

Drivers of Future Skills Demand

November 2013

Jamie Watson

Contact:

Jamie.watson@coast2capital.org.uk

Drivers of Future Skills Demand

Table of Contents

Introduction	2
Political Factors.....	2
European policy drivers:	2
UK Government Policy:	3
Economic Factors	6
Social and Demographic Factors	8
Technological factors	11
Conclusion:	14

Drivers of Future Skills Demand

Introduction

1. This paper considers the potential drivers of future skills demand; specifically the political, economic, social and technological factors and assesses their likely impact at national level.
2. The following section looks at likely drivers of skills supply and demand in the near future and their likely effects on skills at a national level. It covers the areas of politics, both EU and UK level, and the potential effects of various policies; economic factors such as global competition, the recession, employment projections, and the skills requirements of employers; social factors covering population demographics, equality in the workplace, and youth unemployment; technological factors such as technological advances, McKinsey's twelve disruptive technologies, the UK government's eight great technologies, and low carbon technology.

Political Factors

European policy drivers:

3. At European level, economic and labour market policy is set by the European Commission. Following the recent economic problems in Europe, for the period 2014 to 2020, the main policy thrust is towards creating growth that is smarter and more sustainable, increased employment, R&D, Education, Environment, and Social Inclusion. This is set out in Europe 2020 policy¹ that has five main targets, four of which are likely to have a direct effect on skills demand.
 - The target for employment of 75% of 20-64 year olds will require their skills to be of a high quality and relevance to the job market to achieve this rate.
 - The target of 3% of EU GDP being spent on R&D will, if achieved, increase the demand for highly skilled researchers to perform the R&D.
 - The target for a 20% increase in renewable energy is expected to drive the need for skills in the low carbon economy, in line with the UK government's aim.
 - Lastly, the targets for reducing the rate of early school leavers below 10% and for at least 40% of 30-34 year olds to complete level 4 education.
4. If achieved, these targets may result in an increase in the supply of a highly skilled workforce. However since skills are a derived need in firms, it may not increase demand for skills if it is not aligned with policies to stimulate business growth.

¹ Source: 'Europe 2020: A strategy for smart, sustainable and inclusive growth' The European Commission, 2010

Drivers of Future Skills Demand

5. As part of Europe 2020, seven flagship initiatives have been launched. Of these three are connected to the provision of skills, the Digital Agenda for Europe, the Innovation Union, and the Agenda for New Skills and Jobs².
 - The Digital Agenda for Europe will have a focus on digital literacy, competencies, and skills; this initiative will aim to raise the skills and inclusion of the EU population in this respect.
 - The purpose of 'The Agenda for New Skills and Jobs' is to anticipate future skills needs better, match skills and labour force needs, and bridge the gap between education and work. This will link to the targets for employment and education rates.
 - The Innovation Union will be concerned with delivering activities related to R&D and the target for 3% of GDP to be spent on R&D. This includes increasing the training of researchers so countries reach their R&D targets and reducing skills shortages, supported by Horizon 2020.
6. Horizon 2020³ is the body charged with helping to secure Europe's global competitiveness, primarily through driving up levels of innovation and R&D. It will be market driven, aiding the development of innovations into commercial products. The aim is to boost top-level research throughout Europe, and increase funding by 77% for the European Research Council. To achieve this they have a budget of €24,598 million. There will be major investment in key technologies to strengthen industrial leadership in innovation. This heavy investment in research and innovation is likely to require an increase in skilled personnel to carry out and manage the R&D process and to enable commercial development.

UK Government Policy:

7. The UK government's policy supports Europe 2020 policy in that it is also focused on increasing growth and jobs through innovation, R&D, skills and education as well as through its industrial strategy which aims to develop key knowledge intensive sectors. Government ambitions to close the skills gap between the UK and competitors such as France and Germany and to have a world-class skills base to create a competitive advantage will be a large factor in skills supply. Creating high skilled job growth will also depend on increasing demand through the development of innovation, R&D, and knowledge intensive sectors to take advantage and realise the full benefits of an increased supply of skilled labour.
8. The Leitch review⁴ sets out the target, which the Government has made central to its skills strategy, of matching the upper quartile of OECD skills, requiring doubling attainment levels at most levels of education. These goals include:

² Ibid

³ Source: 'Horizon 2020 - The Framework Programme for Research and Innovation' The European Commission, 2011

⁴ Source: 'Leitch Review of Skills' Lord Leitch, 2006

Drivers of Future Skills Demand

- 95% of adults to achieve the basic skills of functional literacy and numeracy, an increase from levels of 85% literacy and 79% numeracy in 2005;
 - In excess of 90% of adults qualified to at least Level 2, an increase from 69% in 2005. There is also a commitment to go further and achieve 95% as soon as possible;
 - Shifting the balance of intermediate skills from Level 2 to Level 3. Improving the esteem, quantity and quality of intermediate skills. This means 1.9 million additional Level 3 attainments over the period and boosting the number of Apprentices to 500,000 a year;
 - In excess of 40% of adults qualified to Level 4 and above, up from 29% in 2005, with a commitment to continue progression.
9. The UK government is reforming education in various ways, including:
- increasing the school leaving age to 17;
 - giving further education institutions more flexibility to set their curriculum;
 - introduction of technical level qualifications;
 - students failing to reach A*-C in GCSE level in English or Maths will be required to continue studying these subjects, and take up a traineeship or extended work experience⁵.
10. In addition, a radical reform of GCSEs has just been announced which will include a review of the subjects which are available as well as a reduction in coursework and an increased focus on examinations.
11. As part of these reforms, Government is expanding the number of adult Apprenticeships by 75,000 and increasing spending on Apprenticeships by £250 million over the spending review period⁶.
12. As part of a drive to up-skill the workforce, Government will also be changing Apprenticeships so that Level 3, technical level, will become the attainment level learners are expected to attain, instead of Level 2. Clearer guidelines for progression onto higher levels will also be given, with Higher Education Institutions instructed to provide for students entering with a Level 3 education⁷.
13. The Government is aiming to widen participation in higher education further from people in low income backgrounds, increase the participation of the over 30s, and increase engagement of employers in what Higher Education Institutions offer. To help those from low income families deal with the tuition fee increases they have set out the following⁸:

⁵ Source: 'Rigour and Responsiveness in Skills' Department for Education, 2013

⁶ Source: 'BIS Skills for sustainable growth – strategy document' 2010

⁷ Ibid

⁸ Source: 'Higher Education Policy Institute: Higher Education, skills and employer engagement' 2007

Drivers of Future Skills Demand

- A full grant to help with living costs for people from families who earn £25,000 or less;
 - The National Scholarship Programme will offer help to people from disadvantaged backgrounds;
 - Universities charging between £6,000 and £9,000 must offer students more financial help through an access agreement.
14. STEM skills, i.e. science, technology, engineering, and maths, have become an increasingly important area for both Government and business, the estimated turnover of the STEM skills intensive industries was £257 billion in 2007, just over 17% of UK GDP⁹, and the provision of these skills will determine the growth of these industries. The Government has set up the STEM cohesion programme, aimed at engaging young people in STEM related activities, such as education and career paths, in order to increase the skills base for STEM activities. The STEM cohesion report has found increasingly positive attitudes towards the programme and STEM related activities among students, teachers and key stakeholders¹⁰.
15. As part of reforms on immigration the government is imposing limits on non-EU migrants. The focus will shift to skilled migrant labour rather than unlimited migration, but could reduce businesses access to skilled migrant labour, driving up demand for domestic skilled workers¹¹.
16. In summary the UK policy on skills and education, combined with fiscal and immigration policy, if effectively implemented could have the following impact on skills demand and supply:
- Support the EU policy focus on creating jobs and growth and the increased emphasis on higher value employment through the development of key sectors and driving up innovation and R&D. This is likely, in turn, to increase demand for skills;
 - Reduce still further the number of people in the workforce without functional literacy and numeracy;
 - Increase the skills and qualification levels of a high proportion of new entrants to the workforce to at least entry level, currently thought to be Level 3 (although there are some signs that this is rising);
 - Continue the drive towards greater participation in HE;
 - Drive up the supply of STEM skills.
17. However, it may be the case that the policy is still too supply, rather than demand side, focused and more will need to be done to increase the demand for higher level skills among organisations, particularly at local level, since such interventions generally take place at the level of the firm.

⁹ Source: ONS, The Guardian: UK GDP since 1955

<http://www.theguardian.com/news/datablog/2009/nov/25/gdp-uk-1948-growth-economy#data>

¹⁰ Source: 'The STEM cohesion programme: final report' Department for Education 2011

¹¹ Source: 'BIS Skills for sustainable growth – strategy document' 2010

Drivers of Future Skills Demand

Economic Factors

18. Globalisation exposes the UK to more competition for example with China and India having a comparative advantage in the low value added end of production. This means that the UK needs to move further up the value chain¹². Progress up the value chain requires businesses to develop the appropriate product/market strategies which will in turn require workers with higher skills in order to compete on quality rather than price, increasing demand for high skilled workers over all¹³.
19. As companies search for growth avenues post-recession, innovation provides an opportunity. Through technical or organisational innovation a company can improve or introduce new products, or making their business more efficient and flexible, both of which require a skilled workforce to take advantage of these innovations¹⁴.
20. Desire for productivity gains could also drive skills demand, provided firms understand the link and are willing and able to make the investment. A 5% increase in the number of workers in training can lead to a 4% rise in value added per worker, at a cost of 1.5% in wage increases to the company¹⁵. However as companies are often hesitant to invest in general human capital due to perceived risk of those trained workers moving onto another employer, this will increase demand on those already trained to that level¹⁶. However the National Adult Learning Survey found that the percentage of people taking up training in the three years before the survey had dropped from 74% in 2007 to 69% in 2010, and down from a high of 80% in 2005. They suggest a combination of factors to explain this fall¹⁷:
 - The recession has led to costs being reduced, making individuals and employers less willing to pay for training;
 - A reduction in funding of short courses in favour of longer ones, potentially reducing the amount of informal learning;
 - A reduction in employer funding for on the job training;
 - A plateauing of ICT training, a big driver of learning, as many people in the workforce have now acquired sufficient ICT skills and the user interface continues to become easier through technological progress;
 - A lack of time to take the training - respondents suggested that the decision to take up training is partly based on how long it will take to complete.

¹² Source: 'Leitch Review of Skills' Lord Leitch, 2006

¹³ Source: 'A Literature Review on Skills and Innovation. How Does Successful Innovation Impact on the Demand for Skills and How Do Skills Drive Innovation?' Tether et al, 2005

¹⁴ Source: 'BIS Economics paper 4: Supporting analysis for "Skills for Growth: The national skills strategy"' 2010

¹⁵ Source: 'UKCES Working Futures 2010-2020' 2012

¹⁶ Source: 'BIS Economics paper 4: Supporting analysis for "Skills for Growth: The national skills strategy"' 2010

¹⁷ Source: 'BIS research paper 63: National Adult Learner Survey 2010'

Drivers of Future Skills Demand

21. Participation rates in different learning activities have also dropped, with:
 - 32% participating to learn new skills for work in 2010, down from 38% in 2005;
 - 23% participating in on the job training in 2010, down from 28% in 2005;
 - 35% participating in professional development in 2010, down from 45% in 2005¹⁸.

22. There is some evidence that jobs as well as skills are being up-skilled. According to the Skills and Employment Survey 2012, jobs requiring a degree rose from a fifth in 2006 to a quarter in 2012 while jobs requiring no qualifications fell from 28% in 2006 to 23% in 2012¹⁹. However the supply of graduates in the workforce was higher than this percentage at around 33% in 2012²⁰ but there is also evidence that rising levels of over-qualification among graduates fell during this period, i.e. that skills demand was also rising, as seen by the graduate over-qualification rate falling from 28% to 22% from 2006 to 2012. There was also a rise in respondents saying they felt they had the opportunity to use the knowledge and skills they had, up to 87% in 2012 from 82% in 2002³⁷. Respondents to the survey suggested that the rise in skills requirements was not just due to the rising supply of qualified workers, but that the qualifications were essential or necessary to do the job³⁷.

23. UKCES forecasts a continuation of the trend in increasing employment at the high end of the skills spectrum, for managers, professionals, and associate professionals, with two million new jobs being created in the next ten years²¹. This is part of a larger trend of 'skills polarisation' where medium skills jobs are reduced through technological improvements or outsourcing, and jobs growth is found at the top and bottom end of the skills spectrum. Skilled manual roles, and administration and secretarial jobs are forecast to lose 400,000 jobs each from 2010 to 2020, while lower skilled jobs in caring, personal and other service occupations, and elementary jobs are expected to increase by 400,000²².

24. In the 2010 to 2015 period public sector employment is expected to fall by 400,000 whereas the private sector is expected to gain 800,000 jobs and is projected to increase by 1.5 million jobs over the 2010-2020 decade²³. At a broad sector level from 2010 to 2020, Primary Sector and Utilities, Manufacturing and Non-Market services are expected to see losses in employment, whilst Construction, Business and Other Services, and Trade, Accommodation and Transport are expected to see gains in employment. Business and Other Services is expected to make the biggest gains of around

¹⁸ Source: 'BIS research paper 63: National Adult Learner Survey 2010'

¹⁹ Source: 'Skills at work in Britain: Skills and Employment Survey' Felstead et al, 2012

²⁰ Source: 'ONS Graduates in the labour market' 2012

²¹ Source: 'UKCES Working Futures 2010-2020' 2012

²² Ibid

²³ Ibid

Drivers of Future Skills Demand

1.1 million jobs, while Manufacturing is expected to lose the most, at around 170,000²⁴.

25. In summary, companies need to move up the value chain, adopt innovation and invest in higher-level skills in order to compete on a global level and there is some evidence that this is occurring in some sectors and with graduates increasingly getting jobs at the appropriate level, the increased supply of graduates, and the increasing share of employment in more highly skilled occupations.
26. However, it is doubtful whether this is happening sufficiently widely across the economy since growth remains slow. This could be due to a complex mix of factors which could include management and leadership skills gaps, reduced levels of training, information failures, lack of 'patient' finance, weaknesses in supply chains and general attitudinal factors.

Social and Demographic Factors

27. An ageing population presents problems as it may lead to a smaller workforce, creating gaps in employment and makes it harder for companies to find the employees with the skills they need. Energy and Utility Skills predicts that by 2031 there will be 9% fewer people under 25 years old in the workforce and 47% more people over 50 years old, compared with 1971 numbers²⁵. Part of the solution will be to raise the retirement age and have people working for longer, but it will also require older workers improving their skill levels and engaging in 'lifelong learning' as the economy changes to enhance their employability and productivity. It will also increase the importance of workforce productivity, as fewer employees are required to do more work, faster, and with more flexibility^{26 27}.
28. The Joseph Rowntree Foundation found that the over 85 population is the fastest growing age group in the UK, growing by 680,000 people in the last twenty five years²⁸ and the over 85s now account for 2.1% of the UK population. There is evidence of this change increasing pressure on benefits such as the Disability Living Allowance and the Attendance Allowance as the prevalence of disability rises with age, there was a 48% increase in the number of older people claiming these benefits between 1997 and 2009²⁹. The rise in numbers receiving these benefits will increase the cost of providing them³⁰, requiring a higher rate of employment and productivity

²⁴ Ibid

²⁵ Source: 'Energy and Utility Skills: Stage 3 report' 2007

²⁶ Source: 'Implications of population ageing for economic growth' Bloom et al, 2009

²⁷ Source: 'A Skilled Workforce for Strong, Sustainable and Balanced Growth' ILO, 2011

²⁸ Source: 'Joseph Rowntree Foundation - Demographic issues, projections and trends: Older people with high support needs in the UK' 2010

²⁹ Ibid

³⁰ Source: 'Joseph Rowntree Foundation - Facing the cost of long-term care' 2005

Drivers of Future Skills Demand

from younger generations, under pinned by improved skills, to provide a tax base capable of paying for these programs.

29. The Work Foundation finds that nearly one million people are not in education, employment or training (NEET), a figure that was rising before the recession and has been exacerbated since. 48% of NEETs had no experience of paid work when leaving education in 2012, rising from 41% in 2001, and before the recession a quarter of NEETs had no qualifications. They also highlight the changing skills requirements and what it has meant for people entering the workforce, suggesting that the move away from manufacturing to services has increase the need for 'soft skills', the ability to effectively interact on a face to face basis, especially in sectors that employ large numbers of young people. For young people without these skills it may have become harder to get into the labour market, leading them to becoming NEET³¹.
30. The National Careers Council highlight work by Mann et al in comparing the aspirations of teenagers with the projected job distributions and find there is a mis-match between the two. They further cite Gardner & Wilson who looked at training acquired by people in Further Education and labour market vacancies and found the two had "nothing in common." This will increase the overall demand for higher skills and the demand on the current workforce with required skills³².
31. The UK government has introduced new measures to tackle inequality, such as 'The Equality Strategy', saying that inequalities weaken society and have a cost to the economy for example the potential benefits of increasing women's employment and tackling occupational gender divides could be worth around £15 to £23 billion to the economy each year and that failure to fully utilise the skills and talents of ethnic minorities could cost the economy £8.6 billion a year. The UK government has also introduced the Equality Act 2010, which has simplified the legislative framework making it easier for targeted interventions ³³. In order to support more women entering the workforce, government and businesses have been called on to promote flexible working contracts, to allow carers to work and care for dependants without a negative impact on their career, improve the help for childcare, via talent management to reduce the effects of time away from work for maternity leave, increase paternity leave to share the responsibility between both parents, and increased action on reducing the cost of childcare through tax breaks for childcare facilities and childcare business grants to increase the provision of childcare^{34 35 36}(WBC 2013, JRF 2008, HM govt. 2013).

³¹ Source: 'The Work Foundation - Lost in transition? The changing labour market and young people not in employment, education or training' 2012

³² Source: 'National Careers Council - An Aspirational Nation' 2012

³³ Source: 'HM Government - The Equality Strategy - Building a Fairer Britain' 2010

³⁴ Source: 'Women's Business Council' 2013:

<http://womensbusinesscouncil.dcms.gov.uk/executive-summary/>

³⁵ Source: 'Joseph Rowntree Foundation - Reducing gender inequalities' 2008

Drivers of Future Skills Demand

32. Evidence from the Joseph Rowntree Foundation (2012) suggests that part time work is heavily in favour of low skilled work, typically jobs that pay the equivalent of circa £20K full time, making relevant part time work for higher skilled workers harder to find. This may also reduce the chances of low skilled workers finding part time work, as the competition for part time work becomes more intense. Attitudes towards high skilled part time roles make it difficult to offer part time work as a flexible solution, with 52% of businesses that had never employed high skilled workers on a part time basis saying they had an unofficial preference against it³⁷.
33. The Equality Strategy finds that women's pay is still 12% lower than men on average, which increases to 22% when part time work is included. The Joseph Rowntree Foundation finds that most care is unpaid but not free, due to the reduced economic opportunities for those who are carers, who are mostly women partly due to the pay gap, meaning it is more costly for men to reduce employment hours³⁸. The reduced economic opportunities have long lasting effects as women typically receive lower pensions due to the fact they worked less throughout their life. The Women's Business Council also found that 2.4 million women out of work who would like to and a further 1.3 million who would like to increase their hours. It also finds women are employed in sectors that are not expected to have job growth over the next decade, or sectors that are low paid. These problems lead to the recommendation that action be taken to train and reskill women so they can enter the workforce and take advantage of growth sectors.
34. Tackling inequality extends to other groups beyond women, such as ethnic minorities, older people, and people with disabilities. 14% of the population is made up of ethnic minorities, up from 7% in 1991³⁹, and the 'Equality Strategy' finds that some ethnic minorities have employment rates three times lower than white males, that Muslim men have the lowest employment rate compared to those of other or no faiths, and that people with disabilities had an employment rate of 48% compared with the average of 72%⁴⁰. The Work Foundation found that the largest employers of ethnic minorities were the distribution, hotel and catering sector and the transport and communication sector. Such sectors are expected to have employment growth as skills polarisation continues, but they are on the low skills end of

³⁶ Source: 'HM Government' 2013: <https://www.gov.uk/government/policies/creating-a-fairer-and-more-equal-society/supporting-pages/funding-a-grant-scheme-for-new-childcare-businesses>

³⁷ Source: 'Joseph Rowntree Foundation – Building a sustainable quality part time recruitment market' 2012

³⁸ Source: 'Women's Business Council' 2013: <http://womensbusinesscouncil.dcms.gov.uk/executive-summary/>

³⁹ Source: 'How has ethnic diversity grown 1991-2011?' Stephen Jivraj, 2012

⁴⁰ Source: 'HM Government - The Equality Strategy - Building a Fairer Britain' 2010

Drivers of Future Skills Demand

the spectrum⁴¹. Up-skilling these ethnic minorities may be required in order for them to move to high skilled, high growth employment sectors.

35. The UK government aims to encourage greater labour market participation in these groups through various measures aimed at reducing cultural and physical barriers to entry in the workforce⁴². However, there is limited mention of improving skills as a way to reduce barriers to entry although having the necessary skill set may help to increase these groups' employment rates.
36. It is increasingly the case that workers no longer have one job for life; they can have many job changes across varied career areas, with an average of eleven changes in their working life. This will require the skill and ability to be flexible and knowledgeable enough to transition between these roles. This also has implications for employers as high staff turnover can lead to skills gaps, increasing their need for skilled workers^{43 44}.
37. With the worker base potentially shrinking through an ageing population employers will have a smaller talent pool to find the skills they need. The UK government's policies on increasing the numbers of women, minorities, and young people in the workforce could help to ease this pressure. However, individuals require the skills that employers need otherwise if they are to be successful in the labour market whilst wider economic growth may be adversely affected by the inability to adequately fill these roles. Employers and government will have to work closely to find the right skills mix. With fewer working age people the choice available will be less flexible, possibly changing the focus from recruitment of young people to the retention and training of the current workforce.

Technological factors

38. The ILO predicts that many of the jobs created in the next twenty years do not currently exist whilst many of the workers who will be in these jobs are currently in education. This trend will place a high demand on those with transferable and flexible skills, both in the future and current workforce, as the technical skill requirements are unknown⁴⁵.
39. Technological advances are an increasingly significant driver of skills as the rate of innovation can be fast paced, the adoption of which may create skills gaps if the workforce is not sufficiently trained. New technology can replace low skills jobs with high skilled ones in sectors such as manufacturing, where new machinery may replace a low skilled worker, but requires a skilled

⁴¹ Source: 'The Work Foundation - Rising to the challenge of diversity' 2006

⁴² Ibid

⁴³ Source: 'National Careers Council - An Aspirational Nation' 2012

⁴⁴ Source: 'UKCES: Ambition 2020 report', 2009

⁴⁵ Source: 'A Skilled Workforce for Strong, Sustainable and Balanced Growth' ILO, 2011

Drivers of Future Skills Demand

worker to maintain and operate it⁴⁶. With increasing use of computers in all jobs, digital literacy skills had been a major driver of skills demand, but evidence suggests this driver of skills demand and training to be decreasing as most of the work force now has proficient ITC skills⁴⁷ and the user interface is becoming more accessible as technology continues to advance. The next driver of ICT skills may be in more specific skills where there are currently gaps, such as software developers and programmers⁴⁸. ICT will continue to displace administration and secretarial jobs that are connected to processing information, but will drive more jobs in skilled areas such as management and maintenance of these systems. The adoption of technology in manufacturing will follow a similar pattern, displacing manual jobs for management and operational ones⁴⁹.

40. E-skills UK find five skills that cut across IT and the Internet that may be in increasing demand in the near future. These are security skills, business skills, interpersonal skills which cut across many sectors, technology specific skills, and analytical and research skills. They also find that many roles are experiencing skills shortages, such as programmers and software developer. With employment of IT professionals expected to grow by 1.6% these skills shortages may be intensified⁵⁰.
41. In the energy sector, Energy and Utility Skills finds that there is already a higher than average number of people employed in the sector with Level 3 or above qualifications. However, around 25% of respondents to a survey stated they had skills shortages. Employment in the sector is expected to decline by around 7% in the 2006 to 2014 period, possibly easing skills shortages. If these technologies have the effect they are expected to, then employment may rise and previously seen skills shortages may return⁵¹.
42. McKinsey's 12 disruptive technologies have been identified based on their criteria of rapid advancement, potential scope of impact, economic value, and disruptive effect on the economy, within the timeframe of 2013 to 2025. These technologies may be important drivers of skills demand if they reach their expected levels of growth and value, as they will have global impact⁵². The disruptive technologies are as follows:
 1. Mobile Internet
 2. Automation of Knowledge Work

⁴⁶ Source: 'A Literature Review on Skills and Innovation. How Does Successful Innovation Impact on the Demand for Skills and How Do Skills Drive Innovation?' Tether et al, 2005

⁴⁷ Source: 'BIS research paper 63: National Adult Learner Survey 2010'

⁴⁸ Source: 'E-Skills UK – Technological Insights 2012'

⁴⁹ Source: 'National Careers Council – An Aspirational Nation' 2012

⁵⁰ Ibid

⁵¹ Source: 'Energy and Utility Skills: Stage 3 report' 2007

⁵² Source: 'McKinsey Global Institute - Disruptive technologies: Advances that will transform life, business, and the global economy' 2013

Drivers of Future Skills Demand

3. The Internet of Things
 4. Cloud Technology
 5. Advanced Robotics
 6. Autonomous and Near-Autonomous Vehicles
 7. Next-Generation Genomics
 8. Energy Storage
 9. 3D printing
 10. Advanced Materials
 11. Advanced Oil and Gas Exploration and Recovery
 12. Renewable Energy
- 43.** The Government has adopted eight great technologies as potential drivers of growth in the near future⁵³. They are science and research driven and there is some crossover between them and the McKinsey Disruptive Technologies for example, Advanced Materials, and Energy Storage. The Government is providing investment for these technologies, with £600 million of investment announced in January 2013⁵⁴, and as such it is likely that these eight technologies will have a more prominent effect on the UK economy and skills demand compared to McKinsey's list.
1. Advanced Materials
 2. Agri-Science
 3. Big Data
 4. Energy Storage
 5. Regenerative Medicine
 6. Robotics
 7. Satellites
 8. Synthetic Biology
- 44.** An increase in mobile application (apps) development will be a large driver of skills demand. Between 2010 and 2011 there was a 91% increase in the time users spent on apps and by 2016 there will be 10 billion mobile internet devices. IT job sites reported a large increase in vacancies in iPhone and Android developer roles from 2010 to 2011, with demand increasing more than supply. As many companies move into app development they also move into cloud computing to avoid costly IT infrastructure, which is expected to increase by 90% between 2009 and 2014, increasing demand for cloud network developers⁵⁵.
- 45.** The move to a low carbon economy is being driven by a range of social, political, and economic factors, but it is technology that will largely enable the transition to happen. This will lead to increased demand in 'green specific' skills in manufacturing, engineering, the application of electronics and

⁵³ Source: 'Eight Great Technologies David Willetts – Policy Exchange' 2013

⁵⁴ Source: BIS: <https://www.gov.uk/government/news/600-million-investment-in-the-eight-great-technologies>

⁵⁵ Source: Forbes 2012: <http://www.forbes.com/sites/anthonykosner/2012/06/08/developers-in-demand-platform-as-a-service-is-key-to-growth-of-mobile-cloud-computing/>

Drivers of Future Skills Demand

chemistry, and managers skilled in low carbon activities. This demand for STEM skills in the low carbon economy is predicted to increase and exacerbate the problem in STEM skills shortages that many businesses have already identified, where 23% of businesses report being unable to find experienced staff with STEM skills, potentially slowing down the transition to a low carbon economy.^{56 57}

46. The transition to a low carbon economy will have implications for all businesses as they will all have to take into account the impact of their goods and services on the environment, opening up the need for all employees to have generic 'green' abilities and knowledge to operate in a greener economy. This will include risk management for resource availability and resource efficiency, accounting services around carbon accounting, and understanding of environmental legislation and targets⁶⁹. Furthermore, the adoption of low carbon technology will create a need for scientists and engineers with training and knowledge of nuclear and renewable energy, technicians to install and retrofit energy efficiency measures in buildings, and skills in designing technologies and processes in minimising carbon emissions^{58 59}.
47. To summarise, the potential for disruption across sectors by new and emerging technologies make it difficult to predict future skills needs, suggesting the need for a more flexible system to react to changing skills needs. Furthermore technology will continue to integrate itself into all aspects of our lives and the economy, increasing the need for technological skills across the workforce. As many people in the workforce now appear to be ICT literate, the main focus should be on sector or technology specific skills. It can be argued that this is an area for which companies and/or individuals should be prepared and encouraged to take more responsibility, as the government and education system can only offer so much depth in specific skills, partly due to the fast pace of technological change and the cost of provision.

Conclusion:

48. There is a complex mix of factors driving the increases in the skills level of the workforce, both in the UK and internationally, and there is strong support for the idea that raising skills levels will improve national and company performance through increased productivity and innovation, leading to growth. There is also some evidence that shows the potential benefits at

⁵⁶ Source: 'HM Government – Skills for a green economy' 2011

⁵⁷ Source: 'National Careers Council – An Aspirational Nation' 2012

⁵⁸ Source: 'A Skilled Workforce for Strong, Sustainable and Balanced Growth' ILO, 2011

⁵⁹ Source: 'BIS Economics paper 1: Towards a Low Carbon Economy – economic analysis and evidence for a low carbon industrial strategy' 2009

Drivers of Future Skills Demand

company level for increased skills, such as improved survival rates, improved competitive advantage, and ability to move up the value chain. However much of current policy and provision is aimed at increasing the supply of skilled labour, through education for young people, training, reskilling and up skilling for current workers, and increasing the supply of labour in general through more inclusive measures. There is less evidence of efforts to simultaneously increase the demand for skills and of increasing demand among firms for higher level skills, in spite of forecasts which show that the proportion of jobs requiring higher level skills is set to rise. Most of the evidence for increased demand is based on skills gaps within organisations which tend to be proportionately quite low, and the slight increase in the number of graduates in graduate level jobs. There is also some evidence against increased levels of higher skills demand in the result of the National Adult Learners Survey, which showed a decrease in the number of employees taking part in some form of training to below 1997 levels.

49. The imbalance between the amounts of work done to create supply and demand suggests a route forward for future work, engaging companies to encourage them to increase their use of skilled labour through more ambitious strategies and better work organisation and employment practices so that they can take advantage of the benefits potentially available to a company with a higher skilled workforce.
-