interest in STEM subjects at school, and to raise awareness of the range of careers that STEM qualifications offer. We are reforming the Programme by developing a digital platform for STEM Ambassadors to broaden the reach of the ambassadors. Schools which already do a lot of STEM activities will be able to access STEM Ambassadors more easily, freeing up resource in the STEM Hubs to target those who are not engaged, especially in disadvantaged or rural areas. The digital platform will also mean that non-school groups such as community groups, uniformed associations, science centres and museums will be able to access STEM Ambassadors for the first time.

1.34 40% of STEM Ambassadors are women and 13% from BAME backgrounds. By going into schools and talking about their career paths as well as doing interesting and engaging STEM activities with young people, the STEM Ambassadors can demonstrate that people like them can be scientists and engineers.

1.35 The positive impact of STEM Ambassadors has been demonstrated in an independent evaluation of the programme, for example helping young people better engage and continue to study STEM subjects and explore STEM careers, and helping enhance quality of teaching by bringing learning from business and industry into the classroom as well as helping professional development.

1.36 Science centres, which play an important role in informal science learning are also receiving a boost in support, through the Inspiring Science Fund. The £30m joint partnership between Government and the Wellcome Trust (funding £20m and £10m respectively) will be used by UK science centres to invest in cutting edge exhibitions and education spaces and research those who think science is not for them. The fund is being administered by Wellcome Trust, and bids will need to demonstrate that the projects will help the centres reach new audiences and improve their financial sustainability.

1.37 To further engage young people with science, we will continue to support schemes such as the CREST Awards, which is the UK’s largest national award scheme for project work in STEM subjects, with 33,000 young people aged 11-18 receiving an award in 2015, around half were female. Independent evaluation of the CREST Awards has shown that gaining CREST silver has a positive impact on both attainment at GCSE and subject choices at A Level: these results are even stronger for young people who have had Free School Meals at any point in their school career. BEIS is also funding the development of a new digital platform to expand the scheme, doubling the participant numbers to over 60,000 within 2 years of the platform launch.

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7 “STEM Ambassadors: Making an Impact” 2016, National STEM Learning Network
8 [www.bsa.sc/crestimpact](http://www.bsa.sc/crestimpact)
1.38 BEIS is investing £1 million in a new Polar Explorer Programme to engage young people and inspire the scientists, engineers and explorers of the future. The Polar Explorer Programme is focused in the Northern Powerhouse region and in schools in disadvantaged areas. It follows a model tested in the successful Tim Peake Primary Project and aims to increase pupils’ engagement and attainment in science; increase confidence in working scientifically- including quality of teaching; increase awareness of the importance and relevance of science to society and the knowledge of the work of the Royal Research Ship Sir David Attenborough.

1.39 Actions the Government has taken to support diversity within engineering include the “Engineer Your Future” exhibit at Science Museum, targeting girls and under-represented groups in engineering between 11-15 years old to consider a future career in engineering. Government also seed funded the Tomorrow’s Engineers Week campaign to inspire young women into engineering careers, and the Your Life campaign led by industry to ensure the UK has the right maths and science skills it needs to succeed in a competitive global economy.

**Teaching**

1.40 Critical to increasing the take-up of STEM subjects is the quality of teaching. To recruit more graduates into teaching, we are continuing to offer financial incentives in the subjects where they are most needed with scholarships and bursaries worth up to £30,000 in physics and £25,000 in maths, chemistry and computing.

1.41 In March 2015, the former Prime Minister announced the Government is investing up to £67m to recruit 2,500 maths and physics teachers and to upskill 15,000 existing non-specialists over the term of this parliament. This package is made up of 8 strands, each focusing on different parts of the teacher supply pipeline.

1.42 The Government has continued to support continuing professional development for existing STEM teachers in primary and secondary schools.

1.43 This includes national networks of school-led centres of excellence: 35 Maths Hubs are raising the standard of maths education from primary school to age 18. This includes disseminating the Shanghai approach to mastery mathematics teaching in primary schools through a £41m programme to address longstanding weaknesses in maths, enabling more pupils to gain a secure grasp of the subject by the end of primary schools; the network of over 40 Science Learning Partnerships, evaluation of which demonstrates good evidence of impact on teachers’ confidence, teaching quality and improved pupil performance; and the Network of Teaching Excellence in Computer Science which manages a national network of over 300 ‘Master Teachers’ whom schools can commission to provide training for their teachers in computing, on a local needs basis. In the period ending March 2016, teachers who received Master Teacher-led CPD reported that their confidence in teaching computing had increased by 88%, and 99% of teachers said that their CPD would have an impact on the classroom.

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9 By age 15, students from Shanghai are three years ahead of pupils in England in mathematics – OECD, PISA 2012
University Technology Colleges (UTCs)

1.44 University technical colleges (UTCs) have been established to address skills gaps in local and national industries, providing a technical education to meet the needs of modern businesses. There are currently 48 UTCs open and a further 7 UTCs are in development which plan to open in 2017 and beyond.

1.45 UTCs typically cater for between 500-800 students who split their time between core academic subjects and learning specific technical skills and qualifications. All UTCs are sponsored by a local university and employers and are established to meet demand for particular skills identified by employers locally and nationally. Each UTC has one or two specialisms, ranging from engineering and manufacturing to construction and bio-medical sciences. These specialisms are determined locally and there is no prescribed DfE list of what is or is not acceptable – it is for the employers and university to decide and make the case.

1.46 UTCs specialise in subjects that need modern, technical, industry-standard equipment, such as engineering and digital technologies. Pupils integrate academic study with practical learning, studying core GCSEs within a high-quality technical and professional curriculum. UTCs work with local and national employers and higher education institutions to design and deliver a curriculum that, through technical projects and work experience, will provide pupils with the skills employers demand for their industries.

1.47 UTCs are legally established as academies that focus on providing a technical education at KS4 & KS5 to meet the needs of modern businesses. Given they are all new schools they are part of the overall free schools programme.

1.48 UTCs follow a model established by the Baker Dearing Educational Trust which is headed by Lord Baker. UTCs are independent from the BDT, and each UTC’s governing body is controlled by a majority of employers and university representatives. This is what makes UTCs unique.

1.49 This government is committed to improving technical education and we want to offer a high standard of education for young people who want to follow a technical or professional pathway. UTCs offer pupils technical and hands-on practical learning alongside their GCSEs and A-levels to equip them with the technical knowledge and professional skills employers demand.

1.50 The timetable at UTCs is split between academic subjects and specific technical skills and qualifications. 60% of KS4 time is given to academic subjects and 40% on technical. These proportions are reversed at KS5.

1.51 Employer engagement extends to the design and delivery of challenge projects which bring together practical and theoretical learning and real life issues. Students also learn through work placements and access to industry standard facilities and equipment. Over 500 employers are involved in UTCs including household names such as Network Rail, Toyota and Siemens.

1.52 University engagement ranges from designing and delivering curriculum projects, providing access to facilities, visiting lecturers, CPD for staff and student mentors. The UTC model means that majority of the board of trustees are nominated by the university and employer sponsors. Over 45 different universities are involved in UTCs, including 8 Russell
Group Institutions.

1.53 Many UTCs run longer term times and operate business hours to help prepare students for the world of work.

1.54 Fourteen open UTCs have been inspected by Ofsted (excluding those which have closed). The outcomes of these inspections are: one judged as ‘outstanding’, seven judged as ‘good’, four as ‘requires improvement’ and two ‘inadequate’. Three UTCs have closed; one was judged as ‘requires improvement’ and two ‘inadequate’. Two UTCs, Lancashire and Daventry are due to close in August 2017; both of these have been judged as ‘requires improvement’.

1.55 In January 2016, we published 2015 KS5 results for 14 UTCs. The highest vocational results were at UTC Lancashire (APS 254.3) and the lowest were at Silverstone UTC (APS 181.3). The national average for vocational APS is 219.5. Seven of the 14 open UTCs with results are above national average for vocational KS5 results. The highest academic results were at Liverpool Life Sciences UTC (APS 211.8) and the lowest were at UTC Lancashire (APS 88.9). The national average for academic APS is 216.4.

1.56 In October 2016, we published provisional 2016 KS4 Progress 8 results for 25 UTCs. The Leigh UTC had the highest provisional results on this measure (-0.07). The lowest provisional results were at the Greater Manchester Sustainable Engineering UTC (-2.49). The average across the 25 open UTCs with provisional results is -0.74. Seventeen were provisionally below the floor standard (-0.5 progress 8 score).

1.57 Learning from the experiences of the early UTCs, we are strengthening the programme through a number of reforms, including improving educational outcomes through partnerships with successful secondary schools and multi-academy trusts. We are also consulting with local authorities on potentially making changes to school information regulations to require them to write to parents of Year 9 children about options for study at age 14, to help ensure parents are better aware of the options open to young people at this age.
FURTHER EDUCATION

Reforms to Technical Education

1.58 There are currently over 13,000 qualifications available to 16-19 year olds, but no clear progression route, making it difficult for young people to decide which courses would best meet their career aspirations. For example, there are 33 qualifications in plumbing available for 16-19 year olds, a bewildering array of options.

1.59 In 2010/11, only 7% of the qualifications secured by 16-19 year olds were in the kind of advanced technical qualification needed to prepare them for employment. As a result, these students found themselves with very few employment or further training options.

1.60 An Independent Panel on Technical Education, chaired by Lord Sainsbury, advised on how to improve technical education in England and represents a ground-breaking package of reforms.

1.61 The technical education measures take forward our reforms set out in the Post-16-Skills Plan – where we accepted Lord Sainsbury’s recommendations.

1.62 The Skills White Paper (published July), accepted all recommendations and outlines the most radical reform of post-16 education since the introduction of A Levels almost 70 years ago, and will transform the technical education landscape.

1.63 Our ambition is for technical education to prepare individuals for employment in occupations which require the acquisition of both a substantial body of technical knowledge and a set of practical skills valued by industry. The new system will be high status and should become the clear pathway of choice for students dreaming of a career in these occupations.

1.64 The reforms mark a fundamental shift towards a simplified, high status system consisting of clear occupational routes which will cover all technical occupations and both college-based education and apprenticeships. Each college-based route will be underpinned by qualifications based on a common framework of standards, designed by employers.

1.65 A reformed technical option needs to build on the excellent progress we have already made in reforming apprenticeships, which are now driven by the skills and knowledge employers want. Technical education reforms will drive further growth in apprenticeships, contributing towards the Government’s pledge of delivering 3 million quality apprenticeship starts by 2020.

1.66 This represents a radical shift in emphasis, making technical education employer-led and responsive to the requirements of the economy. It will simplify the existing system, standardising qualifications and making it easier to understand for employers and students alike.

1.67 The 15 routes approach is consistent with the best practice as used in countries like Germany, Australia and Norway, and will place our system on par with the best in the world. There are specific routes relating to health and science, engineering and manufacturing, and digital, and these will help learners who are interested in these areas to identify more clearly the skills they need to acquire for a successful career. The standards that employers
develop for the other routes will also identify the key competences – particularly in maths and ICT – which are needed to perform well in today’s economy (see organogram on page 23 for further information).

1.68 The new system will be high status – not all occupations will qualify for technical education – and should become the pathway of choice for students dreaming of a career in these occupations.

1.69 Every 16-18 year old student will also have the opportunity to have a work placement, meaning that real experience of an occupation will be at the heart of the reforms.

**National Colleges**

1.70 There is currently evidence of skills gaps in a number of strategically important sectors, with non UK born workforce accounting for 20% of engineering professionals in the oil and gas, aerospace, computing, electronic and optical engineering sectors.

1.71 Many industries reliant on higher level technical skills face challenges due to an ageing workforce, e.g. 70% of highly skilled nuclear workers are due to retire by 2025.

1.72 National Colleges are a key part of our measures to address gaps in the high-level skills needed by employers. They will also help ensure that we have the skills in the UK to support the delivery of major infrastructure programme.

1.73 As employer-led institutions, they will deliver specialist technical skills training within sectors that are critical to economic growth and productivity.

1.74 Around £80m of government funding has been announced to support the creation of 5 new National Colleges. These centres of high-tech training will ensure the UK has skilled people in industries crucial to economic growth – high speed rail, nuclear, onshore oil and gas, digital skills and the creative industries.

1.75 A number of key milestones in the rollout of the Government’s National College programme have been achieved, with the opening in September 2016 of the ‘Ada’ National College for Digital Skills and the National College for the Creative and Cultural Industries. Work is also on track to ensure that the National Colleges for High Speed Rail and Nuclear open as planned from Autumn 2017. Each College is developing learner recruitment plans aimed at attracting new talent into their respective sectors as well as improving the skills of the current workforce; and will work closely with other providers to ensure a broad national reach and to develop clear progression routes for learners. The expectation is that National Colleges will deliver training to c21,000 learners by 2020.

**Institutes of Technology (IoTs)**

1.76 There are particularly acute skills shortages at higher levels in sectors that depend on STEM subjects such as manufacturing and construction. The Government is therefore supporting the creation of new Institutes of Technology to increase the provision of higher level Technical Education, which only exists on a limited scale in England currently.

1.77 Institutes of Technology will deliver high-quality technical education at higher levels, tailored around the needs of employers to fill skills gaps in local areas. They will grow out
of high-quality provision where it already exists and take account of recommendations from Area Reviews. IoTs will specialise in technical disciplines such as STEM that are aligned to the new technical routes; offer high quality provision at levels 3, 4 and 5 (equivalent of A level to just below degree); and have a local focus to deliver qualifications of value that meet the skills needs of local employers. In this way IoTs will help raise the profile of higher-level technical provision in their areas and increase the attractiveness of this route to learners and employers.

1.79 DfE officials have been testing a range of IoT delivery models over the autumn with stakeholders to test the validity of the concept and how delivery would work in practice. This will inform further thinking on the way ahead in 2017.
APPRENTICESHIPS

1.80 Apprenticeships play an important role in addressing the gap in skills within the STEM workforce.

1.81 Our 2020 Vision document (published in December 2015) set out that apprenticeships were being reformed precisely to address skills shortages and stimulate economic growth given our critical need for technical and professional skilled workers, particularly in sectors such as STEM and digital.

1.82 The 2020 vision for apprenticeships explicitly supports growth/productivity: increasing skills of workers; reducing skills gaps by providing employers with skilled labour; creating high quality.

1.83 It is important to articulate to young people the career opportunities in STEM based occupations via STEM Apprenticeships. We launched a new apprenticeships communications campaign in May 2016 promoting the benefits of apprenticeships to young people, their influencers and employers, which builds on the previous successful Get In Go Far campaign; the budget for f/y 2016/17 is £13million.

1.84 There are an increasing number of STEM apprenticeships. Those currently available are in sectors such as Construction, Advanced Engineering, Engineering Environmental Technologies, Energy and Utilities (Water and Waste), and Space Engineering.

1.85 As part of funding policy reforms published in October 2016, we are uplifting the funding rates of STEM subjects, recognising that employers are previously more likely to have contributed to the costs of the training. This uplift reflects that employers are currently disproportionately likely to be paying extra to providers on top of the funding provided by government for these apprenticeships.

1.86 The STEM uplift is based upon the Sector Subject Area (SSA) that the framework issuing authority assigns. The uplift is 40% for level 2 pathways and 80% for pathways at level 3 and above. The SSAs that receive a STEM uplift are:

- Engineering and Manufacturing Technologies
- Information and Communication Technology
- Science and Mathematics
- Construction, Planning and the Built Environment.  

1.87 For all STEM frameworks we will increase the current government-funded adult rate by 40% at Level 2 and 80% at Level 3, and then allocate these frameworks to the nearest new funding band. For this purpose, we will determine STEM frameworks by sector subject area.

1.88 Apprenticeship starts in STEM-related Sector Subject Areas (all ages) increased by 42.0% between 2009/10 and 2013/14.

12 Engineering and Manufacturing Technologies; Information and Communications Technology; Science and Mathematics
1.89 For 16-18 year olds, Apprenticeship starts in STEM-related SSAs increased by 6.7% between 2009/10 and 2013/14 but for adult apprentices aged 19+, starts increased by 82.6%.

1.90 Research into the provision of STEM Apprenticeships published on 31 March 2014:

- Confirmation that employers in a range of sectors value the contribution STEM Apprenticeships make to their businesses. Supply and demand are currently in balance, but an up-turn in the economy or large infrastructure project could alter this, given that employers take a lean approach to apprenticeship recruitment.

- Many of the new Degree Apprenticeships are in STEM occupations, such as Aerospace Engineer, Nuclear Engineer & Scientist, and Manufacturing Engineer.
1.91 The Government has introduced part-time maintenance loans in 2018/19 alongside the tuition fee loans we introduced for part-time students in 2012/13, and we will extend the Equivalent and Lower Qualification (ELQ) exemption so that those studying part-time for second degrees in a STEM subject are eligible for student finance.

1.92 The Government has changed the restriction on previous study introduced in 2008 to allow new students to apply for tuition fee loans for a second, part-time honours degree in engineering, technology & computer sciences in 2015/16 and for a wider range of part-time honours degree STEM courses from 2017/18.

1.93 The outcomes of two independent reviews, led by Sir Nigel Shadbolt and Sir William Wakeham, looked respectively at how graduate employment outcomes for graduates from Computer Sciences and STEM degrees more broadly could be strengthened and stressed the need for an increased focus on, for example, work experience, ‘soft skills’ and advice and support on career planning. We are working with stakeholders to take forward their key recommendations, in particular, seeking to increase the number of students undertaking work experience to develop their professional skills.

1.94 In November 2015, George Osborne gave his commitment to support the training of the nation’s next generation of coders. He announced the launch of a new competition, attracting joint collaborations between universities and business for a prize of up to £20 million focused on digital skills and computer science. Titled the Digital Skills Innovation Fund, it aims to contribute to an innovative solution which will increase the digital skill level of the UK, in order to support the growth of the UK’s digital sector, and ultimately, the economy as a whole.
DIVERSITY AND INCLUSION IN STEM

1.95 The Government is committed to ensuring the STEM workforce is diverse, reflects wider society and makes use of all the talents available to it. For the UK to reach its full potential, we must draw on all available talent and improve diversity in the STEM workforce.

1.96 Provisional 2016 data shows that since 2010 the number of girls entries to STEM A levels has increased by 12,000 (13.5%). We want to build on this so that more girls take STEM A levels especially mathematics, physics and computing. Excellent teaching is vital and we are improving the quality of teaching through a number of programmes including Maths Hubs, Science Learning Partnerships and the Network of Teaching Excellence in Computer Science as set out above, and both the Stimulating Physics Network and the Further Maths Support Programme focus some of their support to schools on improving girls’ engagement in these subjects.

1.97 Although they make up around half the STEM workforce, women are underrepresented at senior levels and particularly in some disciplines, e.g. engineering, where less than 10% are female – the lowest proportion in Europe. Only 51% of Black and Minority Ethnic compared with 71% of White engineering graduates enter full time employment after 6 months.

1.98 BEIS and wider Government, therefore, fund and support organisations which run programmes to help create more of a diverse STEM workforce, both now and in the future. Diversity and inclusion are also embedded across all the STEM inspiration programmes funded by BEIS. These programmes also aim to encourage girls to consider the breadth of STEM careers. GEO published an online guide ‘Your Daughter’s Future’ in 2015 which is designed to help parents to support their daughters career choices. It provides guidance on what choices children will face and when and supports parents to challenge gender expectations.

1.99 BEIS is working with the Women’s Business Council’s STEM working group to develop proposals to tackle issues of low numbers of women in engineering. The Women’s Business Council is a Government Equalities Group made up of independent experts from a range of industries which makes recommendations to businesses and government on how to increase women’s contribution to the economy.

1.100 BEIS Ministers established a Diversity Steering Group to advise how to help improve the diversity in the research and innovation sectors. The remit of the group is to focus on removing barriers to equality; improving the diversity of the workforce and promoting equality in service delivery (including on research grants) of research and innovation partner organisations. Membership comprises of experts from the research community, universities and business. As part of this work Research Councils UK launched an Action Plan on Equality and Diversity and Inclusion in May 2016. This best practice will be shared through the Science and Research sectors to raise more awareness and to encourage partners to work together to improve diversity.

1.104 To improve the diversity of research fellowship awards, the National Academies are working to encourage more applications from under-represented groups and to guard against discrimination in the selection process.
1.101 Innovate UK have also developed the ‘infocus’ brand as a communications campaign concept to support all of their work on diversity and inclusion. The first major action from this campaign is the ‘infocus - Women in Innovation’ initiative. The initiative provides an opportunity to boost the UK economy by getting more women innovating in UK businesses. Women are currently underrepresented in the applications that Innovate UK receives for funding (latest research shows that 14% of lead applicants to Innovate UK are women) and it is hoped the campaign will address this.

1.102 BEIS established a programme jointly run by the Royal Society and Royal Academy of Engineering aimed at understanding and addressing issues of diversity and inclusion in the STEM workforce. The programme remains a key component of both organisations’ strategic plans. The Royal Academy of Engineering’s Diversity and Inclusion Leadership Group is an example of the type of action which is necessary from business to tackle retention as well as recruitment of underrepresented groups in engineering.

January 2017
The 15 new technical routes to skilled employment

- Agriculture, Environmental and Animal Care (454,726)
- Business and Administrative (2,204,478)
- Catering and Hospitality (568,996)
- Childcare and Education (1,060,804)
- Construction (1,625,448)
- Creative and Design (529,673)
- Digital (351,649)
- Engineering and Manufacturing (1,319,645)
- Hair and Beauty (293,004)
- Health and Science (915,979)
- Legal, Finance and Accounting (1,525,482)
- Protective Services
- Sales, Marketing and Procurement
- Social Care
- Transport and Logistics

We expect these routes to be delivered primarily through apprenticeships.