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The UK's Skills Mix: Current Trends and Future Needs

Future of Skills & Lifelong Learning
Evidence Review

Foresight, Government Office for Science

The UK's Skills Mix: Current Trends and Future Needs

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I. Summary and Key Issues for Policy Makers

- Skills Intelligence about recent trends, current conditions and future prospects have a vital role to play in informing long term skills policy development. It is essential to examine all three elements: skills supply, skills demand and skills mismatch; and to track the relevant key metrics over time.
- UK skill levels, as measured by qualifications, have improved considerably in recent years and are likely to continue to do so to 2020. The skill mix is becoming increasingly high skill orientated with the proportion of adults qualified to Level 4 and above nearly doubling over the years from 2002 to 2020. The proportion of adults not qualified to Level 2 halved over the same period. Nonetheless, in 2020, there are still likely to be nearly 7 million adults who are not qualified to Level 2.
- However, when internationally benchmarked, the UK's position, recent performance and future prospects are mixed, being relatively strong at the higher level, but relatively weak at both intermediate and low levels.
- The direct measurement of literacy, numeracy and digital skill proficiency corroborates the qualification findings and shows also that the UK is around the international average on literacy and digital skills, but well below it on numeracy skills.
- One third of all employers do not undertake any training of their staff in a given year. Employers more widely however, spend around £45 billion a year on training their staff.
- Nearly a quarter of all job vacancies are hard to fill due to 'skill shortages', though these are sectorally and occupationally concentrated. Such shortages are associated with both technical job specific skills and with personal skills, including problem solving *inter alia*.
- 1 in 7 employers have some staff who are not fully proficient in their job. These 'skill gaps' amount to some 5% of the employed workforce/jobs
- 1 in 3 employers, however, have staff whose skills and qualifications are both above those required for their job, and are thus 'underused'. These 'over skilled' and 'over qualified' staff amount to some 7% of the employed workforce. International studies show that the incidence of over qualification is high by international standards and that of over skilling is also relatively high, being respectively the highest and second highest in the EU.

- Overall, job opportunities have been, and are expected to remain relatively strong with net jobs growth to 2020. These are additional to substantial opportunities associated with 'replacement demand' as people retire from the labour force.
- However, the structure and composition of jobs, both sectorally and occupationally, continues to change considerably so that the skills needed to access job opportunities and perform them effectively change too.
- There is a broad polarisation of jobs across occupations and skill levels, with increases at higher levels and decreases at lower levels, though the specifics are more nuanced than this implies. This is associated with significant increases in the qualifications and skills required at level 4 and above, in the coming 10 years.
- There are a range of drivers of change which continue to reshape jobs and skills, sometimes unpredictable ways which, together with a number of potentially disruptive changes, may lead in the period to 2030 to alterations to existing trends and thus to possible different futures, depending on market conditions and policy choices.
- There are a range of implications that arise from this review as to the issues that confront policy makers, beyond the specifics as above:
 - **The importance of and need to continually adapt to change.** Policy makers, education and training providers at all levels, employers and, not least, individuals, all need to recognise recent, current and prospective future changes and take these into account in their planning and decisions.
 - **The value of transparency.** To enable policy makers, organisations and individuals to make informed choices, information and intelligence on changing skill requirements needs to be made widely available and effectively disseminated.
 - **The use of incentives.** To encourage stakeholders to behave more in line with changing market conditions, and to benefit from them, appropriate and effective financial and behavioural incentives require consideration.
 - **Resource allocation.** Decisions are needed regarding how can public resources can be best deployed to achieve skills policy objectives. The key priorities; the key target groups; decisions on what skill levels and types are most in need; how far to focus on supply, mismatch or demand conditions; and what institutional or governance arrangements are required to these ends: all these are important policy choices.
 - **Skill mismatches.** How can a better match between skills supply and demand be achieved? What tools are available to improve provider, learner and employer responsiveness to skill needs?

- **Skill utilisation.** Skills need not only to be available; for them to add value for individuals and employers, they have to be effectively used in the workplace. How can we ensure that skilled people have skilled jobs to do and that their skills are deployed and developed over time in line with their evolving jobs and other job opportunities?

2. Introduction

This review first outlines why skills intelligence matters and provides a framework for analysing it. It then identifies the key sources of skills intelligence. Second, the review examines the UK's skills mix: its current position, recent trends and likely future, before going on to identify the extent and nature of the UK's skills mismatches before finally drawing attention to the changing nature of the UK's current and likely future skills needs. The review thus seeks to distil the headline evidence on the UK's skills challenges and the implications for policy makers.

Skills are a key driver of economic growth, an important source of competitiveness and a contributor to social mobility and inclusion. It is therefore essential to have appropriate information on the skills the UK has available, the skills the UK needs and any mismatches between the two.

This skills 'intelligence' adds value to the project and our understanding of the skills agenda in a range of ways: it aids transparency, by providing 'signals' throughout the skills and employment system; it informs the multiple key agents in the system (the learners/non learners; providers; employers; public agencies); it helps to inform the policy discourse around setting the skills agenda; it enables the tracking of progress; and it helps identify needs and inform strategy.

In sum, skills intelligence assists in the search for a better balance between skills supply and skills demand, between the skills we have available and the skills that are required.

3. Framework and Sources

We need to establish a framework to inform the presentation and understanding of the most relevant skills intelligence. There are three essential elements: the supply of skills; the demand for skills; and the existence or otherwise of any 'mismatches' between them.

Skills supply refers to the skills that are available in society or in the workforce, as a result of participation in, and attainment of, certified/non certified skills acquisition, by people throughout their lives, both before and during their working lives.

Skills demand refers to the skills that are needed by employers in order to produce goods and services. These are articulated in the jobs that are made available and the skills needed to undertake them. The scale and nature of this demand for skills is a 'derived' demand, depending on economic conditions, the structure of the economy, technology and business behaviour.

Skills mismatches between the supply of, and the demand for, skills arise when the volume and type of skills available do not keep pace with those required by employers. These mismatches between 'skills and jobs' will be exhibited in the labour market in two main ways. First, they occur in the form of excess demand for some skills (and thus for the people holding them). These skills shortages and skills gaps mean that some employer needs are unmet, with skill levels being insufficient to meet the needs of the economy and labour market.

Second, they arise in the form of excess supply of some skills where employers do not require them in sufficient numbers to fully employ all those who have them. This gives rise to unemployment and underemployment amongst those whose skills are not required, under existing demand conditions.

So, skills have to be the 'right' skills i.e. those that are required in the labour market. They have to be activated (employed) and utilised (in the workplace), in order to ensure that the benefits of skills are secured. It is clear that a pivotal role is played by the 'demand' side in all of this. The decisions of employers are central. It is they that determine the jobs available and the skills required to do them. On the other hand, it is also essential that individuals develop the skills that are required. Together, it is the interaction of demand and supply that determine the extent and nature of mismatch.

There are several key data sources which enable us to obtain evidence on skills supply, skills demand and skills mismatch. These are identified below, together with the key metrics that they provide. It should be stressed that only a summary of high level evidence can be reported here in this short review.

UK Skill Levels

The UK Commission for Employment and Skills (UKCES) was established in 2008 and tasked with monitoring and assessing the UK's progress towards the ambition of being in the top quartile of (OECD) countries at each skill level by 2020. Consequently, UKCES has published a series of reports to that end. The most recent covers current skill levels (as measured by qualifications), recent trends and future prospects, internationally benchmarked against other OECD countries (Bosworth, 2014).

The National Employer Skills Survey (NESS)

This biennial employer survey of around 90,000 employers provides insight into both skills demand and skill mismatches between employer skills needs and the skills available to them. It covers hard to fill vacancies; skills shortages; skills lacking in applicants; the impact of skills shortages; skills gaps; training activity including expenditure; underuse of skills; management skills; and business strategies including product market and human resources practices (Vivian et al, 2016).

The Skills and Employment Survey (SES)

This regular (four yearly) survey of individuals at work provides information on the skills and employment experience of working life. The sample size varies over time, but most recently was 2,800 individuals across Great Britain. It covers: the qualification needs of jobs; the skills requirements of jobs; the use of skills in the workplace; the extent of over-qualification and over-skilling; experiences of training; and the experience of training (Felstead et al, 2014).

Working Futures (WF)

This biennial study focuses on the demand for skills as measured by occupation and qualification. It provides 5 and 10 year projections of the likely evolution of the labour market. Coverage includes: employment projections by detailed sector and occupation; expansion, replacement and net employment change; employment status; and labour supply and broad qualification projections. The most recent report covers the period 2004-2014 (Wilson et al, 2016).

The Future of Work

Here the focus is on the 'drivers' of skills and labour market change, those shaping future possible jobs and their skills needs. These include both relatively stable trends as well as potentially 'disruptive' changes. Four scenarios are developed that depict possible labour market futures (Stormer et al, 2014).

Programme for the International Assessment of Adult Competences (PIAAC)

The OECD survey of adult skills was undertaken in 2012 across 18 countries, with a view to measuring on a comparable basis adult proficiency in literacy, numeracy and digital skills (OECD, 2013; BIS, 2013).

Migration Advisory Committee (MAC)

The MAC is charged by the Home Office with developing and maintaining a 'shortage occupation list' to inform the points based migration system. As part of this process the MAC draws up a list of skilled (now graduate level and above) occupations (at the detailed four digit

level) that are deemed to be 'in shortage' based on 12 indicators: three employment based, three price based, four volume based and two indicators of 'imbalance' (MAC, 2013, table 3.1).

European Skills and Jobs Survey (ESJ)

This survey, undertaken for the first time in 2014, examines skills mismatch and how it is changing over time across all 28 EU member states through a survey of 49,000 individual adults in employment (aged 24-65) focusing on the skill needs of people's job and how that has changed over time (CEDEFOP, 2015).

Taken together these sources provide extensive intelligence about skills. The key metrics that can be obtained from these sources are summarised in table 1 below, presented through the lens of our simple framework.

Table 1: Key Skills Metrics

Timings	Skills Supply	Skills Mismatch	Skills Demand
CURRENT	<ul style="list-style-type: none"> • Current Skill Levels, Mix and International Comparisons • Recruitment • Training: Extent, Benefits and Quality • Barriers to Training • Literacy, Numeracy and Digital Skills and International Benchmarking • Outcomes from literacy, numeracy and digital skills 	<ul style="list-style-type: none"> • Vacancies and Recruitment Difficulties • Skills Shortages • Skills Gaps • Skills Lacking • Graduate Supply and Demand • Underemployment/ Under-use of skills • Over-qualification • Over-skilling 	<ul style="list-style-type: none"> • Qualification Requirements of Jobs • Skill Levels Required • Generic skills • Job Quality, Control and Work Intensification • High Performance Working • Product Market Strategy • Management Skills
FUTURE	<ul style="list-style-type: none"> • Labour Supply: age, gender and participation • Qualifications • International Comparisons of Qualification Levels and Skill Mix 		<ul style="list-style-type: none"> • Sectoral and Occupational Employment change: total, status, gender • Employment expansion, replacement and net change by occupation • Qualification intensity of occupations • Drivers of Change • Potential Disruptions • Alternative Scenarios

4. Overview of the Evidence on Skills Supply, Mismatch and Demand

We now provide the headline evidence on the supply of skills, skills mismatch and skills demand that is available. It should be stressed that only a summary of high level evidence can be reported here in this short review. A very substantial volume of further relevant, detailed material is able to be accessed as required.

4.1 Skills Supply

We can gain a picture of the skill mix of the adult population of the UK, by examining their highest qualification held, as gained through the Labour Force Survey. Bosworth (2014) provides the most recent analysis, which sets out the picture in 2002, 2012 and with projections for 2020 (a broadly similar perspective is provided in Wilson et al, 2016, Figure 5.1 but dealing with the labour force rather than all adults).

The results are summarised in table 2 below, which shows the proportion, and absolute numbers, of adults (aged 19-64) according to their highest qualification held, in terms of four qualification 'bands'. In short, we can see that the UK is becoming much more highly skilled (or strictly speaking, more highly qualified) over time.

The current position is that around 37% of adults are qualified to Level 4 or above, whilst 24% have a highest qualification that is below level 2. Over the previous 10 years there has been considerable growth (of some 44%) in the proportion (and absolute numbers) of adults qualified to level 4 and above. The proportion of adults without a level 2 qualification, on the other hand, has declined by 45%.

The increasingly highly qualified composition of the adult population looks set to continue with, for example, a further growth, to nearly 47% of all adults, being qualified to level 4 and above by 2020. This implies a further 4.2 million adults being qualified to this level.

Table 2: UK Qualification Mix 2002-2020, Adult Population

Qualification Level	2002		2012		2020	
	Number (millions)	%	Number (millions)	%	Number (millions)	%
Level 4 and above	9.1	25.7	14.2	37.1	18.4	46.7
Level 3	6.8	19.4	7.4	19.4	6.8	17.5
Level 2	7.2	20.3	7.5	19.7	7.1	18.2
Below Level 2	12.4	34.8	9.1	23.9	6.9	17.7

Source: Adapted from Bosworth (2014).

Note: Level 2 is broadly equivalent to GCSE at A-C; Level 3 to Advanced level; Level 4 and above includes degree level and above.

However, this data also needs to be put into international perspective: how does this upskilling of the population compare to that in other comparable countries? How are we doing relative to others?

Drawing on OECD data (OECD, 2014), Bosworth (2014) is able to compare the UK's performance with that of the other 32 OECD countries: where does the UK stand today and where is it likely to stand, on recent trends, in 2020? Defining skill levels in terms of low skill (beneath upper secondary level), intermediate (upper secondary) and higher (tertiary), table 3 below summarises the position, benchmarking the UK against other countries by means of its ranking and the proportions of adults qualified to the three different levels as above.

Table 3: UK and OECD Countries Qualification Levels: Adult Population

UK Ranking	Low Skills		Intermediate Skills		High Skills	
	Rank	%	Rank	%	Rank	%
Current (2012)	19	26	24	37	11	38
Future (2020)	22	18	28	34	7	48

Source: Adapted from Bosworth (2014). Further details in OECD (2016).

The table shows that the UK performs relatively poorly on low level skills and that this is expected to deteriorate a little further in the coming years. The UK is currently ranked 19th out of 33 OECD countries on the proportion of its adult population (26%) being qualified to less than upper secondary level, with that ranking falling to 22nd by 2020. The best performing country (i.e. the one with the lowest proportion of adults with low skill levels) currently has 7% at this level. So, the UK still has, and is likely to continue to have, a relatively long tail of poorly qualified adults despite the improvements in skill levels generally over recent years. On intermediate level skills the UK also performs relatively poorly and, again, this relative position is likely to decline further in future years, its ranking declining from 24th to 28th.

However, the UK performs very well at the high skills end, being ranked 11th currently and improving further in the future. It is expected to rank 7th by 2020, with by then nearly half of all adults being qualified to tertiary level. The best performing country has 60% qualified to this level.

We can conclude that whilst the UK's supply of skills has been improving substantially over recent years, and is expected to continue to do so, in international comparative terms the upskilling still leaves the UK relatively poorly skilled compared to other similar countries, being in the bottom half of countries on both low and intermediate skills. However, with regard to high level skills the UK is in the top third of OECD countries and expected to be in the top quintile by 2020.

Skill levels, as measured by qualifications, can be augmented by training, which may or may not be accredited. The National Employer Skills Survey (Vivian et al, 2016) provides UK wide (and four nation) data on levels of training in 2015. Two thirds (66%) of employers were found to have arranged/funded training for at least one of their staff in the previous 12 months, whilst 1 in 3 provided no training. Some 63% of staff received some training. The average number of days training per individual trained was 6.8, for the 17 million employees who were trained during the year. Total employer expenditure on training for the year amounted to some £45 billion.

Skills can also be developed through experience and the application of knowledge and not all skills are certified. Such competencies can be measured by tests, by self-assessment, and

through employer views. The recently published Survey of Adult Skills, known as the Programme for the International Assessment of Adult Competencies (PIAAC) draws on assessment and survey evidence to enable the measurement of proficiency in literacy, numeracy and digital skills not only in the UK but across 18 OECD countries in all (OECD, 2013; BIS, 2013). Conducted in 2012, covering England and Northern Ireland (the parameters of the survey), 8892 people aged 16-65 were surveyed. Six skill levels were derived from the proficiency scores and were found to correlate strongly with successful economic and social outcomes for people.

On literacy skills, England and Northern Ireland (ENI) come out as being around this international average, with 8 countries above and 8 below, based on the proportion of adults who had a literacy score at level 1 or below. 16% of adults, 5.8 million people, were in this category (the OECD sample countries average being 15.5%).

On numeracy skills ENI performed poorly, with only 5 countries performing less well. 24% of adults, 8.5 million people, scored at level 1 or below (the OECD sample countries average was 19%).

Of even more concern is the fact that the differences in proficiency, in both literacy and numeracy, across the age range are 'negligible'. Indeed, adults aged 55-64 perform better in both than do 16-24 year olds. The near retiring are better equipped than the young. ENI is the only country of the 18 where this is so. In consequence, ENI's relative proficiency is likely to shrink further over time.

On digital literacy, 49%, some 18 million people, are at or below level 1. Of the 11 countries participating in this part of the study, 5 performed less well than ENI and 5 performed better. Young people in ENI performed below the OECD average, with 42% of 16-24 year olds (21% below the best and 5% above the worst) proficient at level 2/3 compared to 50.7%.

4.2 Skills Mismatch

What is the relationship between skills supply and the skills needed in the workforce i.e. between supply and demand? We first deal with imbalances associated with excess demand and then those associated with excess supply.

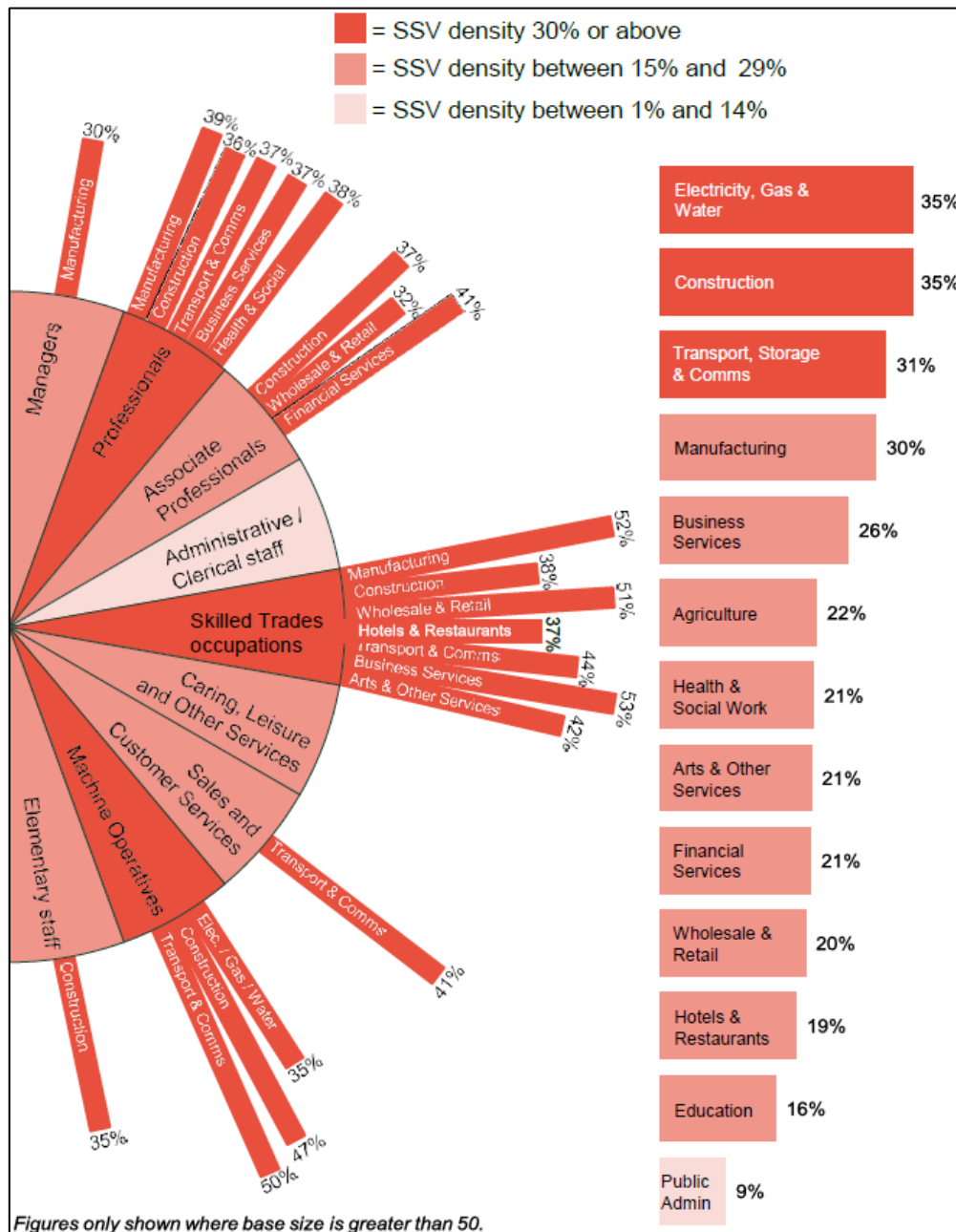
Skill shortages arise when vacancies are hard to fill due to insufficient numbers or quality of people with the right skills to fill them. Based on the results of the biggest, regular employer survey in the world of some 90,000 employers (Vivian et al, 2016), in 2015 there were around 930,000 reported vacancies (40% higher than in 2013). The proportion of these vacancies that were hard to fill because of skill shortages (often referred to as the 'density' of skills shortages) was nearly 1 in 4 (23%). This amounts to 209,000 'skill shortage vacancies' experienced to some degree by 6% of all employers (50% higher than 2013).

Skill shortages however vary considerably by sector and occupation (see figure 1). They are highest (36% density) in the gas, electricity and water industries, 34% in construction and 30% in manufacturing. Occupational density is highest in skilled trades (43%), machine operatives (33%) and in professional services (32%). Indeed, in each of these three occupations, skill shortages have increased considerably since 2011: by 30%, 235% and 68% respectively.

The MAC provides further insight into skills shortages at the detailed occupational level (MAC, 2013, Table C4). Only 5 of the 97 skilled occupations 'pass' the shortage test on half or more of

the available indicators they use: design/development engineers; production managers in mining/energy; town planning officers; production/process engineers; and aircraft pilots/flight engineers). 35 occupations pass on a third or more of their indicators.

Figure 1: Density of skill-shortage vacancies (SSVs) by sector and occupation within sector



Source: UKCES (2015) Employer Skills Survey.

What skills are in 'short supply'? NESS asks employers who have suffered from skill shortages which people and personal skills need improving and which technical/practical skills are difficult to obtain. In the former case some 64% of employers report sales and customer relations skills and 46% report a range of management and leadership skills. In the latter case, in addition to the specialist knowledge/skills specific to the job role, the largest reported shortages relate to

problem solving; numeracy; literacy and IT (see also the PIAAC results referred to above, in this connection).

Skills shortages arise in the external labour market, when employers are seeking to recruit. Skills gaps arise within the workplace, post-hiring, when workers are not considered to be fully proficient in their job. 14% (1 in 7) of employers report such problems which amounts in all to 1.4 million employees (5% of the whole employed workforce) lacking full proficiency in their current role. The skills lacking in such workers, perhaps not surprisingly, closely mirror those indicated in respect of skills shortages above (for details see Vivian et al (2016) figure 5, page 7).

We now turn to conditions of excess supply. The other side of the skills shortage issue is where people's skills may not be employed at all because they are unemployed. Unemployment varies systematically with qualification levels. For example the unemployment rate amongst adults with a degree is 2.7%, with upper secondary qualifications it is 3.9%, and amongst those without upper secondary qualifications it is 7.7% (OECD 2016). Interestingly too, the employment rates of those without upper secondary qualifications has been falling over the last 15 years (from 65% to 60%) especially amongst those aged below 35 (where it has fallen from 66% to 57%). Amongst those with tertiary (broadly degree level) qualifications the overall employment rate also declined, but by much less and from a considerably higher level –from 88% to 85% (OECD 2016).

The other side of the skills gaps issue is where people are employed but their skills are actually 'underused' or 'underemployed'. NESS provides estimates of this phenomenon, asking employers whether they have staff whose skills and qualifications both are above those required in their current role. 3 in 10 employers report such underuse, where at least one employee fits this description. In total this amounts to around 2 million people, or some 7% of the employed workforce. This underuse is a waste of talent and a missed opportunity for employers to improve performance and productivity. The occupations most affected by underuse are managers (31% of those employed) and administrative/clerical workers (14%).

The PIAAC survey of individuals offers further data on this issue. 30% of workers report having higher qualifications than deemed necessary to obtain their job. This is the highest rate of 'over qualification' as defined by OECD amongst the 18 countries studied (except one, Japan). By contrast, the incidence of 'over skilling', as defined by OECD, (where workers' proficiency is above the minimum needed for the job) is actually relatively low, being below the average for all the countries, at less than 10%.

One further detailed study, which has been regularly undertaken over 25 years in the UK, is the Skills and Employment Survey (sometimes referred to as 'Skills at Work', Felstead et al, 2013). This provides further insight into the issue of over qualification and how it has changed over time. In essence, table 6 below shows that the extent of over qualification has been rising for 20 years to 2006, though it has actually fallen back in more recent years. Nonetheless, over a third of workers are now overqualified for the work they do: even 1 in 5 graduates are over qualified.

This issue of the extent of over qualification provides insight into how far the growth of qualifications has kept up with the demand for them (i.e. is skills supply rising fast enough to meet demand) or, as indicated by the bulk of evidence here, how far has the growth in supply outstripped the growth in demand so that workers are under employed/used rather than less well qualified than the jobs require? The same issue is relevant to the wider 'skills' or proficiency issue. We will turn to this issue of demand in the next section of this review.

Table 4: Trends in Over Qualification in the UK 1986-2012

	1986	2006	2012
% of all workers over qualified	28	39	36
% graduates overqualified	20	28	22

Source: Felstead et al (2013).

The European Skills and Jobs Survey provides evidence on this agenda too, benchmarked across the member states of the EU. The highlights of the survey results show that:

- 39% of employees across the EU as a whole have skill levels higher than that needed to do their current job (hence their skills are underutilised and as such they are 'over skilled') whilst 5% have skill levels lower than those needed to be proficient in their job (representing therefore a 'skills gap'). The respective figures for the UK are 51% and 6%: the first of these is the second highest in the EU, whilst the second is around average (CEDEFOP, 2015, figure 13).
- 29% have qualifications that are either more than they require, and are thus over qualified (17%), or less than they require, and thus under qualified (12%) to undertake their job. The levels of both over and under qualification in the UK are 34% and 8% respectively. The figure for over qualification is in fact the highest of all 28 EU countries, implying a high level of qualification mismatch (CEDEFOP, 2015, figure 8). The proportion of employees who are underqualified however, is amongst the lowest in the EU.

4.3 Skills Demand

Sometimes also referred to as 'skill needs', skills demand, the skills that employers require, depends on the volume and composition of the jobs that they make available, which in turn depends on the goods and services they produce and the means by which they do so. In this sense the demand for skills is very much a 'derived' demand.

Total employment in the UK is currently around 31.4 million. Of these, 58% are employees, working full time, 28% are employees working part time and 14% are self-employed. Projections for the future, overall as well as by sector and occupation, are available through the Working Futures bi-annual study (Wilson et al, 2016). In future years (2014-2024) the total number of jobs is expected to grow by a further 1.8 million, with the largest increase being among female full time employees though male part time employment growth is likely to outstrip male full time growth. Overall, part time jobs growth (c. 1 million) is expected to exceed full time growth (0.8 million).

In terms of the sectors that people work in, when divided into the 6 main SIC categories (see table 5 below), around 31% of all jobs are currently in business and other services, with a further quarter each in trade, accommodation and transport and in non-marketed services (largely education and health). Only one job in eight is in manufacturing, little more than are employed in construction. Future trends are likely to see the largest increases in employment to be in trade, accommodation and services (over 600,000 jobs growth) and, especially, in business and other services (over 1 million more jobs). Thus, private sector services are the main engine of jobs growth. Manufacturing continues to decline in terms of jobs numbers and is overtaken by construction as a source of jobs. Public sector jobs in health and social care are likely to increase but this is almost outweighed by the prospects for public administration and education, associated with austerity. The level and changes in the sectoral distribution of jobs are crucial in generating the skills that are required.

Table 5: Employment by Sector 2014-2024 ('000 and %)

	Level ('000)		Share (%)		Change('000)
	2014	2024	2014	2024	
Primary/Utilities	837	765	2.5	2.2	-72
Manufacturing	2591	2350	7.8	6.7	-241
Construction	2092	2393	6.6	6.8	+301
Trade, Accommodation and Transport	8604	9248	25.8	26.3	+644
Business and Other Services	10523	11552	31.6	32.9	+1029
Non Marketed Services	8684	8833	25.0	25.1	+149

Source: Wilson et al, 2016.

However, it is the jobs that people actually do in the organisations that produce these goods and services that determine the skills needed. In terms of the occupations that people currently have (the jobs that they do), when divided into the 9 SOC (standard occupational classification) categories, the occupation that employs most people is Professional Occupations, accounting for 1 in 5 of all jobs, some 6.6 million in all. Associate Professional and Technical Jobs account for a further 1 in 7 of all jobs or a further 4.6 million (see Table 6 below).

Over the past 20 years, different occupations have experienced substantial variations in jobs growth and decline. Managerial, professional and associate professional jobs have grown the

most rapidly and they together account for 85% of the net jobs growth over the period. On the other hand, skilled trades; administrative and secretarial; and process operative occupations have declined.

The future prospects for different jobs differ considerably and mostly reflect long standing trends in the occupational structure. As can be seen most clearly in the 'net changes' section of Table 6 there is a broad polarisation in jobs and skills, with 'high level', white collar, qualification intensive jobs growing most strongly. For example, professional and associate professional jobs combined are expected to grow over the next 10 years by more than 1.4 million or 12%. This will occur alongside the expansion of some 'lower level' service related jobs, notably caring, leisure and other human contact service occupations, which are likely to see a growth of around 400,000 or 13% over the same period, continuing a long term growth trend. Meanwhile it is expected that administrative/clerical, skilled trades and machine operative occupations will continue to decline as over the previous 20 years. However, the growth in sales and customer service jobs that was experienced, is likely to come to a halt. These occupational changes in volume and composition are substantial and imply on-going changes in the skills required to do the jobs that the economy and labour market requires.

Further insight at a more detailed 25 occupational SOC sub-group level is possible, as are projections which combine sectors and occupations and thus show likely occupational change at the sector level (for details see Wilson et al, 2016, page 86), through the production of a 25 occupation by 22 sector matrix, where each of the more than 500 cells represents a specific occupation in a particular industry.

It should however be noted that the changes in jobs and consequent skills demand outlined above represent the likely net changes in employment. Because of people leaving the labour force, in particular through retirement but also maternity leave and indeed death, further job opportunities arise and these jobs too need to be filled by appropriately qualified/skilled workers. Such 'replacement demand' is very substantial, amounting to some 13.1 million openings over the next 10 years: this is some 7 times the scale of the 'expansion' demand we have discussed above. The scale of this replacement demand also varies by sector and occupation, largely as a result of their age and gender profile. Furthermore, it means that in some sectors and occupations, there may well be a growth in overall job opportunities even if employment is declining.

What are the implications of these changes in the jobs market for the qualifications profile that is likely to be required? Table 7 shows that by 2024 it is likely that 1 in 8 of those employed will be qualified to above degree level, a 30% increase from current levels. Those qualified to degree level will account for 43% of the employed workforce, over 40% higher than today. So, by 2024 55% of the employed workforce is likely to be qualified to degree level or above. For comparison, this proportion was just 31% in 2004. Those with less than level 2 qualifications on the other hand are likely to account for just about 1 in 10 of those in employment, a more than 40% reduction from current levels.

Table 6: UK Employment in SOC2010 occupational categories – major groups

	Employment Levels (000s)					Percentage Shares					Net Changes				
	1994	2004	2014	2019	2024	1994	2004	2014	2019	2024	1994-2004	2004-2014	2014-2019	2019-2024	1994-2024
Managers, directors and senior officials	2,049	2,684	3,304	3,612	3,802	7.6	8.8	10.0	10.5	10.9	635	620	306	191	499
Professional occupations	3,996	5,247	6,596	7,115	7,471	14.8	17.1	19.9	20.8	21.4	1,251	1,349	519	356	875
Associate professional and technical	3,205	3,995	4,638	4,964	5,176	11.9	13.1	14.0	14.5	14.8	791	642	326	212	538
Administrative and secretarial	4,016	3,926	3,565	3,315	3,176	14.9	12.8	10.7	9.7	9.1	-89	-361	-250	-140	-389
Skilled trades and occupations	3,913	3,805	3,611	3,576	3,514	14.5	12.4	10.9	10.4	10.0	-108	-194	-35	-62	-98
Caring, leisure and other services	1,711	2,443	3,134	3,359	3,543	6.4	8.0	9.4	9.8	10.1	732	691	226	183	409
Sales and customer service	2,172	2,489	2,600	2,605	2,603	8.1	8.1	7.8	7.6	7.4	317	111	5	-2	3
Process, plant and machine operatives	2,395	2,204	2,067	1,991	1,936	8.9	7.2	6.2	5.8	5.5	-191	-137	-76	-55	-131
Elementary occupations	3,475	3,803	3,652	3,722	3,771	12.9	12.4	11.0	10.9	10.8	328	-151	70	50	119
TOTAL	26,931	30,596	33,167	34,259	34,992	100	100	100	100	100	3,665	2,571	1,092	734	1,825

Source: Wilson et al (2016).

Table 7: Qualification Profile associated with Labour Market Demand: 2024

Qualification Level	% of the employed by highest qualification level in 2024	% change 2014-2024
Level 7-8	12	+30
Level 4-6	43	+42
Level 3	18	-6
Level 2	18	-7
None/Level 1	11	-41

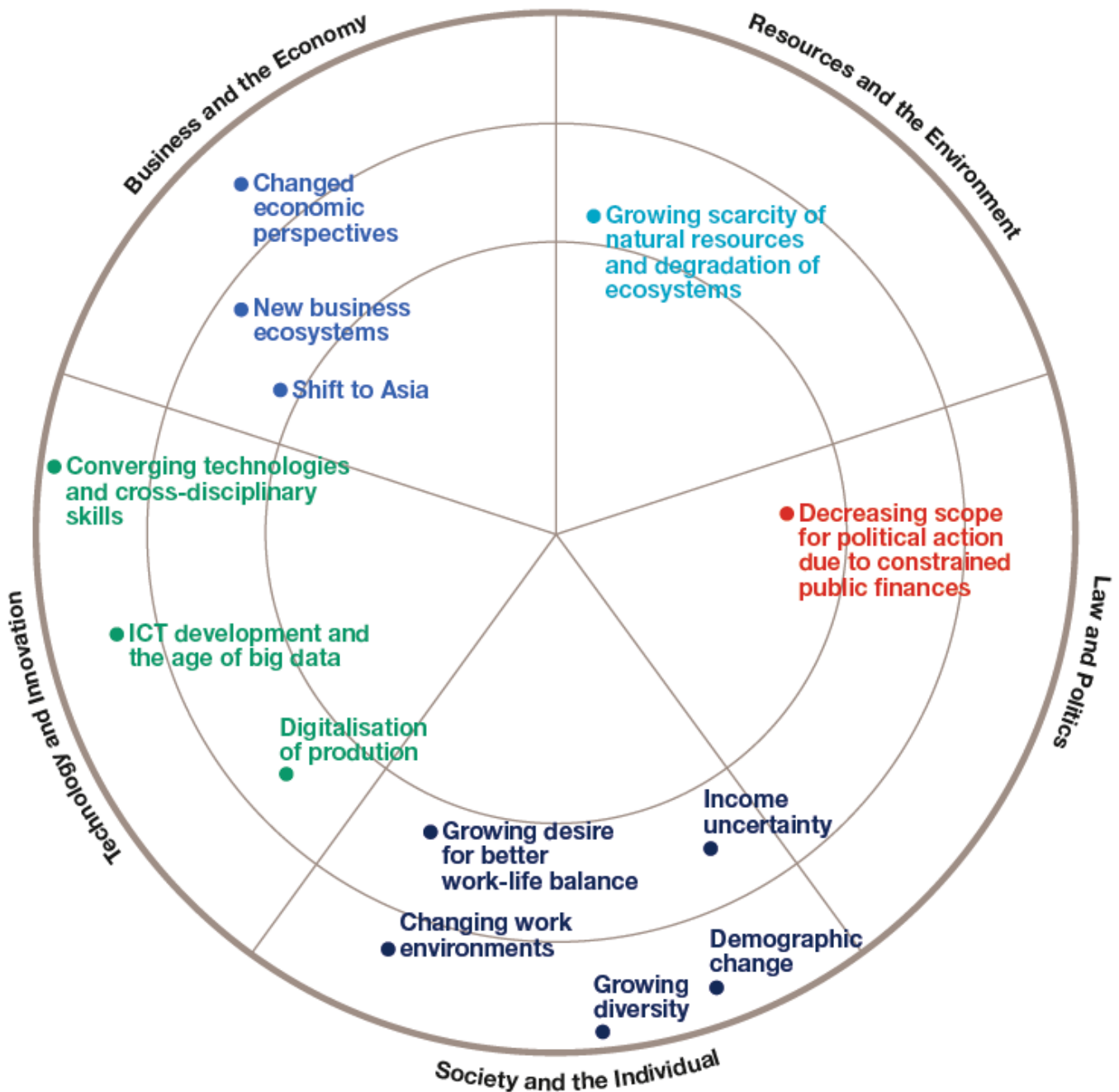
Source: Adapted from Wilson et al, 2016.

Note: Levels 1-4 are as indicated in the note to table 2. Level 6 relates to degree level or equivalent, 7 to Masters level and 8 to PhD.

These projections of the qualifications implications of future labour market demand make no assumption that the qualifications associated with the jobs are necessarily required by them. The work of Felstead et al (2013), however, provides us with some insight as to whether that is likely to be the case. They found that over the period 1986 to 2006, the proportion of jobs requiring graduate qualifications doubled from 10% to 20% whilst the proportion requiring no qualifications declined from 38% to 28%. We also saw above, that they showed that 'over qualification' in general, and for graduates in particular, rose over these 20 years by 40%. From 2006-2012 however, the proportions requiring graduate qualifications rose to 26% and the proportion requiring no qualifications increased to 23%. They also found that over qualification rates actually declined somewhat. So, care should be exercised when drawing out implications from the 'qualifications intensity' of jobs growth.

There is one final set of insights that can be brought to bear in considering the future of skills requirements. 'Foresight' work can help us understand the drivers of change and how jobs and skills may change in the future. Projections are based on the assumption that the relationships between variables that are exhibited by recent/current structural trends will continue into the future. Foresight work alternatively examines the forces for change that may make the future somewhat different from the past. Stormer et al (2014) undertook three related tasks. First, they examined the trends shaping the future of jobs and skills in the UK. They identified the 13 most influential and plausible trends, organised into five groups, impacting on the jobs and skills landscape over the period to 2030. The groups were: business and the economy; resources and the environment; technology and innovation; society and the individual; and politics and law. They then outlined the changes that may result from these trends (see figure 2 below).

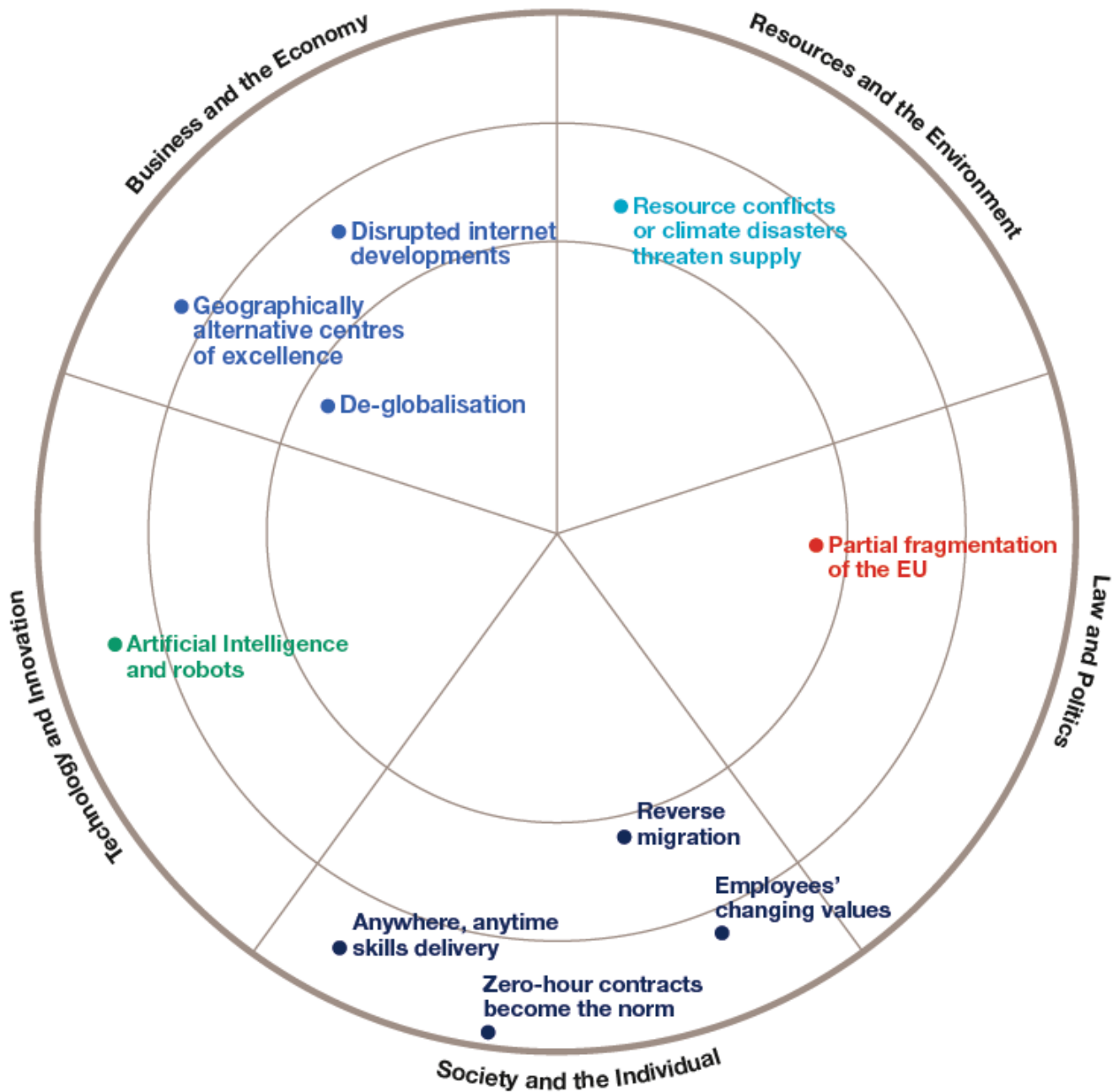
Figure 2: Trends driving the future of UK jobs and skills



Source: Stormer et al (2014).

Second, they sought to identify the potentially 'disruptive' changes over the period to 2030 that could change the future of work. This more speculative work, helps us consider things that go beyond 'business as usual' and change known trajectories. They set out 10 key 'disruptors' based on their plausibility and severity of impact, which could lead to significant deviations from the 'BAU' path. These are again organised into the same groups as above (see figure 3 below).

Figure 3: Disruptive trends driving the future of jobs and skills in the UK



Source: Stormer et al (2014).

Finally, based on the above they scope out four possible scenarios for jobs and skills by 2030. Note that these are not forecasts but possible futures, stories or development paths that the UK may broadly follow over the coming years: Business as Usual; The Great Divide: Skills Activism; and Innovative Adaptation. They represent ways of thinking about the future in the longer term. Each of the four contain an outline of the situation; the position of employers, employees and providers; and the role of policy makers.

From these analyses, they derive a number of broad conclusions for action by the main players (employers; individuals, providers; policy makers) which relate to:

- Technological growth and expansion
- Interconnectivity and collaboration
- Convergence of Innovation
- Increased individual responsibility
- The shrinking middle
- The 4 generation workplace

5. Concluding Remarks

This review has outlined the key dimensions of the UK's skill mix and how it is expected to change in the coming years. It has provided a framework within which to do so by means of considering the supply of skills, skills mismatches and the demand for skills. It has identified the key sources of data that are available to enable the population of this framework and has set out the main headline findings from that data. At the front of the review there is set out a summary of the findings together with the key issues that arise for policy makers.

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