UK COMMISSION FOR EMPLOYMENT AND SKILLS

# Information and Communication Technologies: Sector Skills Assessment 2012

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Intelligence › Investment › Impact

# Sector Skills Assessment: Information and Communication Technologies

**e-skills UK**

**October 2012**

Views expressed in this Evidence Report are not necessarily those of the UK Commission for Employment and Skills

# Foreword

The UK Commission for Employment and Skills is a social partnership, led by Commissioners from large and small employers, trade unions and the voluntary sector. Our ambition is to transform the UK's approach to investing in the skills of people as an intrinsic part of securing jobs and growth. Our strategic objectives are to:

- Maximise the **impact** of employment and skills policies and employer behaviour to support jobs and growth and secure an internationally competitive skills base;
- Work with businesses to develop the best market solutions which leverage greater **investment** in skills;
- Provide outstanding labour market **intelligence** which helps businesses and people make the best choices for them.

The third objective, relating to intelligence, reflects an increasing outward focus to the UK Commission's research activities, as it seeks to facilitate a better informed labour market, in which decisions about careers and skills are based on sound and accessible evidence. Related, impartial research evidence is used to underpin compelling messages that promote a call to action to increase employers' investment in the skills of their people.

Intelligence is also integral to the two other strategic objectives. In seeking to lever greater investment in skills, the intelligence function serves to identify opportunities where our investments can bring the greatest leverage and economic return. The UK Commission's third strategic objective, to maximise the impact of policy and employer behaviour to achieve an internationally competitive skills base, is supported by the development of an evidence base on best practice: "what works?" in a policy context.

Our research programme provides a robust evidence base for our insights and actions, drawing on good practice and the most innovative thinking. The research programme is underpinned by a number of core principles including the importance of: ensuring '**relevance'** to our most pressing strategic priorities; '**salience'** and effectively translating and sharing the key insights we find; **international benchmarking** and drawing insights from good practice abroad; **high quality** analysis which is leading edge, robust and action orientated; being **responsive** to immediate needs as well as taking a longer term perspective. We also work closely with key partners to ensure a **co-ordinated** approach to research.

Sector Skills Assessments (SSAs) are key sources of authoritative and focused sectoral labour market intelligence (LMI), designed to inform the development of skills policy across the UK. They combine "top-down" analysis of official data with bottom-up intelligence to provide a consistent, comparable and rich understanding of the skills priorities within different sectors of the economy, across the four UK nations.

This report has been produced by e-skills UK. As the Sector Skills Council for Business and Information Technology, e-skills UK works on behalf of employers to develop the software, internet, computer gaming, IT services, Telecommunications and business change expertise necessary to thrive in today's global digital economy. The Sector Skills Council does this by taking its lead from employers and working with government, IT professionals and IT training providers to tackle skills needs and support economic recovery.

Sharing the findings of our research and engaging with our audience is important to further develop the evidence on which we base our work. Evidence Reports are our chief means of reporting our detailed analytical work. All of our outputs can be accessed on the UK Commission's website at www.ukces.org.uk

But these outputs are only the beginning of the process and we are engaged in other mechanisms to share our findings, debate the issues they raise and extend their reach and impact. These mechanisms include our *Changing Behaviour in Skills Investment* seminar series and the use of a range of online media to communicate key research results.

We hope you find this report useful and informative. If you would like to provide any feedback or comments, or have any queries please e-mail info@ukces.org.uk, quoting the report title or series number.

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**UK Commission for Employment and Skills**

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# Executive Summary

## Introduction

The aim of this report is to provide authoritative labour market intelligence (LMI) for the Information and communication technologies sector to inform the strategic decision making of national governments in the development of employment and skills policy.

This report has been produced by e-skills UK, the Sector Skills Council for Business and Information Technology. We work on behalf of employers to develop the software, internet, computer gaming, IT services, telecommunications and business change expertise necessary to thrive in today's global digital economy.

## Current performance of the sector

The Information and communication technologies sector contributes nearly £69 billion to the UK economy (7.4 per cent). Measured by Gross Value Added (GVA) per employee job, the sector is one of the most productive in the UK economy at £83,000 per job, almost twice the UK average for all sectors.

There are over 131,000 establishments in the sector and nearly 57,000 businesses have two or more employees. Businesses in the sector tend to be small with 83 per cent of businesses classified as micro-businesses, having between two and nine employees.

Whilst businesses in the sector comprise five per cent of all UK businesses, seven per cent of UK business start-ups in 2009 were in the Information and communication technologies sector. However, there were a quarter more business closures than start-ups in the sector in the same year. The sector is also characterised by innovative companies with high end product market strategies, more often than not with a national and international market focus.

The Information and communication technologies sector in 2010 has a UK workforce of 761,000, three per cent of total UK employment. The majority of employment (60 per cent) is in the Computer programming, consultancy and related activities sub-sector with a further quarter (23 per cent) of employment in Telecommunications.

There has been a fall of six per cent in total employment in the sector since 2002, driven by the fall in employment in England and the impact of the recession in 2008. Employment in the sector in every other nation (Scotland, Wales and Northern Ireland) has grown over the same period.

## The workforce

The Information and communication technologies sector has a high proportion (63 per cent) of the workforce in Management and Professional occupations and employment in these occupational groups has grown by 13 per cent since 2002.

The largest occupational groups in the sector are technical IT and Telecommunication occupations, focused on developing and delivering products and services to deliver value from technology.

Software Professionals are the largest occupational group with nearly one in five (19 per cent or 141,000) in the sector workforce employed in these occupations. Information and Communication Technology Managers comprise another 14 per cent of the workforce (105,000).

The dominant characteristics of employment are permanent, full time and male. The gender imbalance remains significant in the sector with the proportion of females employed declining from 26 per cent of the workforce in 2002 to 23 per cent in 2010. Women remain under-represented in Managerial, Professional and Associate Professional and Technical occupations despite gender equality having been shown to provide real business benefit.

Self employment (16 per cent) is more common in the sector than across the economy as a whole (14 per cent) and has increased by 40 per cent since 2002.

There are a lower proportion of young people employed in the sector than across the economy as a whole and over time, the sector workforce is aging.

## Demand for, and value of, skills

Qualification levels in the sector have been rising since 2002 and the Information and communication technologies sector is one of the most highly qualified sectors in the UK economy.

The high level of skills within the workforce aligns with the occupational structure in the workforce which is predominantly professional and managerial. Higher level skills are specifically required in the sector and in particular technical and technology skills for the most common occupations, and business and interpersonal skills as an increasing volume of technical and professional level employees become client facing.

The positive association between the highly skilled workforce and organisational performance means these skilled employees need to be deployed and managed to support the objectives of the business through High Performance Working practices, management and leadership and training.

Employers in the Information and communication technologies sector tend to score highly in comparison to other sectors in High Performance Working measures linked to employee autonomy and less well where measures relate to business processes.

There is high proportion of highly qualified Managers in the sector, despite comparatively low levels of training provided by employers to this occupational group. Indeed, training provision across the sector is comparatively low and the proportion of employees receiving training has decreased from 27 per cent in 2002 to 20 per cent in 2010. A lack of money to fund training is a common barrier to training in the sector.

Overall though, employers in the sector shows signs of valuing and utilising the high level skills within the workforce for benefit to businesses and in driving a competitive and productive sector. However, High Performance Working indicators suggest a variable picture of effective skills use and evidence of skills mismatch, though restricted to relatively small volumes, is concentrated in important and highly skilled occupational areas. If training and High Performance Working practices in particular were exploited to a greater extent in the sector, the skills of the workforce might be better managed, improved and applied to further drive sectoral performance.

## Extent of skills mismatch

The extent and nature of vacancies in the sector indicate the level of demand, and where there are hard to fill vacancies unmet demand, in the labour market

Employers in the Information and communication technologies sector account for three per cent of all UK employers with vacancies, four per cent of those with hard to fill vacancies and five per cent of those with skills shortage vacancies (SSVs).

There are over 29,000 current vacancies in the Information and communications technologies sector, equivalent to five per cent of total employment in the sector and the highest proportion across all sectors.

Where there are hard to fill vacancies in the sector (5,449), the vast majority (91 per cent or 4,937) of these are skills shortage vacancies. Whilst a third of vacancies are for Sales and Customer Service staff, hard to fill and skill shortage vacancies are concentrated in Professional and Associate Professional and Technical occupations and the most common skills thought to be lacking are job specific, and advanced IT or software skills.

Nearly one in ten employers in the sector report skills gaps in the workforce, one of the lowest rates across all sectors however skills gaps affect a higher proportion of the workforce than average with six per cent of employees in the Information and communication technologies sector (34,775) having skills gaps. Skills lacking in the sector include: Planning and organisation skills; problem solving skills; job specific skills; written communication skills; and customer handling skills.

High levels of demand for highly qualified and experienced labour and skills and mismatches in the sector are also indicated by: high average hourly wages (the second highest across all sectors indicating the possibility of persistent skills shortages and the reward for scarce skills that are not easily learnt); an increasing proportion of migrant labour, the use of Intra-company transfers and Software Developers for Games companies being on the MAC skills shortage occupation list. The low level of recruitment of young people indicates an under-utilised recruitment pool but also reflects employer preferences for recruiting highly skilled and experienced workers.

Skills deficits (skills shortages and gaps) are causing an increase in workload for other staff, and are hampering growth in the sector, causing delays in developing new products and services and loss of business. Finding suitably skilled staff is a key challenge for employers in the sector.

## Drivers of change and their skills implications

The drivers of change considered in this report are: Regulation and multi-level governance; Demographics and population change; Environmental change; Economics and globalisation; Technological change; Changing values and identities and Changing consumer demand.

Each of the above drivers has been ranked (Table 6.1) indicating the relative scale of impact with the most significant drivers for the sector identified to be technological change, cyber security and the economy.

Of these, technological change not only drives the sector itself from within, through innovation and research and development, but also is driven by the demands of businesses who are looking to use technology in smarter and more productive ways. In addition, today's 'tech savvy' consumers are constantly looking to harness the pervasive power of computing in their daily lives.

Specific technologies with important skills implications are: Cloud Computing; social and mobile computing; 'big data' / smart computing / analytics and security and data protection. Skills development for the sector workforce will include more emphasis on service integration (as opposed to product specialism), service management with partner and supplier management becoming more complex (particularly with cloud computing). With mobile technologies the skills challenges will be around developing new security models for managing and securing devices and services.

In addition to technological change, the current economic and global environment are the significant drivers of change in the sector. The impact of international and national regulation, the effect of government efficiency and reform measures and migration policy are considered important but with a lesser impact on skills and employment in the sector.

Differences across the nations are most evident in the respective national responses to the economy (including the emphasis on supporting priority sectors) and in raising consumer demand through the digital inclusion agenda. In both of these areas, the development of government policy within the nations could raise demand and impact skills and jobs in the sector.

### Future skills needs

The sector is considered in its own right to be a major driver of the economy over the next ten years.

- Employers are optimistic about recovery in the immediate future. Key issues and developments in the short term include security and data protection, innovation, cloud computing, convergence of communications and IT and the real world web.
- Green IT, the transformation of business using IT and reshaping the data centre are considered medium term or developing issues. In the medium term (2010-2015) output and productivity growth for the Telecommunications and Computer programming consultancy and related activities subsectors is forecast to be the highest level of all sectors.

- Long term/horizon issues include backshoring, industrialisation of IT delivery, and the pool of talent and gender issues. Output in the sector in the long term (through to 2020) is forecast to grow at 5.8 per cent per annum and productivity at 5.2 per cent, well above the average for all sectors.

Within the Information and communication technologies workforce there is forecast to be an increase of 50,000 workplace jobs by 2020 through growth of six per cent between 2010 and 2020. Growth is predominantly in the high skill, high value areas of Managerial, Professional and Associate Professional and Technical occupations.

Replacement demand will generate an additional 321,000 job openings in the sector which in addition to the 50,000 jobs created by growth means there is a total requirement of 371,000 between 2010 and 2020. As with growth, replacement demand is expected to be in Professional occupations (125,000), Managerial positions (57,000) and Associate Professional and Technical occupations (53,000).

Future skill needs in the sector can be grouped into five areas: security skills, business skills, technology specific skills, interpersonal skills and analytical skills. These are discussed in more detail in Chapter 7.

## Priority areas for action

Priority areas for action, based on the evidence in this report set out the core and strategic areas that require action over the short, medium and longer term if the Information and communication technologies sector in the UK is to maintain and increase its contribution to the UK.

High priority skills needs for immediate action include the requirement to address the supply of new entrants into the sector, effectively ensuring there is a sufficient and ongoing pipeline of talent and a broad and diverse enough recruitment pool for employers. Without this the growth of the sector could be restricted and future skills demands will be difficult to meet.

Security and data protection skills, across all occupations in the sector are a critical area for immediate action and intervention, along with the need to address the technical skills gaps and skills shortages within Professional occupations in the sector.

Skills needs of importance include the increasing needs for business and interpersonal skills across most occupations in the sector. Management skills are regarded as an area of current need in Wales in particular but across all nations in the UK, there could be a future issue if the current lack of investment in management skills continues.

Non-technical skills needs (for example business and interpersonal skills) for Professionals and technical skills shortages for Associate Professional and Technical occupations are also rated as important but are noted to be smaller in scale.

Within the self-employed workforce, there is some need for skills development around business and management areas and although these needs are of a slightly more moderate scale than the higher priority skills issues discussed above, it is important as trends show that the self-employed are less likely to participate in work related training or education. In addition moderate skills priorities are apparent for the smaller Skilled Trade occupational group and for Sales and Customer Service occupations.

# 1 Introduction

## 1.1 Purpose of report

The aim of this report is to provide authoritative labour market intelligence (LMI) for the Information and communication technologies sector to inform the strategic decision making of national governments in the development of employment and skills policy. It is one of 15 UK Sector Skills Assessment (SSA) reports produced by Sector Skills Councils[1] and the UK Commission for Employment and Skills.

SSAs combine top-down data from official sources with bottom-up sectoral intelligence to provide a consistent, comparable and rich understanding of the skills priorities within sectors across the four UK nations. The reports have been produced to a common specification (developed by the UK Commission in consultation with the four UK governments) and follow a consistent structure.

Reports have been produced for the following sectors of the economy:

- Agriculture, forestry and fishing;
- Energy production and utilities;
- Manufacturing;
- Construction, building services, engineering and planning;
- Wholesale and retail trade;
- Transportation and storage;
- Hospitality, tourism and sport;
- Information and communication technologies;
- Creative media and entertainment;
- Financial, insurance & other professional services;
- Real estate and facilities management;
- Government;
- Education;

[1] Please note, the Education report was produced by LSIS who are not a licensed Sector Skills Council

- Health;
- Care.

The reports contain intelligence on sectors and sub-sectors of particular interest to the four UK governments. As each nation has different 'key sectors', that are defined in different ways, it hasn't be possible define the SSA sectors in a way that matches precisely the key sectors identified by each nation government. Therefore, as far as possible, data has been reported in such a way that it can be aggregated to produce an overall picture for key sectors of interest. In some cases this will involve gathering information from more than one SSA report.

The reports are designed to provide sectoral intelligence at a relatively broad level for strategic decision making purposes. Whilst they do contain some sub-sectoral and occupational intelligence, further intelligence at a more granular level may be available from individual Sector Skills Councils.

In addition to the main UK reports, executive summaries have been produced for Scotland, Wales and Northern Ireland. The UK reports contain information on key regional variations between the four UK nations and within England where appropriate (for example if sectoral employment is focused in a particular geographic area). However, the reports are not designed to provide a comprehensive assessment of sectoral skills issues beyond the national level.

In order to indentify the skills issues and priorities within the Information and communication technologies industries, the report covers: the performance of the sector; the workforce; demand for, use of and value of skills; extent of current skills mismatch; drivers of change and their skills implications; and future skills needs. The report concludes with skill priorities for the sector based on an analysis of the evidence in the report

## 1.2 Defining the sector

Sector Skills Assessment reports are being produced for 15 broad sectors of the economy. This report covers the Information and communication technologies sector. The industries covered are defined by the following 2 digit Standard Industrial Classification (SIC) codes:

- SIC 61 - Telecommunications comprising wired, wireless, satellite and other telecommunications activities;

- SIC 62 - Computer programming, consultancy and related activities comprising Computer programming and consultancy activities, computer facilities management and other information technology and computed service activities;
- SIC 63 - Information Service Activities covering data processing, hosting and related activities; web portals; news agency activities and other information service activities;
- SIC 95 - Repair of computers and other goods includes repair of: computers and peripheral equipment; communication equipment; consumer electronics; household appliances and home and garden equipment; footwear and leather goods; furniture and home furnishings; watches clocks and jewellery; and repair of other personal and household goods.

Across the four nations parts of the Information and communication technologies sector are highlighted as having particular importance to the economy. In England, Northern Ireland and Wales, parts of the sector are considered to be 'priority sectors' and in Scotland, there is a recognised need for skills to enable the exploitation of ICT to increase sustainable economic growth.

## 1.3 Sector Skills Councils

Sector Skills Councils (SSCs) are independent, employer-led, UK–wide organisations. e-skills UK is the Sector Skills Council for Business and Information Technology. We work on behalf of employers across all sectors of the economy to develop the software, internet, computer gaming, IT services, telecommunications and business change expertise necessary to thrive in today's global digital economy.

The industries and occupations e-skills UK is licensed for, and has an interest in, are set out below using Standard Industrial (SIC) and Standard Occupational (SOC) Classifications.

**Table 1.1 e-skills UK licensed industry footprint**

| SIC CODE [2007] | [2007] DESCRIPTION |
|---|---|
| 18.20/3 | Reproduction of computer media |
| 58.2 | Software Publishing |
| 61 | Telecommunications |
| 62 | Computer programming, consultancy and related activities |
| 63.1 | Data processing, hosting and related activities; web portals |
| 95.1 | Repair of computers and communications equipment |

The following business sectors represent areas where there is a sector interest. e-skills UK, to the extent the sectors are a priority for sector employers, collaborates with other SSCs that are accountable for the relevant business sectors:

**Table 1.2 e-skills UK footprint – industries of interest**

| SIC CODE [2007] | [2007] DESCRIPTION |
|---|---|
| 70.22/9 | Management consultancy activities(relating to technology and business change) |
| 33.20 | Installation of industrial machinery and equipment (relating to communications equipment and computers) |
| 43.21 | Electrical installation (relating to telecoms and computer network wiring) |
| 77.33 | Renting and leasing of office machinery and equipment (relating to computers) |
| 26.2 | Manufacture of computers and peripheral equipment |
| 26.3 | Manufacture of communication equipment |
| 27.31 | Manufacture of fibre optic cables |
| 46.14 | Agents involved in the sale of machinery, industry equipment, ships and aircraft (relating to computers) |
| 46.5 | Wholesale of Information and Communication Equipment |
| 47.41 | Retail sale of computers, peripheral units and software in specialised stores |
| 47.42 | Retail sale of telecommunications equipment in specialised stores |

In addition to employers in the industries above, e-skills UK works with employers in sectors across the economy to ensure those working in IT and Telecoms related occupations have the skills they need. The occupations for which the Company has been licensed are as follows:

**Table 1.3 e-skills UK occupational footprint**

| SOC CODE [2000] | [2000] DESCRIPTION |
|---|---|
| 1136 | Information & Communication Technology Managers |
| 2131 | IT Strategy & Planning Professionals |
| 2132 | Software Professionals |
| 2423 | Management Consultant, Actuaries, Economists and Statisticians* |
| 3131 | IT Operations Technicians |
| 3132 | IT User Support Technicians |
| 4136 | Database Assistants & Clerks |
| 5242 | Telecommunications Engineers |
| 5245 | Computer Engineers |

** Note e-skills UK assumes exclusive responsibility for management consultants concerned with technology and business change. FSSC have responsibility for Actuaries. Previously Government Skills had responsibility for economists/statisticians.*

e-skills UK has a shared responsibility with other SSCs for SOC 5243 Line Repairers and Cable Jointers.

Our mission is to ensure the UK has the technology skills it needs to compete in the global economy, with responsibility for the skills of the IT & Telecoms workforce and for IT-related skills across the economy.

The company's strategy[2] has evolved with the changing global and domestic landscapes, growing ambition, and increasing employer support. Focused on making the biggest contribution to enterprise, jobs and growth across the economy, our three strategic objectives are to:

- Inspire future talent by motivating students to pursue IT-related careers and better prepare all young people for work in a technology-enabled world;
- Support IT professionals by helping them develop world-class skills;
- Promote the benefits of IT to organisations and individuals across society.

Delivery on these strategic objectives is underpinned by employer engagement across the sector, authoritative research, a continually developing sector qualifications and learning strategy, and effective strategic partnerships. Further information on e-skills UK can be found at www.e-skills.com/research

## 1.4 Summary of methodology

This report combines top-down data with bottom-up intelligence to provide a rich assessment of sectoral skills priorities that is consistent and comparable with assessments produced for other sectors of the economy.

Three main types of information have been drawn on in the preparation of this report:

- Economy-wide quantitative data from core labour market information sources (such as the Labour Force Survey and the UK Employer Skills Survey);
- Sectoral, sub-sectoral and occupational specific quantitative data generated by SSCs / sector bodies and others (including Government departments and agencies, academics and professional associations);
- Qualitative information collected by SSCs / sector bodies and other organisations.

To ensure consistency and comparability across all 15 SSA reports, data from core labour market information sources was centrally collected, processed and formatted. It was then distributed by the UK Commission to Sector Skills Councils / sector bodies for inclusion within the reports. This data was quality assured by contractors, the UK Commission and by Sector Skills Councils.

[2] e-skills UK strategic plans can be found at: http://www.e-skills.com/about-e-skills-uk/what-we-do/corporate-publications/

To meet consistency requirements, sub-sector analysis of data from core sources has primarily been undertaken at a 2-digit Standard Industrial Classification (SIC) code level (or by combining 2-digit SIC codes where appropriate).

Data for Scotland, Wales and Northern Ireland for the Information and communication technologies sector, being one of the smallest SSA sectors, is most likely to be suppressed.

Please note some tables present a total for 'All sectors' while others present a total for 'All/Whole economy'. The values for these totals are different because the All/Whole economy total includes the 'Not within scope' category (i.e. sectors that don't fall within an SSA sector), whereas All sectors is the total for just the 15 SSA sectors.

Data from core sources has been supplemented within the report with data from sector specific sources.

> A central aim of SSCs is to be the authorities on skills issues in their sectors across the whole of the UK, and key to achieving this involves them collecting, collating and analysing labour market information, and turning this into high quality sectoral labour market intelligence that is communicated effectively to inform policy and practice. (UKCES, 2009)

Sector-specific employer surveys, forecasts for industry and occupations, future trends work, training provision and educational supply analysis and other research have been undertaken by e-skills UK since 2000[3]. This research and analysis provides valuable and detailed insights into specific sectoral, occupational and skills issues and, where appropriate, has been drawn on to produce this report.

This data has been supplemented by a review of recent skills and employment related research and other bespoke research for the Information and communication technologies sector, providing more in-depth sector understanding and analysis.

The report also draws on qualitative research that has been undertaken by e-skills UK and others to explore sectoral skills issues in more detail. Qualitative research with small samples of employers (and others), most commonly through interviews and focus groups, seeks to provide rich and detailed understanding and insight, rather than measurement. Samples tend to be designed to be broadly representative of the wider population, to gather a range of views. In terms of skills research with employers, size and sector tend to be key drivers of demand and therefore these are usually the main characteristics that are taken into account when designing samples.

[3] e-skills UK research includes labour market intelligence for the IT and Telecoms industry and also covers all those working in IT and Telecoms related occupations, working in businesses across all sectors of the economy.

The report synthesises and contextualises information from the sources identified above and, by undertaking a rigorous analysis of it, turns the information into intelligence.

Further methodological information is provided within Appendix A, the Technical Appendix. This includes descriptions of the main quantitative and qualitative sources used within the report.

# 2 Current performance of sector

This chapter sets out the position of the sector in the UK and international economy covering the economic position, business profile and employment trends.

**Chapter Summary**

- The Information and communication technologies sector contributes nearly £69 billion (over seven per cent) to the UK economy.
- Measured by GVA per employee job, the sector is one of the most productive in the UK economy at £83,000 per person, close to twice the UK average level for all sectors. GVA per employee job in the sector is growing faster than across the economy as a whole.
- There are 131,065 establishments in the sector in the UK. Despite businesses in the sector comprising just five per cent of all UK businesses, seven per cent of UK business start-ups in 2009 were in the Information and communication technologies sector. However, there were a quarter more business closures than start-ups in the sector in the same year.
- There are 56,710 businesses in the sector with two or more employees. Businesses in the sector tend to be small with 83 per cent of businesses classified as micro-businesses, having between two and nine employees.
- The sector is also characterised by innovative companies with high end product market strategies, more often than not with a national and international market focus. The sector is currently well placed in an internationally competitive market and contributing to a trade surplus in services, despite the emerging countries increasing prominence in the global sector.
- In the Information and communication technologies sector in 2010 the UK workforce is 761,000, three per cent of total UK employment. The majority of employment (60 per cent) is in the Computer programming, consultancy and related activities sub-sector with a further quarter (23 per cent) of employment in Telecommunications.
- There has been a fall of six per cent in total employment in the sector since 2002, driven by the fall in employment in England and the impact of the recession in 2008. Employment in the sector in Scotland, Wales and Northern Ireland has grown over the same period.

## 2.1 Economic performance

This section considers the current and recent economic performance of the Information and communication technologies sector in the UK, looking at the added value to the economy, the profile of businesses in the sector, market strategies and competitive position.

### 2.1.1 Current and recent economic performance

Gross Value Added (GVA) measures the contribution to the economy of each producer, industry or sector in the UK. It is the difference between the value of goods and services produced and the cost of the raw materials and other inputs which are used up in production.

GVA data presented in Tables 2.1 to 2.3 is not presented by SSA sectors because data is not available at a 2-digit SIC level. Therefore, the list of sectors presented is as used in Regional accounts and does not separate out the Information and communication technologies sector but gives an indication of GVA across broad sector of the economy. The Information and communications technologies sector is included in the following broad sectors in Tables 2.1 to 2.3: 'Transport, storage and communication' (Telecommunications sub-sector) and 'Real estate, renting and business activities' (broadly the Computer programming, consultancy and related activities, Information services and Repair of Computers sub-sectors)[4].

As shown in Table 2.1, GVA in the UK is estimated to be £1,261,162 million in 2008. The 'Real estate, renting and business activities' broad sector contributes 24 per cent to UK GVA and is the largest contributor to GVA in each nation, followed by manufacturing and wholesale and retail trade.

[4] Accurate mapping of the Information and communication technologies sector as defined in this report by SIC 2007 codes is not possible as GVA data in Tables 2.1 to 2.3 is based on SIC 2003.

**Table 2.1: GVA by nation (£m in current basic prices) (2008)**

| | UK | England | Scotland | Wales | Northern Ireland |
|---|---|---|---|---|---|
| | £m | £m | £m | £m | £m |
| Agriculture, hunting, forestry & fishing | 9,715 | 7,982 | 1,180 | 145 | 407 |
| Mining and quarrying of energy producing materials | 2,661 | 1,298 | 1,277 | 60 | 27 |
| Other mining and quarrying | 2,365 | 1,777 | 282 | 134 | 173 |
| Manufacturing | 150,298 | 124,860 | 13,555 | 7,734 | 4,149 |
| Electricity, gas and water supply | 21,342 | 17,414 | 2,653 | 729 | 545 |
| Construction | 80,756 | 68,247 | 7,328 | 2,924 | 2,256 |
| Wholesale and retail trade (including motor trade) | 147,158 | 127,900 | 10,441 | 5,166 | 3,651 |
| Hotels and restaurants | 36,428 | 30,938 | 3,297 | 1,424 | 770 |
| Transport, storage and communication | 91,347 | 80,262 | 7,065 | 2,529 | 1,491 |
| Financial intermediation | 116,801 | 104,574 | 8,501 | 2,305 | 1,422 |
| Real estate, renting and business activities | 303,179 | 268,770 | 20,829 | 8,380 | 5,200 |
| Public administration and defence | 63,281 | 51,275 | 6,148 | 3,275 | 2,583 |
| Education | 76,493 | 64,478 | 6,322 | 3,502 | 2,191 |
| Health and social work | 93,775 | 76,336 | 9,851 | 4,788 | 2,800 |
| Other services | 65,563 | 57,177 | 4,804 | 2,420 | 1,162 |
| All sectors | 1,261,162 | 1,083,288 | 103,533 | 45,515 | 28,827 |

*Source: Regional Accounts, ONS, 2010*

Table 2.2 shows the GVA by English region. London (23 per cent of the total) and the South East (18 per cent) are the biggest contributors to GVA in England.

Table 2.3 shows that UK GVA increased every year between 1999 and 2008, contributing to an overall growth of 56 per cent during the period. The financial intermediation sector has seen the greatest growth over the period (141 per cent), followed by Construction (91 per cent). The manufacturing sector was the only sector to experience an overall decrease in GVA from 1999 to 2008.

**Table 2.2: GVA by English region (£m in current basic prices) (2008)**

| | North East | North West | Yorkshire and The Humber | East Midlands | West Midlands | East | London | South East | South West |
|---|---|---|---|---|---|---|---|---|---|
| | £m | £m | £m | £m | £m | £m | £m | £m | £m |
| Agriculture, hunting, forestry & fishing | 303 | 777 | 966 | 996 | 915 | 1,387 | 86 | 1,168 | 1,383 |
| Mining and quarrying of energy producing materials | 81 | 90 | 140 | 130 | 82 | 164 | 280 | 270 | 61 |
| Other mining and quarrying | 178 | 142 | 156 | 379 | 84 | 132 | 60 | 202 | 442 |
| Manufacturing | 6,706 | 19,336 | 14,332 | 13,299 | 13,974 | 13,518 | 13,651 | 18,084 | 11,961 |
| Electricity, gas and water supply | 979 | 1,622 | 1,511 | 1,952 | 1,920 | 1,948 | 1,823 | 3,061 | 2,598 |
| Construction | 2,990 | 8,236 | 6,266 | 5,835 | 6,588 | 8,946 | 10,262 | 12,482 | 6,643 |
| Wholesale and retail trade (including motor trade) | 4,424 | 14,906 | 11,348 | 10,850 | 12,313 | 15,933 | 22,016 | 24,588 | 11,522 |
| Hotels and restaurants | 1,123 | 3,527 | 2,383 | 2,012 | 2,905 | 3,041 | 7,717 | 5,063 | 3,166 |
| Transport, storage and communication | 2,668 | 8,846 | 6,518 | 5,866 | 6,596 | 9,871 | 17,509 | 16,218 | 6,170 |
| Financial intermediation | 2,195 | 8,356 | 6,641 | 3,702 | 5,260 | 9,352 | 48,190 | 13,828 | 7,050 |
| Real estate, renting and business activities | 7,842 | 26,072 | 17,146 | 16,325 | 20,405 | 29,769 | 74,039 | 55,440 | 21,733 |
| Public administration and defence | 2,623 | 5,843 | 4,753 | 3,919 | 4,376 | 5,634 | 7,642 | 10,218 | 6,267 |
| Education | 3,156 | 8,008 | 6,302 | 4,877 | 6,541 | 6,725 | 11,972 | 10,861 | 6,036 |
| Health and social work | 4,004 | 10,080 | 7,552 | 5,894 | 7,215 | 8,201 | 13,719 | 11,975 | 7,696 |
| Other services | 1,715 | 5,174 | 3,459 | 3,314 | 4,583 | 5,577 | 18,190 | 10,551 | 4,615 |
| All sectors | 40,987 | 121,015 | 89,473 | 79,350 | 93,757 | 120,198 | 247,156 | 194,009 | 97,343 |

*Source: Regional Accounts, ONS, 2010*

**Table 2.3: UK GVA (£m in current basic prices) (1999-2008)**

| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|
| | £m | £m | £m | £m | £m | £m | £m | £m | £m | £m |
| Agriculture, hunting, forestry & fishing | 9,022 | 8,532 | 8,333 | 9,007 | 9,807 | 10,670 | 7,530 | 7,792 | 8,632 | 9,715 |
| Mining and quarrying of energy producing materials | 2,059 | 1,998 | 1,874 | 1,661 | 1,456 | 1,643 | 2,055 | 2,297 | 1,861 | 2,661 |
| Other mining and quarrying | 1,700 | 1,784 | 1,750 | 1,469 | 1,519 | 1,848 | 2,115 | 2,145 | 2,291 | 2,365 |
| Manufacturing | 151,157 | 150,009 | 149,223 | 146,308 | 144,845 | 145,689 | 148,110 | 151,455 | 154,726 | 150,298 |
| Electricity, gas and water supply | 15,703 | 15,798 | 15,660 | 16,052 | 16,405 | 16,106 | 16,685 | 20,279 | 21,884 | 21,342 |
| Construction | 42,236 | 45,626 | 50,526 | 54,684 | 59,522 | 66,029 | 69,868 | 74,619 | 80,675 | 80,756 |
| Wholesale and retail trade (including motor trade) | 99,509 | 103,410 | 110,249 | 113,777 | 120,520 | 127,367 | 129,810 | 135,366 | 141,735 | 147,158 |
| Hotels and restaurants | 24,146 | 25,605 | 26,928 | 28,639 | 30,120 | 31,870 | 32,902 | 34,594 | 35,962 | 36,428 |
| Transport, storage and communication | 64,961 | 69,201 | 70,502 | 73,064 | 76,587 | 79,020 | 80,889 | 83,655 | 88,280 | 91,347 |
| Financial intermediation | 48,545 | 44,989 | 48,202 | 63,367 | 71,530 | 75,117 | 79,553 | 90,807 | 103,731 | 116,801 |
| Real estate, renting and business activities | 173,329 | 18,8361 | 204,041 | 214,849 | 232,204 | 24,8677 | 260,116 | 276,108 | 296,955 | 303,179 |
| Public administration and defence | 39,891 | 41,645 | 43,855 | 46,212 | 49,768 | 53,779 | 58,229 | 60,385 | 61,503 | 63,281 |
| Education | 44,914 | 48,111 | 51,675 | 55,099 | 58,328 | 61,934 | 65,739 | 68,926 | 72,766 | 76,493 |
| Health and social work | 51,577 | 55,282 | 59,549 | 64,492 | 70,593 | 75,154 | 79,965 | 85,965 | 89,381 | 93,775 |
| Other services | 39,821 | 42,085 | 44,560 | 48,311 | 51,804 | 54,947 | 57,961 | 60,166 | 62,824 | 65,563 |
| All sectors | 808,570 | 842,436 | 886,927 | 936,991 | 995,008 | 1,049,850 | 1,091,527 | 1,154,559 | 1,223,206 | 1,261,162 |

*Source: Regional Accounts, ONS, 2010*

More recent data from the ONS Annual Business Survey (ONS, 2011c) shows that approximate Gross Value Added for the Information and communication technologies sector is £68,994 million or 7.4 per cent of total UK GVA[5]. Most of this (52 per cent or £36,864 million) is from the Computer programming, consultancy and related activities sub-sector, with Telecommunications contributing 37 per cent (£25,660 million). Gross Value Added has increased in the Information Service activities sub-sector each year since 2008 whilst the GVA from Telecommunications activities decreased from 2008 to 2009 and again from 2009 to 2010. Whilst GVA decreased in Computer programming, consultancy and related activities from 2008 to 2009, there was a four per cent increase in GVA from 2009 to 2010 in this sub-sector.

The latest BIS Value Added Scoreboard (BIS 2009) shows that, before the economic downturn, there were 35 companies in Fixed line and mobile telecommunications and Software and Computer services in the UK top 800 companies, contributing £49,044 million in value added.

The 'value added' by sector can also be indicated by GVA per employee job as shown in Table 2.4. GVA in the UK for the Information and communication technologies sector, is £83,000 per job, and is close to double the average for all sectors across the UK (£46,000). The sector has the fourth highest productivity level on this measure after Energy production and utilities, Financial Services and Real estate.

The level of productivity in the sector is consistently higher than the whole economy average across all of the nations. GVA per person employed in the Information and communication technologies sector in Wales is around twice the average (£72,000 compared to £38,000), and the sector is ranked third in terms of GVA per person employed. In Scotland the contribution per person is 1.8 times higher than the average for all sectors (£77,000 compared to £43,000). In Northern Ireland, GVA per person employed in the Information and communication technologies sector is £63,000, just less than double the all sector average of £38,000.

[5] Sections A-S.

**Table 2.4: Estimated workplace gross value added per employee job at current basic prices, 2009**

| SSA Sector | UK | England | Wales | Scotland | Northern Ireland |
|---|---|---|---|---|---|
| | £000s | £000s | £000s | £000s | £000s |
| Agriculture, forestry and fishing | 35 | 41 | 11 | 21 | 25 |
| Energy production and utilities | 131 | 134 | 118 | 127 | 107 |
| Manufacturing | 52 | 51 | 49 | 61 | 53 |
| Construction, building services, engineering and planning | 65 | 66 | 54 | 60 | 56 |
| Wholesale and retail trade | 33 | 33 | 27 | 29 | 27 |
| Transportation and storage | 50 | 51 | 44 | 50 | 41 |
| Hospitality, tourism and sport | 23 | 23 | 21 | 22 | 20 |
| **Information and communication technologies** | **83** | **84** | **72** | **77** | **63** |
| Creative media and entertainment | 45 | 49 | 30 | 12 | 38 |
| Financial, insurance & other professional services | 86 | 89 | 57 | 69 | 63 |
| Real estate and facilities management | 85 | 86 | 103 | 67 | 98 |
| Government services | 39 | 40 | 33 | 35 | 40 |
| Education | 33 | 33 | 32 | 36 | 33 |
| Health | 27 | 27 | 26 | 25 | 23 |
| Care | 30 | 30 | 28 | 31 | 26 |
| Not within scope | 32 | 33 | 27 | 35 | 30 |
| **All sectors** | 46 | 47 | 38 | 43 | 38 |

*Source: UK Commission estimates based on Regional Accounts; Annual Business Survey; Business Register and Employment Survey (BRES). See technical appendix for basis for estimates.*
*Notes: Figures for Real estate and facilities management sector include contribution from owner-occupier imputed rental. All figures exclude Extra-Regio element. Estimates will tend to overstate the level of GVA per job in those sectors with high levels of self-employment.*

Further analysis by sub-sector (2 digit SIC)[6], shows that the Telecommunications industry has the highest GVA per person employed in the Information and communication technologies sector at £124,000 (data is for England and Scotland only), followed by Information Service activities (£115,000 per person across the UK). The Repair of computers and other goods sector sub-sector has the lowest GVA per person in the sector and at £28,000 per person is lower than the all sector average for the UK of £46,000.

The *Working Futures* model (Wilson and Homenidou, 2011) provides historic estimates of productivity (output per job) by sector on a constant price (chained volume measure) basis. This analysis indicates an average rate of productivity growth for the UK Information and Communication sector[7] for the first half of the last decade (2000-2005) of 4.5 per cent per annum, moderating to 2.6 per cent in the second half of the decade. This is much higher than the average rates for the two periods for the wider UK economy of 1.4 per cent and 0.7 per cent respectively.

[6] These sub-sector figures are calculated using the Annual Business Survey and Business Register and Employment Survey (both 2009) and unlike Table 2.4 are not constrained to the Regional Accounts totals.
[7] The sectoral definition of Information and Communication used in *Working Futures* differs from the "footprint" employed n this report in that it excludes SIC 95 - Repair of computers and other goods.

GVA data presented in this section shows that the Information and communication technology sector is one of the most productive sectors of the economy, across the UK and in each nation.

### 2.1.2 Business profile

The profile and character of businesses in the UK is a key determinant of the extent of need for labour. Across the UK economy there are over 2.5 million establishments and 131,065 establishments in the Information and communication technologies sector, five per cent of UK businesses. With just one per cent of businesses classified as Information and communication technologies establishments in Northern Ireland compared to five per cent across the UK and eight per cent in London, the sector in Northern Ireland is particularly under-represented in terms of business numbers.

The sector itself is heavily concentrated in England with 92 per cent of Information and communication technologies businesses located in England compared with 85 per cent across the economy. Five per cent of Information and communication technologies businesses are located in Scotland (compared to eight per cent of businesses across the economy in the UK which are located in Scotland), two per cent in Wales (four per cent) and one per cent in Northern Ireland (three per cent of all businesses).

**Table 2.5: Number of establishments by sector and nation (2010)**

| | UK | | England | | Scotland | | Wales | | Northern Ireland | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Number | % | Number | % | Number | % | Number | % | Number | % |
| Agriculture, forestry and fishing | 144,895 | 6% | 96,770 | 4% | 17,625 | 9% | 14,210 | 13% | 16,290 | 19% |
| Energy production and utilities | 13,290 | 1% | 10,365 | 0% | 1,495 | 1% | 865 | 1% | 565 | 1% |
| Manufacturing | 144,115 | 6% | 124,235 | 6% | 9,395 | 5% | 6,040 | 5% | 4,445 | 5% |
| Construction, building services, engineering and planning | 358,455 | 14% | 303,300 | 14% | 27,845 | 14% | 14,280 | 13% | 13,030 | 15% |
| Wholesale and retail trade | 509,215 | 20% | 431,330 | 20% | 38,165 | 20% | 23,000 | 20% | 16,720 | 20% |
| Transportation and storage | 83,825 | 3% | 70,685 | 3% | 6,370 | 3% | 3,925 | 3% | 2,845 | 3% |
| Hospitality, tourism and sport | 223,370 | 9% | 185,390 | 8% | 20,515 | 11% | 11,580 | 10% | 5,885 | 7% |
| Information and communication technologies | 131,065 | 5% | 120,095 | 5% | 6,610 | 3% | 3,130 | 3% | 1,230 | 1% |
| Creative media and entertainment | 134,115 | 5% | 121,900 | 6% | 6,830 | 4% | 3,640 | 3% | 1,745 | 2% |
| Financial, insurance & other professional services | 255,000 | 10% | 228,725 | 10% | 14,770 | 8% | 7,160 | 6% | 4,345 | 5% |
| Real estate and facilities management | 149,325 | 6% | 129,340 | 6% | 10,610 | 5% | 5,730 | 5% | 3,645 | 4% |
| Government services | 52,210 | 2% | 40,870 | 2% | 5,625 | 3% | 2,985 | 3% | 2,730 | 3% |
| Education | 67,125 | 3% | 55,020 | 3% | 5,535 | 3% | 3,250 | 3% | 3,320 | 4% |
| Health | 55,135 | 2% | 46,925 | 2% | 3,895 | 2% | 2,515 | 2% | 1,800 | 2% |
| Care | 85,935 | 3% | 70,460 | 3% | 7,810 | 4% | 4,710 | 4% | 2,955 | 4% |
| All economy | 2,574,230 | 100% | 2,183,845 | 100% | 193,305 | 100% | 112,810 | 100% | 84,270 | 100% |

*Source: Inter-departmental Business Register (IDBR), ONS*

**Table 2.6: Number of establishments by sector and English region (2010)**

| | North East | North West | Yorkshire and The Humber | East Midlands | West Midlands | East | London | South East | South West |
|---|---|---|---|---|---|---|---|---|---|
| Agriculture, forestry and fishing | 3,870 | 11,305 | 11,205 | 10,770 | 11,880 | 12,170 | 935 | 11,785 | 22,850 |
| Energy production and utilities | 475 | 1,460 | 1,155 | 1,025 | 1,065 | 1,320 | 950 | 1,605 | 1,310 |
| Manufacturing | 4,650 | 15,950 | 13,100 | 12,915 | 15,930 | 15,235 | 13,350 | 20,025 | 13,080 |
| Construction, building services, engineering and planning | 10,845 | 35,520 | 26,035 | 24,975 | 28,750 | 41,485 | 42,520 | 58,785 | 34,385 |
| Wholesale and retail trade | 16,630 | 55,955 | 41,975 | 36,895 | 45,695 | 48,635 | 67,620 | 71,850 | 46,075 |
| Transportation and storage | 2,610 | 8,775 | 7,270 | 6,830 | 7,930 | 9,305 | 9,190 | 11,570 | 7,205 |
| Hospitality, tourism and sport | 8,395 | 23,095 | 17,600 | 14,030 | 16,700 | 19,290 | 32,470 | 31,885 | 21,925 |
| Information and communication technologies | 2,325 | 10,885 | 6,685 | 6,900 | 9,260 | 14,735 | 29,655 | 28,805 | 10,845 |
| Creative media and entertainment | 2,660 | 10,035 | 6,735 | 6,215 | 7,425 | 12,210 | 43,255 | 22,760 | 10,605 |
| Financial, insurance & other professional services | 5,440 | 23,475 | 14,900 | 14,950 | 18,300 | 23,850 | 61,915 | 45,495 | 20,400 |
| Real estate and facilities management | 4,185 | 14,800 | 10,225 | 9,390 | 11,925 | 15,045 | 27,475 | 22,980 | 13,315 |
| Government services | 1,815 | 4,810 | 4,260 | 4,270 | 4,040 | 4,215 | 6,495 | 6,340 | 4,625 |
| Education | 2,495 | 6,890 | 4,965 | 4,810 | 5,465 | 6,330 | 8,215 | 9,925 | 5,925 |
| Health | 2,010 | 6,255 | 4,265 | 3,830 | 4,570 | 4,850 | 8,045 | 8,280 | 4,820 |
| Care | 3,575 | 9,340 | 6,950 | 6,110 | 6,940 | 7,210 | 10,725 | 11,700 | 7,910 |
| Whole economy | 75,975 | 255,705 | 187,810 | 174,700 | 210,065 | 253,120 | 392,540 | 394,505 | 239,425 |

*Source: Inter-departmental Business Register (IDBR), ONS*

As shown in Table 2.6, London and the South East of England are the main locations for Information and communication technologies businesses with nearly half (49 per cent) of all Information and communication technologies businesses in England located there.

The number of Information and communication technologies businesses in the UK grew from 2006 to 2008 where there were 144,080 establishments, before falling back to 131,065 by 2010 (see Table 2.7). This is an overall decrease of four per cent since 2006 and in contrast to the general trend across the economy where the number of businesses grew by two per cent in the same period.

**Table 2.7: Number of establishments by sector 2006-2010 (UK)**

| | 2006 | 2007 | 2008 | 2009 | 2010 | % Change 2006-2010 |
|---|---|---|---|---|---|---|
| Agriculture, forestry and fishing | 146,485 | 158,080 | 163,715 | 146,620 | 144,895 | -1% |
| Energy production and utilities | 18,170 | 18,260 | 11,435 | 12,980 | 13,290 | -27% |
| Manufacturing | 165,675 | 163,525 | 167,335 | 151,165 | 144,115 | -13% |
| Construction, building services, engineering and planning | 230,610 | 240,535 | 258,055 | 374,320 | 358,455 | 55% |
| Wholesale and retail trade | 533,105 | 532,905 | 532,060 | 520,070 | 509,215 | -4% |
| Transportation and storage | 70,425 | 70,750 | 71,665 | 86,680 | 83,825 | 19% |
| Hospitality, tourism and sport | 219,770 | 222,920 | 227,430 | 229,690 | 223,370 | 2% |
| Information and communication technologies | 136,395 | 140,505 | 144,080 | 134,805 | 131,065 | -4% |
| Creative media and entertainment | 125,100 | 130,185 | 131,180 | 132,225 | 134,115 | 7% |
| Financial, insurance & other professional services | 271,310 | 283,920 | 287,015 | 256,915 | 255,000 | -6% |
| Real estate and facilities management | 180,305 | 191,195 | 201,915 | 155,855 | 149,325 | -17% |
| Government services | 159,395 | 164,690 | 54,875 | 52,060 | 52,210 | -67% |
| Education | 28,935 | 28,880 | 66,055 | 66,725 | 67,125 | 132% |
| Health | 25,860 | 25,810 | 53,300 | 53,900 | 55,135 | 113% |
| Care | 40,150 | 40,075 | 82,755 | 83,675 | 85,935 | 114% |
| All economy | 2,533,855 | 2,600,065 | 2,643,215 | 2,634,790 | 2,574,230 | 2% |

*Source: Inter-departmental Business Register (IDBR), ONS*
*Note: Data for 2006-2008 is based on SIC 2003 whereas data beyond this use SIC 2007. Some of the data for 2006-2008 is based on estimates. For full details please see technical appendix.*

In England, there was an overall decrease of three per cent in the number of Information and communication technologies businesses between 2006 and 2010. The number of businesses in the sector fell by a much greater percentage in the devolved nations: in Scotland there were 13 per cent fewer businesses in 2010 than in 2006; in Wales 12 per cent fewer, and in Northern Ireland the number of businesses in the sector fell by 16 per cent over the same period.

The UKCES Employer Perspectives survey (Shury *et al.*, 2011) shows that, 62 per cent of establishments across all sectors are single-site organisations, with the remaining 38 per cent being multi-site (either head-office of a multi-site or subordinate sites). In the Information and communication technologies sector, a larger proportion of organisations are single site (70 per cent) with 30 per cent in total being multi-site.

Analysis by size of business is important because, across the UK, 94 per cent of employees are employed in companies with fewer than 50 employees. Additionally, small firms are "commonly seen as sources of job creation and innovation." (UKCES, 2010b)

There are 1,742,370 establishments in the UK with 2 or more employees (Table 2.8). The number of businesses with 2 or more employees is commonly used to differentiate between firms with employees and those without employees, sole proprietorships or the self-employed.

**Table 2.8: Number of establishments by nation (2010)**

| | UK | England | Scotland | Wales | Northern Ireland |
|---|---|---|---|---|---|
| 2-4 | 908,825 | 767,415 | 66,560 | 44,675 | 30,175 |
| 5-9 | 388,990 | 323,815 | 33,775 | 18,005 | 13,395 |
| 10-24 | 259,470 | 215,295 | 23,090 | 11,910 | 9,175 |
| 25-49 | 97,820 | 82,055 | 8,330 | 4,170 | 3,265 |
| 50-99 | 49,505 | 41,835 | 4,140 | 2,055 | 1,475 |
| 100-199 | 21,905 | 18,505 | 1,905 | 925 | 570 |
| 200-250 | 4,135 | 3,525 | 360 | 150 | 100 |
| 251-499 | 7,605 | 6,440 | 655 | 330 | 180 |
| 500+ | 4,115 | 3,475 | 375 | 175 | 90 |
| Total | 1,742,370 | 1,462,360 | 139,190 | 82,395 | 58,425 |

*Source: Inter-departmental Business Register (IDBR), ONS*

Most businesses with 2 or more employees are located in England (84 per cent), with eight per cent in Scotland, five per cent in Wales and three per cent of businesses of this size in Northern Ireland. The size of establishment (Table 2.9) follows a similar pattern across nations with around half of all establishments having 2 to 4 employees. Just one per cent of businesses can be categorised as large, having more than 250 employees and a further four to five per cent are medium sized companies with between 50 and 250 employees.

**Table 2.9: Size of establishments by nation (2010)**

| | England | | Scotland | | Wales | | Northern Ireland | |
|---|---|---|---|---|---|---|---|---|
| | Number | % | Number | % | Number | % | Number | % |
| 2-4 | 767,415 | 52 | 66,560 | 48 | 44,675 | 54 | 30,175 | 52 |
| 5-9 | 323,815 | 22 | 33,775 | 24 | 18,005 | 22 | 13,395 | 23 |
| 10-24 | 215,295 | 15 | 23,090 | 17 | 11,910 | 14 | 9,175 | 16 |
| 25-49 | 82,055 | 6 | 8,330 | 6 | 4,170 | 5 | 3,265 | 6 |
| 50-250 | 63,865 | 4 | 6,405 | 5 | 3,130 | 4 | 2,145 | 4 |
| 251+ | 9,915 | 1 | 1,030 | 1 | 505 | 1 | 270 | 0 |
| Total | 1,462,360 | 100 | 139,190 | 100 | 82,395 | 100 | 58,425 | 100 |

*Source: Inter-departmental Business Register (IDBR), ONS*

The size of establishments varies much more across sectors. There are 56,710 establishments with two or more employees in the Information and communication technologies sector in the UK. As shown in Table 2.10, the sector has a high proportion of very small establishments - those with 2 to 4 employees. With 68 per cent of businesses in this category, this is the largest proportion save for Agriculture, forestry and fishing where 80 per cent of businesses have 2 to 4 employees.

**Table 2.10: Size of establishments by sector (UK) (2010)**

| | Number of employees | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2-4 | 5-9 | 10-24 | 25-49 | 50-250 | 251+ | All |
| | % | % | % | % | % | % | Number |
| Agriculture, forestry and fishing | 80 | 14 | 5 | 1 | 0 | 0 | 97,910 |
| Energy production and utilities | 36 | 22 | 20 | 10 | 10 | 2 | 10,265 |
| Manufacturing | 43 | 22 | 18 | 8 | 8 | 1 | 108,050 |
| Construction, building services, engineering and planning | 67 | 18 | 10 | 3 | 2 | 0 | 211,710 |
| Wholesale and retail trade | 49 | 27 | 16 | 4 | 3 | 1 | 385,760 |
| Transportation and storage | 48 | 20 | 16 | 7 | 8 | 1 | 52,620 |
| Hospitality, tourism and sport | 42 | 30 | 19 | 6 | 3 | 0 | 198,630 |
| Information and communication technologies | 68 | 15 | 10 | 4 | 3 | 1 | 56,710 |
| Creative media and entertainment | 66 | 17 | 10 | 4 | 3 | 0 | 62,305 |
| Financial, insurance & other professional services | 57 | 21 | 14 | 4 | 3 | 1 | 134,900 |
| Real estate and facilities management | 62 | 21 | 11 | 3 | 3 | 1 | 95,270 |
| Government services | 34 | 21 | 20 | 10 | 12 | 4 | 41,505 |
| Education | 20 | 14 | 20 | 23 | 21 | 2 | 56,740 |
| Health | 31 | 24 | 25 | 10 | 7 | 2 | 47,570 |
| Care | 26 | 24 | 28 | 13 | 8 | 0 | 75,725 |
| All economy | 52 | 22 | 15 | 6 | 4 | 1 | 1,742,370 |

*Source: Inter-departmental Business Register (IDBR), ONS*

As shown in Table 2.11, within the Information and communication technologies sector, Wales has a higher proportion of very small companies (with 2-4 employees) and as a proportion of the sector business population in each nation, both Scotland and Northern Ireland have slightly more medium to large sized businesses (both with five per cent of the business population) than Wales (three per cent) and England (four per cent).

**Table 2.11: Size of establishments within sector by nation (2010)**

| | England | | Scotland | | Wales | | Northern Ireland | |
|---|---|---|---|---|---|---|---|---|
| | Number | % | Number | % | Number | % | Number | % |
| 2-4 | 35,215 | 68 | 1,770 | 63 | 1,060 | 71 | 440 | 62 |
| 5-9 | 7,685 | 15 | 470 | 17 | 230 | 15 | 110 | 15 |
| 10-24 | 5,040 | 10 | 325 | 12 | 125 | 8 | 80 | 11 |
| 25-49 | 1,820 | 4 | 120 | 4 | 35 | 2 | 45 | 6 |
| 50-250 | 1,590 | 3 | 100 | 4 | 30 | 2 | 25 | 3 |
| 251+ | 345 | 1 | 20 | 1 | 15 | 1 | 15 | 2 |
| Total | 51,695 | 100 | 2,805 | 100 | 1,495 | 100 | 715 | 100 |

*Source: Inter-departmental Business Register (IDBR), ONS*
*Data has been rounded to the nearest 5 and may not sum to totals due to rounding.*

The Telecommunications sub-sector has a lower proportion of micro companies (2-9 employees) than average at 67 per cent. The Computer programming, consultancy and related activities sub-sector and Repair of Computers and other goods sub-sector both have a higher proportion of micro companies (85 per cent) than the sector overall (83 per cent).

The Telecommunications sub-sector has a higher proportion of large companies (251+ employees) than the other Information and communication technologies sub-sectors at three per cent.

Growth and the health of the sector can be indicated by the number of business start-ups and closures, shown in Table 2.12. Across the UK there were 236,025 business start-ups in 2009 and 277,618 business closures, creating a balance of 41,593 more closures than start-ups. In 2009, there were more business closures than start-ups in each nation of the UK and in every English region.

**Table 2.12: Business (enterprise) start-ups and closures 2009 (UK)**

| Sector | Start-ups | Closures |
|---|---|---|
| | Number | Number |
| Agriculture, forestry and fishing (SIC 75 only) | 285 | 190 |
| Energy production and utilities | 1,270 | 408 |
| Manufacturing | 10,570 | 15,445 |
| Construction, building services, engineering and planning | 35,835 | 51,040 |
| Wholesale and retail trade | 38,760 | 47,090 |
| Transportation and storage | 6,980 | 10,805 |
| Hospitality, tourism and sport | 23,345 | 28,030 |
| Information and communication technologies | 16,120 | 19,935 |
| Creative media and entertainment | 24,290 | 20,805 |
| Financial, insurance & other professional services | 25,640 | 25,765 |
| Real estate and facilities management | 12,805 | 16,275 |
| Government services | 1,010 | 1,260 |
| Education | 3,485 | 3,160 |
| Health | 4,135 | 3,110 |
| Care | 2,745 | 2,165 |
| Other sectors | 28,750 | 32,135 |
| All economy | 236,025 | 277,618 |

*Source: Business Demography - Enterprise Births, Deaths and Survivals 2009 (ONS)*

Business start-ups in the Information and communication technologies sector comprise seven per cent of all UK business start-ups and seven per cent of all closures. Overall there were 3,815 more business closures than start-ups in the Information and communication technologies sector in 2009, this equates to nearly a quarter more business 'deaths' than business 'births' in 2009. Nine of the fifteen sectors (excluding 'other sectors') also experienced the trend of more business 'deaths' than 'births'.

The IT trade association Intellect says that, in respect of the UK software industry at least, they have seen increasing consolidation of small and medium sized businesses, saying these businesses "struggle to compete with their larger rivals, who are able to leverage greater marketing muscle, R&D budgets and low cost development skills in offshore locations – a trend fuelled by the recent economic hard times." (Intellect, 2011)

In contrast to the overall trend in the sector, the Telecommunications sub-sector and Information Service activities both saw the number of company 'births' exceed 'deaths'. In Telecommunications there was positive growth in the number of companies of 45 and in Information Service activities of 295 more start ups than closures.

However, the more populous (in terms of the overall number of businesses) Computer programming, consultancy and related activities sub-sector saw 'births' of more than 12,000 and 'deaths' of more than 16,000 causing a negative impact on the numbers of businesses in the sub-sector.

### 2.1.3 Competition and market strategies

Investment, innovation, skills, enterprise and competition are the recognised indicators of UK productivity and competitiveness. This section outlines the competitive position of the sector.

Using data from the UK innovation surveys from 2005, 2007 and 2009, the report 'The distribution of innovation activity across UK industry' (Adams, 2011) gives an indication of the industrial concentration of 'innovative' businesses. Whilst the report notes that findings should be treated with caution[8], it concludes that 'Software consultancy and supply' (SIC03 72.2) and 'Other computer related activities' (SIC03 72.6) are in the top six high performing industries across the timeframe and as such, are characterised as 'innovation hotspots'.

[8] The report uses unweighted data and limitations are explained as: respondents are self-selecting and differ across the period, unweighted data has been used, three separate surveys have been used with some changes, small cell sizes when analysing industry and postcode data – cell counts where respondents are 10 or less have been excluded.

A study of the links between product market strategies and skills shortages in England shows that product market strategies are strongly positively related to skills levels within the workforce. Although the same report says that it is not possible to say that high product market strategies (where companies produce high spec, premium quality goods and services) drive up skills or vice versa, the data shows that companies with high product market strategy scores are also likely to register higher levels of workforce skill.

The market focus for the Information and communication technologies sector is much more widely based in terms of geography than is the case for businesses across the rest of the economy, with 49 per cent of businesses in the sector having either a UK or international market focus compared to 28 per cent of businesses as a whole (Shury *et al.*, 2011).

Whilst robust data for market focus is not available for the sector by nation from the recent Employer Perspectives Survey 2011, indicative data suggests that businesses in the sector in Scotland and Wales are more likely to have a local and regional customer base than the average for Information and communication technologies businesses across the whole of the UK. However, businesses in the sector in England and Scotland in particular would seem to have a higher proportion of businesses with a mainly international market focus.

Indeed, the significance of international trade to the UK would appear to have increased in recent years. Analysis in the UKCES Employment and Skills Almanac (Hay *et al.*, 2011) shows that in 2009 the value of exports was 23 per cent of GDP, and imports 25 per cent, having grown from 18 per cent since 1990.

The OECD report ‘Information Technology Outlook 2010 Highlights’ (OECD, 2010) ranks the UK 13th for the value of ICT exports (goods and services) in 2008 at US $38 billion. The report notes that ICT trade has returned to growth following decline in 2008 and 2009. Whilst China is the largest exporter of ICT goods, the report notes that India is by far the largest exporter of Computer and Information Services (covered by this report on the Information and communication technologies sector) and that the growth in India’s exports is “fuelled by the growth of domestic firms”.

The ONS provides a summary of the UK's trade in services and shows exports, imports and balances by main types of services, seasonally adjusted (ONS, 2011). This can be used to indicate economic transaction between the UK and the rest of the world. In the fourth quarter of 2010 the UK had a trade in services surplus of £12.1 billion. In the same period there was a £652 million trade surplus in 'Communications' and 'Computer and Information'. These two areas make up 6.7 per cent of UK exports, 7.3 per cent of imports and are 5.4 per cent of the UK trade in services balance.

Annual changes show a decrease of eight per cent in the trade in services balance for 'Communications' and 'Computer and Information'. This is largely due to 'Communications' which saw a change of minus £185 million or minus 83 per cent between the fourth quarters of 2009 and 2010.

One means for assessing the competitiveness of the Information and communication technologies sector is through international benchmarking. The Economist Intelligence Unit report 'Investment for the future, Benchmarking IT industry competitiveness 2011', (EIU, 2011) specifically benchmarks IT sector competitiveness, comparing countries in different regions of the world on the extent to which they possess the conditions necessary to support a strong IT industry.

The 2011 report highlights the increasing prominence of emerging economies such as India and China and questions whether the IT industry's centre of gravity is moving East from the previously dominated Western world. The United States, previously described as "the world's most conducive environment for the development and growth of IT firms", retains its position at the top of the Index and the UK is ranked in 5$^{th}$ place, one place higher than in 2009.

IT companies in emerging markets are thought to be less close to their consumer base and, as such, have been less ready to capitalise on new innovations and social networking to develop products and services. However, this could all be about to change according to a recent report 'Capturing the ICT Dividend' (Oxford Economics, 2011) which suggests firms in emerging markets are: 'investing aggressively' in ICT; twice as likely (compared to firms in advanced economies) to be planning to significantly increase their investments in mobile devices, social media, business intelligence, collaborative tools and telepresence systems; and able to realise the benefits of ICT investment quicker through learning from the mistakes of rivals in more advanced economies.

## 2.2 Employment

This section looks at current and recent employment in the UK and in the Information and communication technologies sector. Employment indicators give a measure of demand for workers, driven by the demands for goods and services and by product market strategies.

### 2.2.1 Total employment

There are nearly 29 million (28,855,000) people in the workforce in the UK in 2010. England makes up 84 per cent of the UK workforce with 24.3 million people in employment; Scotland has eight per cent of the UK workforce with over 2.4 million in employment, Wales five per cent with 1.3 million, and Northern Ireland three per cent with a workforce of 766,000.

In the Information and communication technologies sector in 2010 the UK workforce is 761,000, three per cent of total UK employment. The sector is slightly less densely represented in Scotland (56,000) and Northern Ireland (13,000) comprising two per cent of employment across the whole economy in each nation. In Wales, total employment in the sector is 18,000, one per cent of employment across the whole economy in Wales.

Employment in the sector is heavily centred in England with 89 per cent of total sector employment in England, seven per cent in Scotland, two per cent in Wales and two per cent in Northern Ireland as shown in Table 2.13.

**Table 2.13: Total employment by sector and nation (2010) ('000s)**

| | UK | | England | | Scotland | | Wales | | Northern Ireland | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 000s | % | 000s | % | 000s | % | 000s | % | 000s | % |
| Agriculture, forestry and fishing | 406 | 100 | 296 | 73 | 51 | 13 | 31 | 8 | 27 | 7 |
| Energy production and utilities | 473 | 100 | 346 | 73 | 88 | 19 | 25 | 5 | 14 | 3 |
| Manufacturing | 2,970 | 100 | 2,542 | 86 | 199 | 7 | 138 | 5 | 91 | 3 |
| Construction, building services, engineering and planning | 2,697 | 100 | 2,270 | 84 | 244 | 9 | 113 | 4 | 71 | 3 |
| Wholesale and retail trade | 4,140 | 100 | 3,471 | 84 | 353 | 9 | 205 | 5 | 112 | 3 |
| Transportation and storage | 1,448 | 100 | 1,252 | 86 | 117 | 8 | 46 | 3 | 33 | 2 |
| Hospitality, tourism and sport | 2,046 | 100 | 1,704 | 83 | 198 | 10 | 100 | 5 | 44 | 2 |
| Information and communication technologies | 761 | 100 | 675 | 89 | 56 | 7 | 18 | 2 | 13 | 2 |
| Creative media and entertainment | 987 | 100 | 876 | 89 | 65 | 7 | 32 | 3 | 14 | 1 |
| Financial, insurance & other professional services | 2,001 | 100 | 1,768 | 88 | 138 | 7 | 53 | 3 | 41 | 2 |
| Real estate and facilities management | 978 | 100 | 848 | 87 | 75 | 8 | 38 | 4 | 18 | 2 |
| Government services | 2,209 | 100 | 1,835 | 83 | 173 | 8 | 111 | 5 | 89 | 4 |
| Education | 3,088 | 100 | 2,625 | 85 | 235 | 8 | 154 | 5 | 75 | 2 |
| Health | 2,087 | 100 | 1,713 | 82 | 199 | 10 | 111 | 5 | 64 | 3 |
| Care | 1,729 | 100 | 1,409 | 81 | 183 | 11 | 97 | 6 | 40 | 2 |
| Whole economy | 28,855 | 100 | 24,331 | 84 | 2,446 | 8 | 1,312 | 5 | 766 | 3 |
| *Unweighted base* | *194.448* | 100 | *161.501* | 83 | *17.022* | 9 | *8.693* | 4 | *7.232* | 4 |

*Source: Labour Force Survey 2010, ONS*
** Sample size too small for reliable estimate.*

Employment in the sector is denser in the South East of England where four per cent of total employment is in the Information and communication technologies sector compared to the average across England of three per cent (Table 2.14).

**Table 2.14: Total employment by sector and English region, % share within region (2010)**

| | London | South East | East of England | South West | West Midlands | East Midlands | Yorkshire and the Humber | North West | North East |
|---|---|---|---|---|---|---|---|---|---|
| Agriculture, forestry and fishing | 0 | 1 | 1 | 3 | 2 | 2 | 1 | 1 | 1 |
| Energy production and utilities | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 |
| Manufacturing | 4 | 9 | 11 | 11 | 14 | 15 | 12 | 12 | 11 |
| Construction, building services, engineering and planning | 9 | 10 | 10 | 9 | 9 | 9 | 9 | 9 | 9 |
| Wholesale and retail trade | 12 | 14 | 14 | 14 | 14 | 16 | 16 | 16 | 15 |
| Transportation and storage | 5 | 5 | 5 | 4 | 5 | 6 | 5 | 5 | 4 |
| Hospitality, tourism and sport | 8 | 7 | 6 | 7 | 7 | 7 | 7 | 7 | 7 |
| Information and communication technologies | 3 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 |
| Creative media and entertainment | 8 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 |
| Financial, insurance & other professional services | 13 | 8 | 8 | 6 | 6 | 5 | 6 | 6 | 4 |
| Real estate and facilities management | 5 | 4 | 3 | 4 | 3 | 3 | 3 | 4 | 3 |
| Government services | 8 | 8 | 7 | 7 | 7 | 7 | 8 | 8 | 9 |
| Education | 10 | 11 | 11 | 11 | 11 | 11 | 11 | 10 | 11 |
| Health | 6 | 7 | 6 | 7 | 7 | 7 | 8 | 8 | 8 |
| Care | 5 | 5 | 5 | 6 | 6 | 5 | 6 | 6 | 8 |
| Whole economy | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| *Weighted base* | 3,726 | 4,147 | 2,779 | 2,515 | 2,413 | 2,099 | 2,382 | 3,126 | 1,145 |
| *Unweighted bases* | *18.925* | *26.614* | *18.998* | *17.015* | *16.534* | *15.044* | *17.467* | *22.418* | *8.486* |

*Source: Labour Force Survey 2010, ONS*
** Sample size too small for reliable estimate.*

The UK has a higher proportion of the total workforce employed in the sector than average across Europe. Data from Eurostat shows that in 2008, three per cent of EU27 employment was in the Information and communication technologies sector. Employment in the sector in the UK was greater at 4 per cent of total employment, along with the Netherlands, Sweden, Denmark, Norway, Finland, Ireland, Luxembourg and Iceland.

### 2.2.2 Employment growth

There has been a fall of six per cent in total employment in the sector since 2002 when employment was 813,000, as shown in Table 2.15. This is in contrast to overall growth across the whole economy of three per cent since 2002 (Table 2.16). At its peak, in 2008, employment in the sector was 871,000. Annual changes in employment growth were in the order of plus three per cent to minus one per cent between 2002 and 2008 but as a proportion of total UK employment, employment in the sector has remained relatively stable at three per cent.

The decrease in employment in the sector across the UK from 2002 to 2010 has been driven by the fall in employment in the sector in England – a decrease of nine per cent (63,000) from 738,000 in 2002 to 675,000 in 2010.

However, employment in the sector in Scotland, Wales and Northern Ireland has grown over the period (by 22 per cent, five per cent and eight per cent respectively). Growth in employment in Wales and Northern Ireland was similar to employment growth in the whole economy over the period. In Scotland however, employment growth in the sector was six times the growth in the whole economy over the same period (22 per cent compared to less than four per cent growth). However, the growth in employment in the sector in Scotland masks somewhat volatile annual employment trends rather than a steady increase.

**Table 2.15: Total employment in the sector by nation 2002-2010 ('000s)**

| | UK | England | Scotland | Wales | Northern Ireland |
|---|---|---|---|---|---|
| | 000s | 000s | 000s | 000s | 000s |
| 2002 | 813 | 738 | 45 | 17 | 12 |
| 2003 | 813 | 728 | 53 | 21 | 11 |
| 2004 | 839 | 753 | 49 | 25 | 12 |
| 2005 | 832 | 745 | 48 | 27 | 11 |
| 2006 | 835 | 742 | 52 | 29 | 11 |
| 2007 | 851 | 759 | 56 | 23 | 12 |
| 2008 | 871 | 776 | 52 | 28 | 16 |
| 2009 | 784 | 699 | 47 | 22 | 16 |
| 2010 | 761 | 675 | 56 | 18 | 13 |

*Source: Labour Force Survey 2010, ONS*

**Table 2.16: Total employment by sector 2002-2010 (UK) ('000s)**

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|
| | 000s | 000s | 000s | 000s | 000s | 000s | 000s | 000s | 000s |
| Agriculture, forestry and fishing | 394 | 389 | 396 | 421 | 417 | 422 | 448 | 364 | 406 |
| Energy production and utilities | 434 | 389 | 407 | 422 | 436 | 479 | 486 | 483 | 473 |
| Manufacturing | 4,153 | 3,870 | 3,687 | 3,615 | 3,562 | 3,575 | 3,368 | 2,915 | 2,970 |
| Construction, building services, engineering and planning | 2,223 | 2,333 | 2,434 | 2,500 | 2,560 | 2,615 | 2,639 | 2,875 | 2,697 |
| Wholesale and retail trade | 4,368 | 4,545 | 4,536 | 4,489 | 4,404 | 4,349 | 4,446 | 4,143 | 4,140 |
| Transportation and storage | 1,486 | 1,485 | 1,461 | 1,511 | 1,501 | 1,490 | 1,517 | 1,489 | 1,448 |
| Hospitality, tourism and sport | 1,718 | 1,720 | 1,730 | 1,714 | 1,773 | 1,807 | 1,799 | 1,991 | 2,046 |
| Information and communication technologies | 813 | 813 | 839 | 832 | 835 | 851 | 871 | 784 | 761 |
| Creative media and entertainment | 1,102 | 1,139 | 1,108 | 1,111 | 1,138 | 1,142 | 1,156 | 975 | 987 |
| Financial, insurance & other professional services | 1,671 | 1,662 | 1,623 | 1,677 | 1,696 | 1,744 | 1,736 | 2,038 | 2,001 |
| Real estate and facilities management | 898 | 869 | 924 | 946 | 984 | 1,036 | 1,028 | 948 | 978 |
| Government services | 2,115 | 2,166 | 2,194 | 2,251 | 2,282 | 2,285 | 2,323 | 2,265 | 2,209 |
| Education | 2,295 | 2,414 | 2,543 | 2,580 | 2,642 | 2,636 | 2,664 | 2,939 | 3,088 |
| Health | 1,811 | 1,881 | 1,980 | 2,048 | 2,079 | 2,033 | 2,118 | 2,038 | 2,087 |
| Care | 1,288 | 1,338 | 1,408 | 1,456 | 1,479 | 1,446 | 1,506 | 1,721 | 1,729 |
| Whole economy | 27,908 | 28,172 | 28,456 | 28,740 | 28,987 | 29,164 | 29,382 | 28,811 | 28,855 |
| *Unweighted base* | *247.273* | *238.005* | *230.951* | *227.794* | *222.196* | *221.046* | *217.000* | *203.221* | *194.448* |

*Source: Labour Force Survey 2010, ONS*
** Sample size too small for reliable estimate.*
*Note: Data before 2009 is based on SIC2003 and data for 2009 and 2010 is based on SIC2007*

Employment in the sector in the UK has fallen each year since the recession began in 2008. This pattern is repeated in England and Wales but employment in the sector in Scotland, whilst falling from 2008 to 2009, grew again in 2010 with a return to the 2007 level of employment (56,000). In Northern Ireland, employment in the sector remained stable from 2008 to 2009 but decreased by 3,000 between 2009 and 2010 (Table 2.15).

### 2.2.3 Sub-sector employment

The Information and communication technologies sector described in this report is defined by two-digit Standard Industrial Classification (SIC) (see Chapter 1). Employment figures can be broken down into "sub-sector" as defined by the two-digit SIC to give a better understanding of where employment is concentrated.

The data in Table 2.17 sets out employment by sub-sector. Computer programming, consultancy and related activities (SIC 62) is the largest sub-sector with 60 per cent of employment in the sector. Telecommunications employment (SIC 61) comprises 23 per cent, with Repair of Computer and other goods (SIC 95) comprising 12 per cent and Information Service activities (SIC 63) five per cent of sector employment.

**Table 2.17: Total employment by sub-sector 2010 (UK)**

| SIC Code [2007] | Description | 000s | % |
|---|---|---|---|
| 61 | Telecommunications | 176 | 23 |
| 62 | Computer programming Consultancy and related activities | 456 | 60 |
| 63 | Information Service activities | 35 | 5 |
| 95 | Repair of computers and other goods | 95 | 12 |
| | Total Information and communication technologies | 761 | 100 |

*Source: Labour Force Survey 2010, ONS*

Employment is further concentrated within certain activities within sub-sectors namely: 'Computer consultancy activities'; 'Other telecommunications activities' and 'Other information technology and computer service activities'. In the Information Service activities sub-sector, 'data processing, hosting and related activities' dominates employment and in the Repair of computers and other goods sub-sector, 'repair of computers and peripheral equipment' is the largest area of employment.

Concluding on the current performance of the sector, growth metrics used to show output, employment, productivity and enterprises, indicate that the Computing sector was the third fastest growing sector in the UK between 2002 and 2007 (UKCES, 2010) and despite recession related falls in overall employment and business numbers the Information and communication technology sector remains one of the most productive sectors of the economy, across the UK and in each nation, with GVA per head continuing to increase.

# 3 The workforce

This chapter provides information on the Information and communication technologies workforce looking at occupational structure and the jobs people do; working patterns and workforce characteristics.

**Chapter Summary**

- The Information and communication technologies sector has a high proportion (63 per cent) of the workforce in Management and Professional occupations and employment in these occupational groups has grown 13 per cent since 2002.
- The largest occupations in the sector tend to be technical IT and Telecommunication occupations, focused on developing and delivering products and services to deliver value from technology.
- Software Professionals are the largest occupational group with nearly one in five (19 per cent or 141,000) in the sector workforce employed in these occupations. Information and Communication Technology Managers comprise 14 per cent of the sector workforce (105,000).
- Across the whole economy, Software Professionals are the fifteenth largest occupational group with total employment of 327,000.
- The dominant characteristics of employment are permanent, full time and male.
- Self employment (16 per cent) is more common in the sector than across the economy as a whole (14 per cent) and has increased by 40 per cent since 2002.
- The gender imbalance remains significant in the sector with the proportion of females employed declining from 26 per cent of the workforce in 2002 to 23 per cent in 2010. Women remain under-represented in Managerial, Professional and Associate Professional and Technical occupations despite gender equality having been shown to provide real business benefit.
- There are a lower proportion of young people employed in the sector than across the economy as a whole and over time, the sector workforce is ageing. However, the sector is also one of the most ethnically diverse sectors in the UK.

## 3.1 The jobs people do

This section looks at occupational structure and the core (most common) jobs within the sector to provide a picture of what the labour market looks like in the UK and in the Information and communication technologies sector. Occupational structure provides important information about the hierarchy of jobs, for example whether the sector is highly skilled. Understanding the types of jobs people do enables better careers and skills development for those that might wish to enter the sector or change careers within the sector. Occupations are defined using the Standard Occupational Classification (SOC) codes at a broad level (one digit SOC) and a detailed level (four digit SOC).

### 3.1.1 Occupation structure

Across the economy in the UK, Managers and Senior Officials comprise 15 per cent of all occupations, as do Associate Professional occupations, shown in Table 3.1. Professional occupations make up 14 per cent of all occupations. Occupational structure varies across the nations with Northern Ireland having a lower proportion of Managers and Associate Professional occupations than England, Scotland or Wales.

**Table 3.1: Employment by occupation and nation, 2010 (UK)**

| | UK | | England | | Scotland | | Wales | | Northern Ireland | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 000s | % | 000s | % | 000s | % | 000s | % | 000s | % |
| Managers and Senior Officials | 4,455 | 15 | 3,866 | 16 | 331 | 14 | 173 | 13 | 85 | 11 |
| Professional Occupations | 4,028 | 14 | 3,454 | 14 | 299 | 12 | 176 | 13 | 100 | 13 |
| Associate Professional and Technical | 4,265 | 15 | 3,638 | 15 | 353 | 14 | 186 | 14 | 88 | 12 |
| Administrative and Secretarial | 3,181 | 11 | 2,670 | 11 | 270 | 11 | 135 | 10 | 106 | 14 |
| Skilled Trades Occupations | 3,061 | 11 | 2,502 | 10 | 285 | 12 | 149 | 11 | 125 | 16 |
| Personal Service Occupations | 2,544 | 9 | 2,123 | 9 | 226 | 9 | 131 | 10 | 64 | 8 |
| Sales and Customer Service Occupations | 2,146 | 7 | 1,772 | 7 | 209 | 9 | 111 | 8 | 54 | 7 |
| Process, Plant and Machine Operatives | 1,907 | 7 | 1,570 | 6 | 174 | 7 | 99 | 8 | 63 | 8 |
| Elementary Occupations | 3,257 | 11 | 2,724 | 11 | 300 | 12 | 153 | 12 | 81 | 11 |
| All occupations | 28,842 | 100 | 24,319 | 100 | 2,446 | 100 | 1,311 | 100 | 765 | 100 |
| *Unweighted base* | *194.372* | | *161.438* | | *17.020* | | *8.690* | | *7.224* | |

*Source: Labour Force Survey 2010, ONS*

As shown in Table 3.2, the Information and communication technologies sector, in comparison to the whole economy, has a much higher proportion of employment in Managerial (28 per cent compared to 15 per cent) and Professional occupations (35 per cent compared to 14 per cent). Employment in these higher level occupations accounts for 63 per cent of employment in the sector in comparison to 29 per cent across the whole UK economy. Together these two occupational areas, have grown 13 per cent since 2002 when they accounted for just over half (52 per cent) of employment in the sector.

**Table 3.2: Employment by occupation and sector, 2010 (UK)**

| | Information and communication technologies | | All economy | |
|---|---|---|---|---|
| | 000s | % | 000s | % |
| Managers and Senior Officials | 212 | 28 | 4,455 | 15 |
| Professional Occupations | 267 | 35 | 4,028 | 14 |
| Associate Professional and Technical | 107 | 14 | 4,265 | 15 |
| Administrative and Secretarial | 45 | 6 | 3,181 | 11 |
| Skilled Trades Occupations | 80 | 11 | 3,061 | 11 |
| Personal Service Occupations | * | * | 2,544 | 9 |
| Sales and Customer Service Occupations | 32 | 4 | 2,146 | 7 |
| Process, Plant and Machine Operatives | 7 | 1 | 1,907 | 7 |
| Elementary Occupations | 8 | 1 | 3,257 | 11 |
| All occupations | 760 | 100 | 28,842 | 100 |
| *Unweighted base* | *4.869* | | *194.372* | |

*Source: Labour Force Survey 2010, ONS*
** Sample size too small for reliable estimate*

The sector has a similar proportion of employment to the whole economy in Associate Professional roles and Skilled Trades occupations. There are lower proportions of employment in the sector in Administration, Sales and Customer Services, Process Plant and Machine Operatives, and Elementary occupations than across the economy as a whole.

'Professional occupations' is the largest occupational group in the Information and communication technologies sector. It accounts for 267,000 people, 35 per cent of employment. In the Computer programming, consultancy and related activities sub-sector, nearly half (47 per cent) of all employment is in Professional occupations.

Managerial occupations account for around a third of employment in the Telecommunications (29 per cent), Computer programming, consultancy and related activities (29 per cent) and Information service activities (30 per cent) sub-sectors.

Sales and Customer Service occupations are more common in the Telecommunications industry than elsewhere in the sector with 26,000 employees in these occupations, 15 per cent of total sub-sector employment.

Skilled Trade occupations are most common in Repair of computers and other goods where they account for 50 per cent of employment (47,000).

Differences in occupational structure in the Information and communication technologies workforce are apparent across each nation. Whilst Professionals are the largest occupational group in the sector in each nation, the proportion of Professionals in the workforce ranges from 27 per cent in Scotland, to 35 per cent in Wales, and 55 per cent in Northern Ireland. The higher proportion of Professionals in the workforce in Northern Ireland is likely to be a reflection of the nature of employer activity which, is more concentrated in Computer programming activities than across the UK as a whole (36 per cent of local units in the sector compared to 14 per cent across the UK) (ONS, 2011g). Manager's account for just 15 per cent of the sector workforce in Northern Ireland compared to 29 per cent in England.

### 3.1.2 Core jobs that are prevalent within the sector

'Sales and retail assistants' is the most common occupational group in the UK with over 1.2 million people employed in these jobs, four per cent of the total workforce.

**Table 3.3: Largest occupational groups, UK (2010)**

| Rank | Occupation | 000s | % workforce |
|---|---|---|---|
| 1 | 7111 Sales and retail assistants | 1,233 | 4 |
| 2 | 6115 Care assistants and home carers | 741 | 3 |
| 3 | 4150 General office assistants or clerks | 656 | 2 |
| 4 | 9233 Cleaners, domestics | 588 | 2 |
| 5 | 1132 Marketing and sales managers | 532 | 2 |
| 6 | 4122 Accounts wages clerk, bookkeeper | 523 | 2 |
| 7 | 6124 Educational assistants | 513 | 2 |
| 8 | 3211 Nurses | 509 | 2 |
| 9 | 2314 Secondary education teaching professionals | 445 | 2 |
| 10 | 2315 Primary & nursery education teaching professionals | 432 | 1 |
| 11 | 1121 Prod. works & maintenance managers | 414 | 1 |
| 12 | 9223 Kitchen and catering assistants | 411 | 1 |
| 13 | 1163 Retail and wholesale managers | 394 | 1 |
| 14 | 9149 Other good handling & storage occupations not elsewhere classified | 382 | 1 |
| 15 | 2132 Software professionals | 327 | 1 |
| | Other occupations | 20,742 | 72 |
| | Total workforce | 28,842 | 100 |
| | *Unweighted base (000s)* | *194.372* | |

*Source: Labour Force Survey 2010, ONS*

As highlighted in Table 3.3, 'Software Professionals' is the fifteenth largest occupational group in the UK with employment of 327,000 people across the economy (141,000 of whom are employed within the Information and communication technologies sector itself). Software Professionals is the third largest professional level occupation after Secondary education teaching professionals and Primary and nursery education teaching professionals.

Seven IT and Telecoms occupations feature in the top ten largest occupational groups within the Information and communication technologies sector and comprise 55 per cent of the workforce (Table 3.4). These occupations are focused on developing and delivering products and services to deliver business and consumer value from technology. Work typically includes software (including web) and systems design and development, operations (running websites, systems and networks), and user support (to customers and staff).

**Table 3.4: Largest occupational groups within sector, UK (2010)**

| Rank | Occupation | 000s | % workforce |
|---|---|---|---|
| 1 | 2132 Software professionals | 141 | 19 |
| 2 | 1136 Info & communication technology managers | 105 | 14 |
| 3 | 2131 IT strategy and planning professionals | 89 | 12 |
| 4 | 1132 Marketing and sales managers | 43 | 6 |
| 5 | 3131 IT operations technicians | 25 | 3 |
| 6 | 5245 Computer engineer, installation & maintenance | 20 | 3 |
| 7 | 3132 IT user support technicians | 19 | 3 |
| 8 | 3421 Graphic designers | 18 | 2 |
| 9 | 5242 Telecommunications engineers | 16 | 2 |
| 10 | 7212 Customer care occupations | 14 | 2 |
| 11 | 5241 Electricians, electrical fitters | 13 | 2 |
| 12 | 1121 Prod. works & maintenance managers | 13 | 2 |
| 13 | 1152 Office managers | 11 | 1 |
| 14 | 2423 Management consultants, actuaries, economists and statisticians | 11 | 1 |
| 15 | 4150 General office assistants or clerks | 11 | 1 |
| | Other occupations | 210 | 28 |
| | Total workforce | 760 | 100 |
| | *Unweighted base (000s)* | *4.869* | |

*Source: Labour Force Survey 2010, ONS*

**Software Professionals** are responsible for all aspects of the design, application, development and operation of software systems. This is the largest occupational group in the Information and communication technologies sector amounting to nearly one in five of the workforce (141,000 or 19 per cent).

**Information and Communication Technology Managers** comprise 14 per cent of the sector workforce. Many are functional managers, managing networks, products, services and programmes of work as well as those who have more traditional managerial duties and resource responsibilities.

**IT Strategy and Planning Professionals** provide advice on the effective utilisation of information technology in order to solve business problems or to enhance the effectiveness of business functions. Self-employed IT consultants could be categorised in this area as well as in the 14th most numerous occupational group, “2423 Management consultants, actuaries, economists & statisticians”

**Marketing and Sales Managers** comprise six per cent of the sector workforce. They plan, organise, direct and undertake market research and formulate and implement organisation's marketing and sales policies. People employed in this role in the Information and communication technologies sector will need some level of technical knowledge about the products and services their business provides.

**IT Operations Technicians** are responsible for the day to- day running of computer systems and networks including the preparation of back-up systems, and for performing regular checks to ensure the smooth functioning of such systems. In the sector they may also be providing these services to clients, alongside those working as Computer engineers and IT user support technicians who install, maintain and repair personal computers, mainframe and other computer hardware and provide technical support, advice and guidance for customers or IT users within an organisation.

The occupational make up of the sector is broadly similar across each nation except in Northern Ireland where Software professionals make up a much higher proportion of the workforce, comprising 42 per cent of the sector’s workforce compared to 19 per cent across the UK, 18 per cent in England, and 17 per cent in Scotland (figures for the proportion of software professionals in Wales have been suppressed).

## 3.2 Working patterns

To provide an understanding of working patterns in the sector this section explores the nature of full and part-time employment, self-employment and permanent and temporary employment.

### 3.2.1 Full and part-time employment

Employment in the Information and communication technologies sector is predominantly full-time with just ten per cent of employment being part-time in comparison to 27 per cent for across the whole economy (Table 3.5). In contrast to the increase in the proportion of the workforce across the whole economy who work part-time (from 25 per cent in 2002 to 27 per cent in 2010), there has been a decline in the proportion working part-time in the sector, falling from 11 per cent in 2002 to ten per cent in 2010.

**Table 3.5: Working hours by sector, 2010 (UK)**

| | Full-time | Part-time | Full-time | Part-time | Weighted base | Unweighted base |
|---|---|---|---|---|---|---|
| | 000s | 000s | % | % | 000s | 000s |
| Agriculture, forestry and fishing | 326 | 79 | 80 | 19 | 406 | 2.976 |
| Energy production and utilities | 435 | 38 | 92 | 8 | 473 | 3.244 |
| Manufacturing | 2,688 | 281 | 91 | 9 | 2,969 | 20.400 |
| Construction, building services, engineering and planning | 2,435 | 260 | 90 | 11 | 2,695 | 17.917 |
| Wholesale and retail trade | 2,549 | 1,590 | 62 | 39 | 4,139 | 27.571 |
| Transportation and storage | 1,218 | 229 | 84 | 16 | 1,447 | 9.729 |
| Hospitality, tourism and sport | 1,127 | 920 | 55 | 44 | 2,046 | 13.183 |
| Information and communication technologies | 682 | 79 | 90 | 10 | 761 | 4.875 |
| Creative media and entertainment | 737 | 249 | 75 | 25 | 986 | 6.186 |
| Financial, insurance & other professional services | 1,623 | 377 | 81 | 18 | 2,001 | 12.804 |
| Real estate and facilities management | 643 | 334 | 66 | 35 | 977 | 6.561 |
| Government services | 1,800 | 408 | 82 | 19 | 2,208 | 15.098 |
| Education | 1,872 | 1,215 | 61 | 40 | 3,087 | 21.537 |
| Health | 1,344 | 742 | 64 | 34 | 2,086 | 14.742 |
| Care | 1,056 | 672 | 61 | 37 | 1,728 | 12.001 |
| All economy | 21,083 | 7,760 | 73 | 27 | 28,843 | 194.363 |

*Source: Labour Force Survey 2010, ONS*
** Sample size too small for reliable estimate.*

This pattern of predominantly full time employment in the sector is repeated across each nation as shown in Table 3.6.

In terms of sub-sector working patterns, full time employment is more likely in the Telecommunications (92 per cent) and Computer programming, consultancy and related activities (91 per cent) sub-sectors than in the rest of the sector.

**Table 3.6: Working hours by sector and nation, 2010 (%)**

| | England | | | | Scotland | | | | Wales | | | | Northern Ireland | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Full-time | Part-time | Weighted base | Unweighted base | Full-time | Part-time | Weighted base | Unweighted base | Full-time | Part-time | Weighted base | Unweighted base | Full-time | Part-time | Weighted base | Unweighted base |
| | % | % | 000s | 000s | % | % | 000s | 000s | % | % | 000s | 000s | % | % | 000s | 000s |
| Agriculture, forestry and fishing | 79 | 21 | 296 | 2.112 | 83 | 17 | 51 | 0.385 | 85 | * | 31 | 0.198 | 88 | * | 27 | 0.281 |
| Energy production and utilities | 92 | 8 | 346 | 2.336 | 91 | 9 | 88 | 0.620 | 96 | * | 25 | 0.157 | 92 | * | 14 | 0.131 |
| Manufacturing | 90 | 10 | 2,541 | 17.233 | 92 | 8 | 199 | 1.431 | 93 | 7 | 138 | 0.905 | 93 | * | 91 | 0.831 |
| Construction, building services, engineering and planning | 90 | 10 | 2,268 | 14.834 | 93 | 7 | 244 | 1.702 | 93 | 7 | 112 | 0.717 | 93 | * | 71 | 0.664 |
| Wholesale and retail trade | 62 | 38 | 3,469 | 22.822 | 58 | 42 | 352 | 2.369 | 57 | 42 | 205 | 1.325 | 63 | 37 | 112 | 1.055 |
| Transportation and storage | 84 | 16 | 1,251 | 8.292 | 83 | 17 | 117 | 0.822 | 80 | 23 | 46 | 0.308 | 87 | * | 33 | 0.307 |
| Hospitality, tourism and sport | 55 | 45 | 1,704 | 10.849 | 52 | 48 | 198 | 1.295 | 51 | 49 | 100 | 0.636 | 62 | 38 | 44 | 0.403 |
| Information and communication technologies | 90 | 10 | 675 | 4.269 | 89 | 11 | 56 | 0.377 | 88 | * | 18 | 0.114 | 88 | * | 13 | 0.115 |
| Creative media and entertainment | 75 | 25 | 875 | 5.406 | 68 | 32 | 64 | 0.436 | 70 | 23 | 32 | 0.214 | 72 | * | 14 | 0.130 |
| Financial, insurance & other professional services | 82 | 18 | 1,768 | 11.123 | 78 | 22 | 138 | 0.948 | 77 | 22 | 53 | 0.358 | 81 | 19 | 41 | 0.375 |
| Real estate and facilities management | 65 | 35 | 847 | 5.623 | 73 | 27 | 75 | 0.519 | 63 | 35 | 38 | 0.254 | 74 | * | 18 | 0.165 |
| Government services | 81 | 19 | 1,835 | 12.302 | 84 | 16 | 173 | 1.210 | 81 | 23 | 111 | 0.744 | 84 | 16 | 89 | 0.842 |
| Education | 60 | 40 | 2,624 | 18.075 | 64 | 36 | 234 | 1.677 | 66 | 32 | 154 | 1.059 | 67 | 33 | 75 | 0.726 |
| Health | 64 | 36 | 1,712 | 11.931 | 65 | 35 | 198 | 1.409 | 67 | 31 | 111 | 0.771 | 71 | 29 | 64 | 0.631 |
| Care | 61 | 39 | 1,409 | 9.629 | 60 | 40 | 183 | 1.308 | 61 | 40 | 97 | 0.665 | 62 | 38 | 40 | 0.399 |
| All economy | 73 | 27 | 24,321 | 161.435 | 73 | 27 | 2,444 | 17.008 | 72 | 27 | 1,311 | 8.689 | 77 | 23 | 766 | 7.231 |

*Source: Labour Force Survey 2010, ONS  * Sample size too small for reliable estimate.*

### 3.2.2 Self-employment

There has been an increase in self-employment across the UK economy in recent years with 18 per cent growth between 2002 and 2010. Currently, 14 per cent of the workforce (nearly four million people) is self-employed in the UK compared to 12 per cent in 2002.

**Table 3.7: Employment status by sector, UK, 2010 ('000s)**

| | Employee | Self-employed | Employee | Self-employed | Weighted base | Unweighted base |
|---|---|---|---|---|---|---|
| | 000s | 000s | % | % | 000s | 000s |
| Agriculture, forestry and fishing | 189 | 202 | 47 | 50 | 405 | 2.973 |
| Energy production and utilities | 446 | 25 | 95 | 5 | 472 | 3.240 |
| Manufacturing | 2,776 | 184 | 94 | 6 | 2,968 | 20.397 |
| Construction, building services, engineering and planning | 1,716 | 964 | 64 | 36 | 2,692 | 17.897 |
| Wholesale and retail trade | 3,731 | 390 | 90 | 9 | 4,133 | 27.534 |
| Transportation and storage | 1,194 | 250 | 83 | 17 | 1,447 | 9.729 |
| Hospitality, tourism and sport | 1,817 | 219 | 89 | 11 | 2,044 | 13.168 |
| Information and communication technologies | 635 | 124 | 84 | 16 | 761 | 4.871 |
| Creative media and entertainment | 672 | 310 | 68 | 31 | 987 | 6.191 |
| Financial, insurance & other professional services | 1,706 | 291 | 85 | 15 | 2,001 | 12.804 |
| Real estate and facilities management | 744 | 229 | 76 | 23 | 977 | 6.561 |
| Government services | 2,145 | 58 | 97 | 3 | 2,207 | 15.091 |
| Education | 2,891 | 188 | 94 | 6 | 3,082 | 21.507 |
| Health | 1,928 | 155 | 92 | 7 | 2,085 | 14.740 |
| Care | 1,577 | 140 | 92 | 8 | 1,723 | 11.971 |
| All economy | 24,774 | 3,952 | 86 | 14 | 28,817 | 194.200 |

*Source: Labour Force Survey 2010, ONS*
** Sample size too small for reliable estimate.*
*Weighted & unweighted bases also include unpaid family workers.*

In the Information and communication technologies sub-sector 16 per cent of the workforce are self employed, slightly higher than the average across the economy of 14 per cent (Table 3.7). Self-employment in the sector is more common in Scotland where 18 per cent of the workforce are self-employed (Table 3.8).

Self-employment is least likely in the Telecommunications sub-sector where just three per cent are self-employed. In contrast, 43 per cent of the workforce are self employed in the Repair of computers and other goods sub-sector.

The proportion of self-employed in the Information and communications technologies sub-sector in the UK has increased by 40 per cent from 2002 to 2010, compared to an 18 per cent increase in self-employment for the whole economy in the same period.

Analysis in the UKCES report ‘Skills for self-employment’ (UKCES, 2011), shows that the self-employed are more likely to need a wider range of competencies and skills than employees, reflecting the nature that many are owner/proprietors and combine a main job function with running the business although the same report notes that the self-employed are a heterogeneous group. The report also finds that the self-employed are only half as likely to participate in work-related training or education and that skills issues are likely to include: lack of business skills or training, insufficient ‘soft’ skills, lack of staff management skills.

**Table 3.8: Employment status by sector and nation, 2010 (%)**

| | England | | | | Scotland | | | | Wales | | | | Northern Ireland | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Employee | Self-employed | Weighted base | Unweighted base | Employee | Self-employed | Weighted base | Unweighted base | Employee | Self-employed | Weighted base | Unweighted base | Employee | Self-employed | Weighted base | Unweighted base |
| | % | % | 000s | 000s | % | % | 000s | 000s | % | % | 000s | 000s | % | % | 000s | 000s |
| Agriculture, forestry and fishing | 50 | 46 | 295 | 2.110 | 49 | 50 | 51 | 0.385 | 33 | 62 | 31 | 0.197 | * | 75 | 27 | 0.281 |
| Energy production and utilities | 94 | 6 | 346 | 2.334 | 95 | * | 87 | 0.619 | 99 | * | 25 | 0.157 | 95 | * | 14 | 0.130 |
| Manufacturing | 93 | 6 | 2,540 | 17.229 | 95 | 5 | 199 | 1.432 | 94 | 6 | 138 | 0.905 | 93 | 7 | 91 | 0.831 |
| Construction, building services, engineering and planning | 63 | 37 | 2,266 | 14.822 | 77 | 23 | 244 | 1.701 | 65 | 35 | 112 | 0.717 | 55 | 45 | 70 | 0.657 |
| Wholesale and retail trade | 91 | 9 | 3,466 | 22.800 | 91 | 9 | 351 | 2.359 | 86 | 14 | 204 | 1.323 | 84 | 16 | 112 | 1.052 |
| Transportation and storage | 83 | 17 | 1,252 | 8.294 | 85 | 15 | 117 | 0.820 | 76 | 23 | 46 | 0.308 | 77 | 23 | 33 | 0.307 |
| Hospitality, tourism and sport | 89 | 10 | 1,702 | 10.836 | 89 | 11 | 198 | 1.295 | 87 | 12 | 100 | 0.634 | 82 | 17 | 44 | 0.403 |
| Information and communication technologies | 84 | 16 | 674 | 4.266 | 82 | 18 | 56 | 0.377 | 77 | * | 18 | 0.113 | 87 | * | 13 | 0.115 |
| Creative media and entertainment | 68 | 32 | 875 | 5.409 | 76 | 24 | 65 | 0.438 | 60 | 39 | 32 | 0.214 | 75 | * | 14 | 0.130 |
| Financial, insurance & other professional services | 85 | 15 | 1,768 | 11.122 | 90 | 10 | 138 | 0.948 | 81 | 19 | 53 | 0.359 | 92 | * | 41 | 0.375 |
| Real estate and facilities management | 75 | 24 | 847 | 5.624 | 85 | 15 | 75 | 0.520 | 78 | 21 | 37 | 0.252 | 67 | * | 18 | 0.165 |
| Government services | 97 | 3 | 1,834 | 12.298 | 97 | 3 | 173 | 1.209 | 97 | * | 111 | 0.742 | 99 | * | 89 | 0.842 |
| Education | 94 | 6 | 2,619 | 18.049 | 95 | 5 | 234 | 1.676 | 96 | 4 | 153 | 1.056 | 95 | * | 75 | 0.726 |
| Health | 92 | 8 | 1,712 | 11.930 | 94 | 6 | 199 | 1.410 | 92 | 8 | 111 | 0.769 | 95 | * | 64 | 0.631 |
| Care | 91 | 9 | 1,404 | 9.601 | 93 | 6 | 183 | 1.306 | 95 | * | 97 | 0.665 | 90 | * | 40 | 0.399 |
| All economy | 86 | 14 | 24,301 | 161.314 | 89 | 11 | 2,442 | 16.995 | 85 | 14 | 1,309 | 8.674 | 84 | 16 | 765 | 7.217 |

*Source: Labour Force Survey 2010, ONS*
** Sample size too small for reliable estimate.*
*Weighted & unweighted bases also include unpaid family workers*

### 3.2.3 Permanent and temporary employment

As shown in Table 3.9, across all sectors 94 per cent of employment is permanent and six per cent temporary. Permanent employment comprises 97 per cent of all employment in the Information and communication technologies sector (excluding self-employed and therefore totalling 635,000) with just three per cent of employment being classified as temporary. The sector has the lowest proportion of temporary workers (three per cent) alongside Financial, insurance and other professional services, and half the all sector average (six per cent). The highest rates of temporary employment are found in the Education (11 per cent) and Hospitality, tourism and sport (ten per cent) sectors.

Permanent employment is more prevalent in the Telecommunications, Computer programming, consultancy and related activities and Information Services sub-sectors than in Repair of Computers and other goods.

**Table 3.9: Permanent and temporary employees by sector, UK, 2010 ('000s and %)**

| | Permanent | Temporary | Permanent | Temporary | Weighted base |
|---|---|---|---|---|---|
| | 000s | 000s | % | % | 000s |
| Agriculture, forestry and fishing | 181 | 8 | 96 | 4 | 189 |
| Energy production and utilities | 430 | 16 | 96 | 4 | 446 |
| Manufacturing | 2,652 | 123 | 96 | 4 | 2,775 |
| Construction, building services, engineering and planning | 1,648 | 66 | 96 | 4 | 1,714 |
| Wholesale and retail trade | 3,573 | 156 | 96 | 4 | 3,728 |
| Transportation and storage | 1,132 | 62 | 95 | 5 | 1,194 |
| Hospitality, tourism and sport | 1,631 | 183 | 90 | 10 | 1,814 |
| Information and communication technologies | 612 | 22 | 97 | 3 | 635 |
| Creative media and entertainment | 615 | 56 | 92 | 8 | 671 |
| Financial, insurance & other professional services | 1,651 | 55 | 97 | 3 | 1,706 |
| Real estate and facilities management | 704 | 39 | 95 | 5 | 743 |
| Government services | 2,028 | 117 | 95 | 5 | 2,145 |
| Education | 2,563 | 327 | 89 | 11 | 2,890 |
| Health | 1,825 | 103 | 95 | 5 | 1,928 |
| Care | 1,474 | 103 | 93 | 7 | 1,576 |
| All economy | 23,247 | 1,513 | 94 | 6 | 24,760 |

*Source: Labour Force Survey 2010, ONS*
** Sample size too small for reliable estimate.*
*Note: The base for permanent and temporary employees is all employees (i.e. excludes the self-employed).*

## 3.3 Workforce characteristics

This section sets out the profile of the Information and communication technologies workforce, outlining the gender, age and ethnic profile of the current workforce and recent trends.

### 3.3.1 Gender

There has been increasing female participation in the UK workforce since 2002. Between 2002 and 2010, the number of females in the workforce across all sectors grew by nearly five per cent whilst the number of males in the workforce grew by just over two percent. Employment now comprises 46 per cent female and 54 per cent male (Table 3.10) with female employment comprising a slightly higher proportion of the workforce in Scotland (49 per cent), Wales (49 per cent) and Northern Ireland (47 per cent).

**Table 3.10: Employment by gender and nation (2010)**

| | Male | Female | Total | Male | Female | Total | Unweighted base |
|---|---|---|---|---|---|---|---|
| | 000s | 000s | 000s | % | % | % | 000s |
| UK | 15,439 | 13,416 | 28,855 | 54 | 46 | 100 | *194.448* |
| England | 13,081 | 11,250 | 24,331 | 54 | 46 | 100 | *161.501* |
| Scotland | 1,257 | 1,189 | 2,446 | 51 | 49 | 100 | *17.022* |
| Wales | 692 | 620 | 1,312 | 53 | 47 | 100 | *8.693* |
| Northern Ireland | 409 | 358 | 766 | 53 | 47 | 100 | *7.232* |

*Source: Labour Force Survey 2010, ONS*

The gender imbalance remains significant in the Information and communication technologies sub-sector in the UK. In 2010 just 23 per cent of employees are female compared to 46 per cent across the whole economy. The proportion of females employed in the sector declined from 26 per cent in 2002 to 22 per cent in 2006. Since 2007, the proportion of females in the sector has been stable at 23 per cent.

The gender balance in the sector would appear to be worse than average in Scotland and Wales, where 80 per cent and 81 per cent of employment in the sector is male, and better in Northern Ireland, where 74 per cent of the workforce is male (Table 3.11).

**Table 3.11: Employment within sector by gender and nation (2010)**

| | Male | Female | Total | Male | Female | Total | Unweighted base |
|---|---|---|---|---|---|---|---|
| | 000s | 000s | 000s | % | % | % | 000s |
| UK | 587 | 174 | 761 | 77 | 23 | 100 | *4.875* |
| England | 518 | 156 | 675 | 77 | 23 | 100 | *4.269* |
| Scotland | 45 | 11 | 56 | 80 | 20 | 100 | *0.377* |
| Wales | 14 | * | 18 | 81 | * | 100 | *0.114* |
| Northern Ireland | 10 | * | 13 | 74 | * | 100 | *0.115* |

*Source: Labour Force Survey 2010, ONS*
** Sample size too small for reliable estimate*

The proportion of females employed is significantly higher in the Information service activities sub-sector (37 per cent). The Telecommunications sub-sector also has a higher proportion of female employment than is average across the sector (28 per cent). However, just one in five in employment (21 per cent) in the Computer Programming, consultancy and related activities, and just 18 per cent in the Repair of computers and other goods sub-sectors are female, compared to 23 per cent in the sector as a whole.

Table 3.12 shows that, in comparison to the UK workforce occupational gender profile, women in the Information and communication technologies sector are underrepresented in the Managers and Senior Officials, Professional and Associate Professional and Technical occupational groups.

**Table 3.12: Gender profile by broad occupational group (UK)**

| | Information and communication technologies | | | All economy | | |
|---|---|---|---|---|---|---|
| | Male | Female | Total | Male | Female | Total |
| | % | % | 000s | % | % | 000s |
| 1 Managers and Senior Officials | 75 | 25 | 212 | 65 | 35 | 4,455 |
| 2 Professional Occupations | 89 | 11 | 267 | 56 | 44 | 4,028 |
| 3 Associate Professional and Technical | 74 | 26 | 107 | 50 | 50 | 4,265 |
| 4 Administrative and Secretarial | 20 | 80 | 45 | 22 | 78 | 3,181 |
| 5 Skilled Trades Occupations | 95 | * | 80 | 92 | 8 | 3,061 |
| 6 Personal Service Occupations | * | * | * | 17 | 83 | 2,544 |
| 7 Sales and Customer Service Occupations | 41 | 59 | 33 | 35 | 65 | 2,146 |
| 8 Process, Plant and Machine Operatives | * | * | 7 | 88 | 12 | 1,907 |
| 9 Elementary Occupations | 84 | * | 8 | 55 | 45 | 3,257 |
| All occupations | 77 | 23 | 760 | 54 | 46 | 28,842 |

*Source: Labour Force Survey 2010 (ONS)*
** Sample size too small for reliable estimate*

However, the proportion of women who are employed as Managers or Senior Officials in the sector has grown since 2002 and women now comprise a quarter (25 per cent) of all employment in this occupational group. Indeed, nearly a third (30 per cent) of all women in the sector are now employed as Managers or Senior Officials.

A further 37 per cent of women in the sector are employed in Professional or Associate Professional and Technical occupations.

Male employment is dominated by two occupational groups, Managers and Senior Officials (27 per cent of all male employment in the sector) and Professionals (41 per cent of all male employment).

The persistent gender imbalance in the sector (along with other STEM subjects, sectors and occupations) is the subject of many industry reports and initiatives which on the whole, suggest women are both put off from entering the sector and progressing within it. A partnership report from the professional body BCS, trade body Intellect and e-skills UK suggests that the lack of females taking IT related qualifications over previous years has directly impacted the proportion employed in related occupations (BCS *et al.*, 2009).

Recent education data (Joint Council for Qualifications, 2011 and UCAS, 2011) shows that female participation in IT related education is small and continues to fall: only 9% of students taking A-level Computing[9] and 13% of applicants to Computing degrees are female.

The lack of female participation in the IT related education supply could compound recruitment issues by restricting the pool of talent available, to the detriment of the sector. The UKRC report 'Women Mean Business' (UKRC, 2010) draws on existing studies to show that gender equality, particularly at management and board levels, has been shown to provide real business benefit and McKinsey & Company, the global management consulting firm, has performed various research projects assessing if, and how, women leaders contribute to companies performance.

Analysis of data from Eurostat shows that for IT related occupations (rather than the Information and communication technologies sector for which data is not available), a low level of female representation is common throughout Europe and the rest of the world. Even in Iceland where the most 'balanced' picture of IT employment in Europe exists, less than one third of those in IT occupations are female (i.e. ten percentage points higher than is the case within the UK).

[9] In England, Wales and Northern Ireland.

### 3.3.2 Age profile

The age profile of the workforce gives an indication of potential for labour market issues. The UKCES commissioned report on older people and skills (McNair, 2011) reports that the Government is encouraging people to stay in work to mitigate the effects of a deteriorating dependency ratio (where a shrinking working population is supporting a growing cohort of retired people) and labour shortages. This is said to be as a consequence of replacement demand when the large cohorts born in the 1940s and 1950s approach retirement.

The profile of the workforce in the UK (Table 3.13) shows around a third of workers (32 per cent) are aged 45-59, a quarter (24 per cent) are aged 35 to 44 and 22 per cent are aged 25 to 34. Just 13 per cent of the workforce in the UK is aged under 24 years old and, at the other end of the spectrum, nine per cent is aged over 60.

In Wales, ten per cent of the workforce is aged 60 or over, compared to nine per cent in England, eight per cent in Scotland and just six per cent of the workforce in Northern Ireland.

**Table 3.13: Age profile of workforce by nation (2010)**

| | UK | | England | | Scotland | | Wales | | Northern Ireland | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Number | % | Number | % | Number | % | Number | % | Number | % |
| 16-18 | 673 | 2 | 569 | 2 | 58 | 2 | 35 | 3 | 10 | 1 |
| 19-24 | 3,037 | 11 | 2,541 | 10 | 274 | 11 | 136 | 10 | 85 | 11 |
| 25-34 | 6,324 | 22 | 5,365 | 22 | 500 | 20 | 267 | 20 | 192 | 25 |
| 35-44 | 7,029 | 24 | 5,932 | 24 | 589 | 24 | 311 | 24 | 197 | 26 |
| 45-59 | 9,331 | 32 | 7,826 | 32 | 834 | 34 | 434 | 33 | 236 | 31 |
| 60-64 | 1,631 | 6 | 1,394 | 6 | 129 | 5 | 79 | 6 | 30 | 4 |
| 65 + | 831 | 3 | 702 | 3 | 62 | 3 | 49 | 4 | 17 | 2 |
| Total | 28,855 | 100 | 24,331 | 100 | 2,446 | 100 | 1,312 | 100 | 766 | 100 |
| *Unweighted base* | *194.448* | | *161.501* | | *17.022* | | *8.693* | | *7.232* | |

*Source: Labour Force Survey 2010, ONS*

The age profile of the UK workforce is changing (Table 3.14) with a smaller proportion of younger workers in 2010 compared to 2002 and an increase in the proportion aged 60 or over.

**Table 3.14: Age profile of workforce 2002-2010 (UK)**

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|
| | 000s | 000s | 000s | 000s | 000s | 000s | 000s | 000s | 000s |
| Under 18 | 1,078 | 1,076 | 1,077 | 1,028 | 976 | 938 | 925 | 765 | 673 |
| 19-24 | 2,948 | 2,973 | 3,072 | 3,097 | 3,179 | 3,224 | 3,221 | 3,048 | 3,037 |
| 25-34 | 6,505 | 6,361 | 6,279 | 6,289 | 6,250 | 6,242 | 6,279 | 6,186 | 6,324 |
| 35-44 | 7,317 | 7,416 | 7,490 | 7,525 | 7,533 | 7,528 | 7,442 | 7,241 | 7,029 |
| 45-59 | 8,474 | 8,638 | 8,748 | 8,915 | 9,017 | 9,046 | 9,171 | 9,182 | 9,331 |
| 60-64 | 1,107 | 1,186 | 1,252 | 1,306 | 1,405 | 1,545 | 1,652 | 1,650 | 1,631 |
| 65 + | 479 | 522 | 538 | 580 | 625 | 641 | 693 | 739 | 831 |
| Total | 27,908 | 28,172 | 28,456 | 28,740 | 28,987 | 29,164 | 29,382 | 28,811 | 28,855 |
| *Unweighted base* | *247.273* | *238.005* | *230.951* | *227.794* | *222.196* | *221.046* | *217.000* | *203.221* | *194.448* |

*Source: Labour Force Survey 2010, ONS*

Table 3.15 shows that the Information and communication technologies sector has a lower proportion of young people than the UK average with just seven per cent of the workforce aged under 25 compared to 13 per cent across all sectors.

Those in their mid-twenties to mid-forties are 'over-represented' in the sector compared to the UK average. However, at the other end of the age spectrum, whilst a third of the sector workforce (33 per cent) is aged 45 or over this is the case for 41 per cent of the UK workforce. The sector in Northern Ireland has a particularly low proportion of the workforce aged over 45 (17 per cent).

**Table 3.15: Age profile of sector workforce (by nation)**

| | UK | | England | | Scotland | | Wales | | Northern Ireland | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 000s | % | 000s | % | 000s | % | 000s | % | 000s | % |
| Under 25 | 55 | 7 | 46 | 7 | 7 | 12 | 2 | 9 | 1 | 6 |
| 25-34 | 215 | 28 | 194 | 29 | 12 | 21 | 4 | 22 | 5 | 38 |
| 35-44 | 240 | 32 | 211 | 31 | 17 | 31 | 7 | 38 | 5 | 39 |
| 45-59 | 218 | 29 | 193 | 29 | 18 | 32 | 5 | 28 | 2 | 17 |
| 60+ | 34 | 5 | 32 | 5 | 2 | 4 | 1 | 3 | 0 | 0 |
| Total | 761 | 100 | 675 | 100 | 56 | 100 | 18 | 100 | 13 | 100 |
| *Unweighted base* | *4.875* | | *4.269* | | *0.377* | | *0.114* | | *0.115* | |

*Source: Labour Force Survey 2010, ONS*
** Sample size too small for reliable estimate.*

Northern Ireland has a much higher proportion of the sector workforce aged under 34 with 44 per cent of the workforce in this age band compared to 36 per cent in England, 33 per cent in Scotland, and 31 per cent in Wales. However, in Scotland, twelve per cent of the sector workforce is aged under 25, the highest proportion across all nations.

**Table 3.16: Age profile of sector workforce 2002-2010 (UK)**

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|
| | 000s | 000s | 000s | 000s | 000s | 000s | 000s | 000s | 000s |
| Under 25 | 77 | 80 | 76 | 81 | 78 | 80 | 73 | 59 | 55 |
| 25-34 | 267 | 261 | 267 | 251 | 248 | 248 | 245 | 240 | 215 |
| 35-44 | 250 | 246 | 267 | 259 | 265 | 264 | 265 | 240 | 240 |
| 45-59 | 200 | 207 | 205 | 215 | 215 | 234 | 253 | 213 | 218 |
| 60+ | 19 | 19 | 25 | 26 | 29 | 26 | 34 | 32 | 34 |
| Total | 813 | 813 | 839 | 832 | 835 | 851 | 871 | 784 | 761 |
| *Unweighted base* | *6.946* | *6.583* | *6.492* | *6.385* | *6.159* | *6.155* | *6.140* | *5.262* | *4.875* |

*Source: Labour Force Survey 2010, ONS*

Table 3.16 evidences an overall ageing profile of the workforce in the Information and communication technologies sector. As a newer and relatively young sector, the age profile in the sector seems to be 'normalising' towards that of the economy overall. The proportion of people aged under 25 has fallen from 77,000 in 2002 (nine per cent of the workforce) to 55,000 in 2010 (seven per cent of the workforce) whilst the proportion age 45 and over has increased from just over a quarter of the workforce (27 per cent) to a third of the workforce (33 per cent) over the same period of time.

Whilst the low proportion of employees under 25 may be partly explained by the sector practice of traditionally recruiting experienced hire and graduates rather than school-leavers, the recent fall (since 2007) could be of concern in terms of recruiting new entrants.

In terms of the age profile of sub-sectors, the Computer Programming, consultancy and related activities sub-sector has the lowest proportion of the workforce aged under 25 (six per cent compared to eight per cent across the sector). Over one in eight (13 per cent) of the workforce in the Repair of computers and other goods sub-sector are aged 60 or over, in comparison to five per cent in the Information and communication technologies sector as a whole and nine per cent across the whole economy.

### 3.3.3 Ethnicity

Across the UK, nine per cent of the workforce has a Black, Asian or Minority Ethnic (BAME) background, an increase from six per cent in 2002. Whilst the number of workers from each BAME group has risen since 2002, the rise in the overall proportion of BAME workers in the UK is due mainly to the increase in Asian or Asian British workers, who comprised three per cent of UK employment in 2002 and five per cent in 2010.

England has the highest proportion of the workforce from Black, Asian and Minority Ethnic backgrounds with 11 per cent of workers compared to just three per cent in Scotland, three per cent in Wales and two per cent in Northern Ireland (Table 3.17).

**Table 3.17: Ethnicity of workforce across whole economy, four nations (2010)**

| | White | BAME | Total | White | BAME | Total | *Unweighted base* |
|---|---|---|---|---|---|---|---|
| | 000s | 000s | 000s | % | % | % | *000s* |
| UK | 26,151 | 2,686 | 28,837 | 91 | 9 | 100 | *194.336* |
| England | 21,755 | 2,558 | 24,313 | 89 | 11 | 100 | *161.395* |
| Scotland | 2,370 | 76 | 2,445 | 97 | 3 | 100 | *17.019* |
| Wales | 1,272 | 40 | 1,312 | 97 | 3 | 100 | *8.691* |
| Northern Ireland | 754 | 12 | 766 | 98 | 2 | 100 | *7.231* |

*Source: Labour Force Survey 2010, ONS*

Table 3.18 shows that the Information and communication technologies sector is one of the most ethnically diverse sectors in the UK, with 13 per cent of the workforce coming from Black, Asian and Minority Ethnic backgrounds compared to nine per cent across the whole economy.

**Table 3.18: Ethnicity of workforce within sectors, UK (2010)**

| | White | BAME | Total | White | BAME | Total |
|---|---|---|---|---|---|---|
| | **'000** | **'000** | **'000** | **%** | **%** | **%** |
| Agriculture, forestry and fishing | 402 | * | 402 | 100 | * | 100 |
| Energy production and utilities | 453 | 20 | 472 | 96 | 4 | 100 |
| Manufacturing | 2,769 | 199 | 2,968 | 93 | 7 | 100 |
| Construction, building services, engineering and planning | 2,567 | 130 | 2,697 | 95 | 5 | 100 |
| Wholesale and retail trade | 3,722 | 416 | 4,139 | 90 | 10 | 100 |
| Transportation and storage | 1,266 | 180 | 1,445 | 88 | 12 | 100 |
| Hospitality, tourism and sport | 1,766 | 280 | 2,045 | 86 | 14 | 100 |
| Information and communication technologies | 660 | 100 | 760 | 87 | 13 | 100 |
| Creative media and entertainment | 913 | 73 | 986 | 93 | 7 | 100 |
| Financial, insurance & other professional services | 1,776 | 224 | 2,000 | 89 | 11 | 100 |
| Real estate and facilities management | 852 | 125 | 977 | 87 | 13 | 100 |
| Government services | 2,037 | 171 | 2,208 | 92 | 8 | 100 |
| Education | 2,875 | 210 | 3,085 | 93 | 7 | 100 |
| Health | 1,814 | 272 | 2,086 | 87 | 13 | 100 |
| Care | 1,526 | 200 | 1,726 | 88 | 12 | 100 |
| All economy | 26,151 | 2,686 | 28,837 | 91 | 9 | 100 |

*Source: Labour Force Survey 2010, ONS*
** Sample size too small for reliable estimate.*

The proportion of the sector workforce that is BAME has increased by 45 per cent from 69,000 in 2002 (eight per cent of the workforce) to 100,000 in 2010 (13 per cent of the workforce).

# 4 Demand for, and value of, skills

This chapter explores the demand for, and value of, skills in terms of the nature of skills used in the workforce and the link between skills and sectoral performance. Evidence of qualification level in the workforce and skills specific to the sector are outlined, followed by an analysis of the value of the skills in improving business competitiveness and sectoral performance.

**Chapter Summary**

- Qualification levels in the sector have been rising since 2002 and the Information and communication technologies sector is one of the most highly qualified sectors in the UK economy.
- The high level of skills within the workforce reflects and aligns with the occupational structure in the workforce which is predominantly professional and managerial.
- Higher level skills are specifically required in the sector and in particular management skills, technical and technology skills for the most common occupations, and business and interpersonal skills as a greater volume of employees become client facing.
- Employers in the Information and communication technologies sector tend to score highly in comparison to other sectors in High Performance Working measures linked to employee autonomy and less well where measures relate to business processes.
- Training provision in the sector is comparatively low and the proportion of employees receiving training has decreased since 2002. Job specific training and training in new technologies is the most common type of training funded or arranged for employees but lack of money to fund training is a common barrier to training and more likely to be cited by employers in the sector than across the economy as a whole.
- Overall, the sector shows signs of valuing and utilising the high level skills within the workforce for benefit to businesses and in driving a competitive and productive sector.
- There is a positive association between highly skilled workforce and organisational performance. If training and High Performance Working practices in particular were exploited to a greater extent in the sector, the skills of the workforce might be more effectively deployed and managed to further drive sectoral performance.

## 4.1 Nature of skills used

A recent report from UKCES notes that, “In practical terms, skills can often be measured in terms of either the qualifications people hold, or the jobs they do (i.e. their occupation)” (UKCES 2010). This section therefore looks at the skills used in the sector by firstly considering qualification level and then looking in more detail at the specific skills that are required in key occupations both in the current workforce and for new recruits.

### 4.1.1 Qualification level

Across the UK workforce, just over a third (37%) of the workforce is qualified to Level 4 or above[10] as shown in Table 4.1. The pattern of qualification level is similar across the nations with the notable exception of a higher proportion of the workforce in Scotland qualified at Levels 3 and 4.

**Table 4.1: Qualification levels by nation (2010)**

| | UK | England | Scotland | Wales | Northern Ireland |
|---|---|---|---|---|---|
| | % | % | % | % | % |
| Level 4 + | 37 | 37 | 40 | 37 | 35 |
| Level 3 | 20 | 20 | 22 | 19 | 19 |
| Level 2 | 21 | 21 | 18 | 22 | 20 |
| Level 1 and below | 23 | 23 | 20 | 22 | 25 |
| Total | 100 | 100 | 100 | 100 | 100 |
| *Weighted base* | 1,729 | 1,409 | 183 | 97 | 40 |
| *Unweighted base* | 194.437 | 161.490 | 17.022 | 8.693 | 7.232 |

*Source: Labour Force Survey 2010 (ONS)*

Qualification levels in the workforce across the UK have been rising since 2002 when 28 per cent of the workforce was qualified at Level 4 or above (Table 4.2). The proportion qualified at Level 3 has remained consistent whilst the proportion of those qualified at Level 2 and below has fallen from 52 per cent in 2002 to 43 per cent.

[10] Qualification levels used in this section are as set out in the Labour Force Survey data supplied. Equivalent qualifications (e.g. GCSE, SVQ 4, Honours degree) can be found in Appendix B.

**Table 4.2: Qualification levels, UK (2002-2010)**

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|
| | % | % | % | % | % | % | % | % | % |
| Level 4 + | 28 | 29 | 30 | 31 | 32 | 33 | 33 | 35 | 37 |
| Level 3 | 20 | 20 | 20 | 20 | 19 | 19 | 20 | 19 | 20 |
| Level 2 | 22 | 22 | 21 | 20 | 22 | 22 | 21 | 21 | 21 |
| Level 1 and below | 30 | 29 | 29 | 29 | 27 | 27 | 26 | 24 | 23 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| *Weighted base* | 27,905 | 28,165 | 28,455 | 28,741 | 28,986 | 29,163 | 29,380 | 28,810 | 28,854 |
| *Unweighted base* | 247.232 | 237.919 | 172.402 | 210.643 | 222.190 | 221.039 | 216.986 | 203.217 | 194.437 |

*Source: Labour Force Survey 2010 (ONS)*

The Information and communication technologies sector is one of the most highly qualified sectors in the UK economy with 55% of the workforce holding a Level 4 or higher qualification (Table 4.3). Just two per cent of the sector workforce does not hold a qualification, one of the lowest proportions across the 15 sectors alongside Financial, insurance & other professional services and Government services.

**Table 4.3: Qualification profile of workforces with sectors, UK (2010)**

| | No qualifications | Level 1 | Level 2 | Level 3 | Level 4 + | Total | Unweighted base |
|---|---|---|---|---|---|---|---|
| | % | % | % | % | % | '000s | '000s |
| Agriculture, forestry and fishing | 18 | 21 | 22 | 15 | 24 | 406 | 2.978 |
| Energy production and utilities | 6 | 16 | 22 | 22 | 33 | 473 | 3.244 |
| Manufacturing | 9 | 19 | 21 | 22 | 29 | 2,969 | 20.404 |
| Construction, building services, engineering and planning | 7 | 16 | 23 | 28 | 27 | 2,697 | 17.927 |
| Wholesale and retail trade | 11 | 22 | 26 | 22 | 19 | 4,140 | 27.582 |
| Transportation and storage | 11 | 26 | 29 | 19 | 16 | 1,447 | 9.732 |
| Hospitality, tourism and sport | 10 | 20 | 27 | 22 | 20 | 2,046 | 13.183 |
| Information and communication technologies | 2 | 10 | 15 | 18 | 55 | 761 | 4.874 |
| Creative media and entertainment | 3 | 10 | 14 | 14 | 59 | 987 | 6.193 |
| Financial, insurance & other professional services | 2 | 12 | 18 | 17 | 52 | 2,001 | 12.805 |
| Real estate and facilities management | 14 | 23 | 22 | 17 | 23 | 978 | 6.565 |
| Government services | 2 | 12 | 19 | 20 | 46 | 2,209 | 15.100 |
| Education | 3 | 9 | 12 | 13 | 63 | 3,088 | 21.544 |
| Health | 3 | 10 | 14 | 12 | 61 | 2,087 | 14.749 |
| Care | 5 | 12 | 23 | 24 | 36 | 1,729 | 12.006 |
| All economy | 7 | 16 | 21 | 20 | 37 | 28,854 | 194.437 |

*Source: Labour Force Survey 2010 (ONS)*

This pattern of a highly qualified Information and communications technology sector is repeated across each nation. Northern Ireland notably has a higher proportion of the workforce qualified at Level 4+ with over three quarters (76 per cent) of the sector workforce qualified equivalent to degree level or above (Table 4.4). The nature of this highly qualified workforce is also reflected by the occupational structure in the workforce in Northern Ireland where 42 per cent of the workforce is employed as Software professionals, a much higher proportion than in the sector elsewhere in the UK.

**Table 4.4: Qualification levels within sector by nation (2010)**

| | UK | England | Scotland | Wales | Northern Ireland |
|---|---|---|---|---|---|
| | % | % | % | % | % |
| Level 4 + | 55 | 55 | 54 | 58 | 76 |
| Level 3 | 18 | 17 | 23 | 16 | 9 |
| Level 2 | 15 | 15 | 15 | 20 | 8 |
| Level 1 and below | 12 | 13 | 8 | 6 | 7 |
| Total | 100 | 100 | 100 | 100 | 100 |
| *Weighted base (000s)* | 761 | 674 | 56 | 18 | 13 |
| *Unweighted base (000s)* | 4.874 | 4.268 | 0.377 | 0.114 | 0.115 |

*Source: Labour Force Survey 2010 (ONS)*
** Sample size too small for reliable estimate.*

Qualification levels in the Information and communication technologies sector have also been rising since 2002 as illustrated in Table 4.5. The proportion of the sector workforce with a Level 4 qualification has risen 24 per cent, slightly less than the growth rate of highly qualified people to the UK workforce (36 per cent).

The decrease in the proportion of the sector workforce holding low level qualifications is much more significant than across the economy as a whole, having fallen quite rapidly since 2008, possibly due to the effect of the recession where employers are more likely to have retained higher skilled workers than low skilled workers.

The qualification profile of the sector is aligned to the occupational profile of the sector where the level of high value roles in Professional and Managerial occupations requires the majority of employees to be educated to Level 4. However, it is noticeable in Table 4.4 that a much smaller proportion of the workforce in Scotland, Wales and Northern Ireland are low skilled than in England.

**Table 4.5: Qualification levels within sector, UK (2002-2010)**

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|
| | % | % | % | % | % | % | % | % | % |
| Level 4 + | 42 | 43 | 45 | 45 | 45 | 46 | 48 | 55 | 55 |
| Level 3 | 20 | 20 | 18 | 18 | 17 | 16 | 17 | 16 | 18 |
| Level 2 | 18 | 17 | 18 | 16 | 17 | 17 | 16 | 15 | 15 |
| Level 1 and below | 21 | 21 | 20 | 22 | 21 | 20 | 19 | 13 | 12 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| *Weighted base (000s)* | 813 | 813 | 839 | 832 | 835 | 851 | 871 | 784 | 761 |
| *Unweighted base (000s)* | 6.946 | 6.582 | 4.860 | 5.896 | 6.159 | 6.155 | 6.140 | 5.262 | 4.874 |

*Source: Labour Force Survey 2010 (ONS)*

The workforce in the Computer programming and consultancy activities sub-sector has the highest qualification level profile with nearly two thirds (64 per cent) of the workforce holding a Level 4 qualification or higher. In contrast, those working in Repair of computers and other goods are more likely to be skilled at lower levels – indeed, seven per cent in this sub-sector have no qualifications.

### 4.1.2 Specific skills requirements

Qualifications evidence shows the Information and communication technologies workforce to be a highly skilled workforce, and ties in with occupational data which shows the majority of the workforce (63 per cent) hold Professional or Managerial level occupations.

**Specific technical and technology skills** are widely required at higher level skill areas particularly in the most common occupations of Software Professionals, Information and Communication Technology Managers, IT Strategy and Planning Professionals. A combination of higher and intermediate (Level 3) skills are more commonly required by those working in IT Operations Technicians, Computer Engineers, IT User Support Technicians, Graphic Designers and Telecommunications Engineers.

The IT professional standards developed by e-skills UK, employers and professional bodies[11] outline seven IT disciplines that cover competence, knowledge and understanding spanning intermediate and higher levels. The technical disciplines include:

- Architecture, analysis and design;
- Business Change;
- Information Management and Security;
- IT Project Management;
- IT Service Management and Delivery
- Solution Development and Implementation

[11] See Appendix A for more details.

Technical and technology skills vary across roles although many skills are common across the range of technical roles. Many technical skills are widely transferable across technology related roles regardless of industry sector. An indication of the most commonly sought after technical skills is given by the SSL/JobAdswatch IT salary and appointments survey, one of the most established sources on IT job information. In 2010, advertised positions for permanent and contract technology occupations shows that the specific technology skills in demand are SQL, C, C#, .NET, and SQLSever (SSL/JobAdsWatch, 2011).

As well as a core set of technical skills, employers require **business and interpersonal** skills particularly where employees are client facing.

**Basic skills** and employability skills are prerequisite to nearly all occupations in the sector and employers tend to look for employees with higher or intermediate level skills, depending on the occupation. The IT professional standards outline Personal competencies as: Personal communications; Team Working; Critical analysis and decision making; Creative thinking; Problem solving; Personal self-development; English, Maths and IT user skills.

**Management and leadership skills** in the sector are predominantly required at higher skills levels and relate to non-technical skills (such as financial management and people management) and technical management skills. Business Competencies include: Business-organisational awareness; Customer service awareness; Quality awareness; IT awareness and impact; IT financial awareness; IT legal and regulatory matters and ethics; Risk awareness. Leadership competencies are required particularly by Managers and senior officials but also by those working in professional capacities or with teams: IT strategy, policy and governance; IT Quality management; Customer Service Management; IT financial management; IT Human resource management; IT risk management; Entrepreneurship.

Table 4.6 presents a summary of skills used in the sector for the five largest occupational groups (defined by 4 digit SOC) within the sector:

- Information and Communication Technology Managers;
- Marketing and Sales Managers;
- Software Professionals;
- IT Strategy & Planning Professionals;
- IT Operations Technicians.

Together these occupations comprise 54 per cent of employment in the workforce. Further detail is given for specific job areas within Software Professionals, the largest occupational group in the sector and for IT Operations Technicians.

**Table 4.6: Nature of skills used in the sector**

| Broad Occupational Group | Sector occupations | Predominate level of skill required | Predominate type of skill required | Minimum qualification level typically required. |
|---|---|---|---|---|
| Managers and Senior Officials | Information and Communication Technology Managers | Higher skills | Management skills (technical, project and programme)<br>Management and leadership skills (non-technical/transferable)<br>Interpersonal and communication skills (transferable) | Level 4+ |
| | Marketing and Sales Managers | Higher skills | Interpersonal and communication skills (transferable)<br>Management and leadership skills (transferable)<br>Technology sales and marketing skills | Level 4+ |
| Professional Occupations | Software Professionals (Systems development and Programming) | Higher skills | Technical and specifically: SQL, C, C#, .Net, ASP, Java and Oracle<br>Project/programme management | Level 4+ |
| | Software Professionals (Software engineering) | Higher skills | Technical and specifically: C, C++, C#, Java, Linux | Level 4+ |
| | Software Professionals (Systems design, Business analysis and Project management) | Higher skills | Project/programme management, process skills, technical skills and specifically: Prince, Agile, SAP, C, Focus and CRM | Level 4+ |
| | IT Strategy & Planning Professionals | Higher skills | Interpersonal and communication skills (transferable)<br>Management and leadership skills (transferable)<br>Project/programme management, technical skills | Level 4+ |
| Associate Professional and Technical | IT Operations Technicians (PC Support) | Intermediate skills | Technical and specifically: SQL, Office, Exchange, SQLServer, Unix, Citrix<br>Customer service skills, interpersonal skills | Level 3/4 |
| | IT Operations Technicians (Technical Support) | Intermediate skills | Technical and specifically: Linux, SQL, Unix, Exchange, Vmware, Winware | Level 3/4 |
| | IT Operations Technicians (Operations) | Intermediate skills | Technical and specifically: Office, Exchange, Linux, Epos, Cisco, Access, Vmware | Level 3/4 |

## 4.2 Value of skills

The value of skills held by employees can be seen in relation to the importance of those skills to: the business in being competitive, profitable and productive; the individual in terms of entering and remaining in employment and in increased earning potential; and at a wider level to the competitiveness of the sector and contribution to the economy as a whole: “Skills are one of the key contributors to economic and social success, at both an individual and macro level.” (Hay *et al.*, 2011)

The section considers skills utilisation, the extent of High Performance Working and management and leadership, considered necessary to get the best out of the skills in the workforce. The provision of training in the sector is set out followed by evidence on the returns to qualification and occupations.

### 4.2.1 High Performance Working

Skills utilisation (using the skills the workforce has to enhance competitiveness and performance) is considered to have a positive association with High Performance Working and organisational performance (Stone, 2011), and management and leadership is particularly recognised as important in enabling both High Performance Working and skills utilisation.

An international investigation into High Performance Working found that skills utilisation tended to be “more of a concern than skills development per se” (Stone, 2011). And so, skills utilisation can be described as skills being developed and then being put to effective use within an innovative workplace.

High Performance Working (HPW) practices are often used to achieve better skills utilisation (UKCES, 2010b) and indicators most commonly gauge people management and working practices that actively involve and empower employees in decision making and the working environment in order to raise productivity through smarter working and engaged employees.

Employers in the Information and communication technologies sector tend to score highly in comparison to other sectors in key HPW measures linked to employee autonomy and less well where measures relate to business processes. For example, employers in the sector are more likely to identify high potential or talented individuals informally (32 per cent) than formally (Table 4.7). Just eight per cent of employers have a formal process in place for this, compared to 14 per cent of employers across the whole economy. Public sector employers are most likely to have a formally documented process in place.

However, a higher proportion of employers in the Information and communication technologies sector than average say that employees have a large extent of variety in their work (63 per cent compared to 55 per cent across the whole economy as shown in Table 4.8). Similarly the majority of employers in the sector (67 per cent) report that to a large extent, employees have discretion over how they do their work, compared to 52 per cent of employers across the workforce (Table 4.9).

In terms of flexible working (Table 4.10), the majority of employers in the Information and communication technologies sector (59 per cent) report that employees have access to flexible working arrangements to a large extent. This is higher than the average for all sectors (44 per cent) and indeed is the highest proportion across all sectors except Government Services (62 per cent).

**Table 4.7: Whether establishment has formal processes in place to identify 'high potential' or talented individuals**

| | Formal process for identifying 'high potential' individuals | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Yes, formally documented | | Yes, informally | | No | | Don't know | | Unweighted base | Weighted base |
| | Number | % | Number | % | Number | % | Number | % | | |
| Agriculture, forestry and fishing | 5,652 | 5 | 30,105 | 27 | 72,671 | 64 | 4,348 | 4 | 820 | 112,776 |
| Energy production and utilities | 2,191 | 17 | 4,077 | 31 | 6,385 | 49 | 486 | 4 | 866 | 13,138 |
| Manufacturing | 15,955 | 12 | 41,908 | 31 | 72,179 | 54 | 3,456 | 3 | 4,001 | 133,498 |
| Construction, building services, engineering and planning | 21,136 | 7 | 89,742 | 29 | 185,426 | 61 | 8,056 | 3 | 4,570 | 304,360 |
| Wholesale and retail trade | 79,322 | 17 | 144,464 | 31 | 229,455 | 49 | 18,075 | 4 | 8,093 | 471,317 |
| Transportation and storage | 12,217 | 10 | 30,841 | 26 | 73,328 | 61 | 4,419 | 4 | 2,400 | 120,805 |
| Hospitality, tourism and sport | 32,190 | 15 | 69,719 | 32 | 109,728 | 50 | 7,234 | 3 | 5,819 | 218,871 |
| Information and communication technologies | 5,976 | 8 | 23,608 | 32 | 42,403 | 58 | 1,136 | 2 | 1,261 | 73,123 |
| Creative media and entertainment | 11,873 | 8 | 48,322 | 33 | 83,861 | 57 | 3,495 | 2 | 1,959 | 147,551 |
| Financial, insurance & other professional services | 31,220 | 18 | 56,823 | 33 | 80,911 | 47 | 3,669 | 2 | 2,680 | 172,623 |
| Real estate and facilities management | 20,259 | 13 | 48,382 | 30 | 83,504 | 52 | 9,000 | 6 | 1,745 | 161,145 |
| Government services | 11,426 | 21 | 16,967 | 31 | 25,307 | 46 | 1,600 | 3 | 1,379 | 55,300 |
| Education | 18,653 | 32 | 20,236 | 34 | 18,789 | 32 | 1,231 | 2 | 2,780 | 58,909 |
| Health | 10,508 | 20 | 15,684 | 30 | 24,879 | 47 | 1,427 | 3 | 1,739 | 52,498 |
| Care | 25,788 | 28 | 26,675 | 29 | 32,817 | 36 | 6,485 | 7 | 2,455 | 91,765 |
| All economy | 320,952 | 14 | 702,866 | 31 | 1,198,876 | 52 | 77,227 | 3 | 44,691 | 2,299,921 |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*
*Base: All establishments in Module 1 and Scotland*

**Table 4.8: Extent to which employees have variety in their work**

| | Extent to which employees have variety in their work | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | To a large extent | | To some extent | | Not much | | Not at all | | Don't know | | Unweighted base | Weighted base |
| | Number | % | Number | % | Number | % | Number | % | Number | % | | |
| Agriculture, forestry and fishing | 76,675 | 68 | 24,469 | 22 | 7,742 | 7 | 2,816 | 2 | 1,074 | 1 | 820 | 112,776 |
| Energy production and utilities | 5,929 | 45 | 4,909 | 37 | 1,795 | 14 | 406 | 3 | 100 | 1 | 866 | 13,138 |
| Manufacturing | 67,095 | 50 | 48,484 | 36 | 12,899 | 10 | 3,756 | 3 | 1,262 | 1 | 4,001 | 133,498 |
| Construction, building services, engineering and planning | 179,144 | 59 | 88,851 | 29 | 24,047 | 8 | 9,313 | 3 | 3,003 | 1 | 4,570 | 304,360 |
| Wholesale and retail trade | 238,562 | 51 | 168,884 | 36 | 48,318 | 10 | 11,692 | 2 | 3,861 | 1 | 8,093 | 471,317 |
| Transportation and storage | 53,146 | 44 | 35,613 | 29 | 17,947 | 15 | 13,259 | 11 | 840 | 1 | 2,400 | 120,805 |
| Hospitality, tourism and sport | 86,140 | 39 | 83,543 | 38 | 37,117 | 17 | 9,289 | 4 | 2,782 | 1 | 5,819 | 218,871 |
| Information and communication technologies | 46,346 | 63 | 21,687 | 30 | 3,293 | 5 | 417 | 1 | 1,381 | 2 | 1,261 | 73,123 |
| Creative media and entertainment | 99,587 | 67 | 37,290 | 25 | 7,267 | 5 | 2,237 | 2 | 1,170 | 1 | 1,959 | 147,551 |
| Financial, insurance & other professional services | 94,803 | 55 | 60,363 | 35 | 12,493 | 7 | 3,148 | 2 | 1,816 | 1 | 2,680 | 172,623 |
| Real estate and facilities management | 92,156 | 57 | 51,012 | 32 | 15,579 | 10 | 1,561 | 1 | 837 | 1 | 1,745 | 161,145 |
| Government services | 33,925 | 61 | 17,273 | 31 | 2,855 | 5 | 391 | 1 | 856 | 2 | 1,379 | 55,300 |
| Education | 38,306 | 65 | 17,346 | 29 | 2,187 | 4 | 619 | 1 | 452 | 1 | 2,780 | 58,909 |
| Health | 26,622 | 51 | 19,718 | 38 | 5,203 | 10 | 694 | 1 | 260 | ** | 1,739 | 52,498 |
| Care | 54,001 | 59 | 31,224 | 34 | 4,410 | 5 | 972 | 1 | 1,159 | 1 | 2,455 | 91,765 |
| All economy | 1,256,316 | 55 | 745,134 | 32 | 212,192 | 9 | 64,300 | 3 | 21,979 | 1 | 44,691 | 2,299,921 |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*
*Base: All establishments in Module 1 and Scotland*
*** denotes a figure greater than 0% but less than 0.5%*

**Table 4.9: Extent to which employees have discretion over how they do their work**

| | Extent to which employees have discretion over how they do their work | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | To a large extent | | To some extent | | Not much | | Not at all | | Don't know | | Unweighted base | Weighted base |
| Agriculture, forestry and fishing | 61,757 | 55 | 39,087 | 35 | 6,625 | 6 | 2,485 | 2 | 2,821 | 3 | 820 | 112,776 |
| Energy production and utilities | 5,809 | 44 | 4,957 | 38 | 1,467 | 11 | 557 | 4 | 348 | 3 | 866 | 13,138 |
| Manufacturing | 63,859 | 48 | 49,442 | 37 | 11,926 | 9 | 5,326 | 4 | 2,945 | 2 | 4,001 | 133,498 |
| Construction | 167,066 | 55 | 103,337 | 34 | 18,624 | 6 | 10,627 | 3 | 4,706 | 2 | 4,570 | 304,360 |
| Wholesale and retail trade | 222,298 | 47 | 182,574 | 39 | 44,174 | 9 | 13,608 | 3 | 8,663 | 2 | 8,093 | 471,317 |
| Transportation and storage | 60,073 | 50 | 38,390 | 32 | 12,736 | 11 | 8,160 | 7 | 1,446 | 1 | 2,400 | 120,805 |
| Accommodation, food and tourism activities | 88,190 | 40 | 87,712 | 40 | 28,331 | 13 | 9,926 | 5 | 4,712 | 2 | 5,819 | 218,871 |
| Information and communication technologies | 48,851 | 67 | 20,130 | 28 | 3,082 | 4 | 614 | 1 | 446 | 1 | 1,261 | 73,123 |
| Creative media and entertainment | 94,306 | 64 | 39,623 | 27 | 5,912 | 4 | 3,212 | 2 | 4,498 | 3 | 1,959 | 147,551 |
| Financial, insurance & other professional services | 88,150 | 51 | 62,426 | 36 | 15,688 | 9 | 5,292 | 3 | 1,068 | 1 | 2,680 | 172,623 |
| Real estate and facilities management | 95,298 | 59 | 48,171 | 30 | 11,255 | 7 | 4,656 | 3 | 1,765 | 1 | 1,745 | 161,145 |
| Government | 32,235 | 58 | 17,718 | 32 | 3,674 | 7 | 810 | 1 | 863 | 2 | 1,379 | 55,300 |
| Education | 27,530 | 47 | 26,592 | 45 | 3,231 | 5 | 660 | 1 | 897 | 2 | 2,780 | 58,909 |
| Health | 22,195 | 42 | 21,678 | 41 | 6,472 | 12 | 1,544 | 3 | 608 | 1 | 1,739 | 52,498 |
| Care | 48,843 | 53 | 36,123 | 39 | 3,779 | 4 | 1,532 | 2 | 1,488 | 2 | 2,455 | 91,765 |
| **All economy** | **1,188,767** | **52** | **814,655** | **35** | **185,638** | **8** | **71,823** | **3** | **39,037** | **2** | **44,691** | **2,299,921** |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*
*Base: All establishments in Module 1 and Scotland*

**Table 4.10: Extent to which employees at establishment have access to flexible working**

| | Employees have access to flexible working | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | To a large extent | | To some extent | | Not much | | Not at all | | Don't know | | Unweighted base | Weighted base |
| | Number | % | Number | % | Number | % | Number | % | Number | % | | |
| Agriculture, forestry and fishing | 48,869 | 43 | 41,468 | 37 | 12,485 | 11 | 8,004 | 7 | 1,950 | 2 | 820 | 112,776 |
| Energy production and utilities | 4,781 | 36 | 4,419 | 34 | 2,431 | 19 | 1,450 | 11 | 58 | ** | 866 | 13,138 |
| Manufacturing | 52,687 | 39 | 44,362 | 33 | 17,955 | 13 | 16,667 | 12 | 1,827 | 1 | 4,001 | 133,498 |
| Construction, building services, engineering and planning | 139,674 | 46 | 101,224 | 33 | 33,585 | 11 | 26,266 | 9 | 3,610 | 1 | 4,570 | 304,360 |
| Wholesale and retail trade | 176,251 | 37 | 168,909 | 36 | 64,843 | 14 | 56,324 | 12 | 4,991 | 1 | 8,093 | 471,317 |
| Transportation and storage | 44,233 | 37 | 38,327 | 32 | 16,329 | 14 | 20,683 | 17 | 1,233 | 1 | 2,400 | 120,805 |
| Hospitality, tourism and sport | 99,272 | 45 | 77,239 | 35 | 22,537 | 10 | 17,703 | 8 | 2,120 | 1 | 5,819 | 218,871 |
| Information and communication technologies | 42,992 | 59 | 20,273 | 28 | 5,342 | 7 | 4,226 | 6 | 289 | ** | 1,261 | 73,123 |
| Creative media and entertainment | 83,200 | 56 | 44,734 | 30 | 10,011 | 7 | 7,602 | 5 | 2,004 | 1 | 1,959 | 147,551 |
| Financial, insurance & other professional services | 89,019 | 52 | 55,484 | 32 | 15,828 | 9 | 11,747 | 7 | 546 | ** | 2,680 | 172,623 |
| Real estate and facilities management | 77,691 | 48 | 52,389 | 33 | 16,393 | 10 | 13,861 | 9 | 811 | 1 | 1,745 | 161,145 |
| Government services | 34,229 | 62 | 15,040 | 27 | 3,343 | 6 | 1,865 | 3 | 823 | 1 | 1,379 | 55,300 |
| Education | 14,445 | 25 | 21,754 | 37 | 12,772 | 22 | 9,545 | 16 | 393 | 1 | 2,780 | 58,909 |
| Health | 14,407 | 27 | 23,130 | 44 | 9,761 | 19 | 5,025 | 10 | 174 | ** | 1,739 | 52,498 |
| Care | 38,920 | 42 | 35,210 | 38 | 9,701 | 11 | 6,858 | 7 | 1,075 | 1 | 2,455 | 91,765 |
| All economy | 1,012,366 | 44 | 783,411 | 34 | 264,071 | 11 | 216,701 | 9 | 23,372 | 1 | 44,691 | 2,299,921 |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*
*Base: All establishments in Module 1 and Scotland*
*** denotes a figure greater than 0% but less than 0.5%*

## Management and leadership

Research literature developed over recent years sets out the importance of management and leadership skills and the contribution these make to a business, sector and the economy overall. The key questions posed are whether the UK as a whole and the sector itself has sufficient high quality managers and whether these employees are being sufficiently deployed and developed. This is of particular importance in maximising the skills of employees and impact of High Performance Working practices.

The Information and communication technologies sub- sector has a high proportion of the workforce (28 per cent compared to 15 per cent across the economy) classified as Managers and the number in the sector has increased by eight per cent since 2002. Information and Communication Technology Managers are the second most common occupation in the sector (at 105,000 employees or 14 per cent of the workforce), Marketing and Sales managers are six per cent of the workforce (43,000 employees), Production Works and Maintenance managers and Office managers make up a further three per cent or 24,000 employees in the sector (see table 3.4 in Chapter 3).

The nature of management and leadership skills is broad and covers both people management, specialist management areas common to all sectors (e.g. financial management) and management specific to the Information and communication technologies sector, for example IT programme and supplier management. However, skills gaps in the sector (see chapter 5 of this report) are not commonly found in managers in the sector with just three per cent of managers thought to have skills gaps although strategic management skills are thought to be particularly lacking in the sector workforce in Wales.

Using evidence of qualification level for the UK as a whole set out in Table 4.11, the proportion of the UK workforce in managerial or professional occupations without a Level 4 or higher qualification has fallen since 2002 and is now just 39 per cent of Managers and Professionals.

**Table 4.11: Managers and professionals without Level 4 or higher qualifications 2002-2010 (UK)**

| | | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|
| Managers or professionals without L4 or higher qualifications | 000s | 3,239 | 3,336 | 2,554 | 3,023 | 3,460 | 3,471 | 3,496 | 3,371 | 3,283 |
| | % | 45 | 45 | 33 | 38 | 43 | 42 | 42 | 40 | 39 |
| *Weighted base (number of managers and professionals)* | *000s* | *7,214* | *7,481* | *7,726* | *7,866* | *8,123* | *8,201* | *8,356* | *8,406* | *8,483* |

*Source: Labour Force Survey 2010 (ONS)*

However, evidence highlights the importance of management and leadership skills with respect to training and that "better managed firms have more highly educated managers" (Garrett *et al.*, 2010).

In line with the UK average, the proportion of Managers and Professionals in the Information and communication technologies sector without a Level 4 or higher qualification is 40 per cent (Table 4.12).

In Scotland, more Managers and Professionals in the sector have a higher qualification than is average across most sectors with just 37 per cent not holding a Level 4+ qualification[12].

[12] Data for Wales and Northern Ireland has been suppressed because the LFS sample size is too small to provide reliable estimates.

**Table 4.12: Managers and professionals without Level 4 or higher qualifications (% of all managers and professionals)**

| | UK | England | Scotland | Wales | Northern Ireland |
|---|---|---|---|---|---|
| | % | % | % | % | % |
| Agriculture, forestry and fishing | 45 | 43 | * | * | * |
| Energy production and utilities | 49 | 51 | 41 | * | * |
| Manufacturing | 51 | 51 | 51 | 59 | 35 |
| Construction, building services, engineering and planning | 50 | 51 | 41 | 40 | * |
| Wholesale and retail trade | 64 | 64 | 67 | 60 | 50 |
| Transportation and storage | 61 | 59 | 67 | * | * |
| Hospitality, tourism and sport | 66 | 66 | 61 | 70 | * |
| Information and communication technologies | 40 | 40 | 37 | * | * |
| Creative media and entertainment | 38 | 38 | * | * | * |
| Financial, insurance & other professional services | 36 | 36 | 38 | 35 | * |
| Real estate and facilities management | 58 | 59 | 63 | * | * |
| Government services | 31 | 32 | 36 | 29 | * |
| Education | 10 | 11 | 8 | * | * |
| Health | 15 | 15 | * | * | * |
| Care | 30 | 30 | 33 | * | * |
| All economy | 39 | 39 | 37 | 36 | 27 |

*Source: Labour Force Survey 2010 (ONS)*
** Sample size too small for reliable estimate.*

The proportion of Level 4 qualified Managers and Professionals in the sector has risen more rapidly than across the economy as a whole. In 2002 45 per cent of Managers or Professionals across the UK did not have a Level 4 or higher qualification whereas in 2010 this had dropped to 39 per cent, whereas in the sector, there was a nine percentage point decrease from 49 per cent in 2002 to 40 per cent in 2010, as shown in Table 4.13.

**Table 4.13: Managers and professionals without Level 4 or higher qualifications 2002-2010 (UK)**

| | | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|
| Managers or professionals without L4 or higher qualifications | 000s | 206 | 204 | 157 | 172 | 205 | 210 | 204 | 197 | 190 |
| | % | 49 | 48 | 35 | 39 | 44 | 45 | 43 | 40 | 40 |
| *Weighted base (number of managers and professionals)* | *000s* | 423 | 430 | 446 | 436 | 464 | 464 | 471 | 495 | 479 |

*Source: Labour Force Survey 2010 (ONS)*

Over half of employers in the sector (58 per cent) provide training to Managers and Senior Officials compared to 61 per cent across the economy and just under a third (32 per cent) of Managers, Directors and Senior Officials in the sector received training compared to 45 per cent across the whole economy.

In terms of management training (regardless of occupational group), employers in the sector who do train are also less likely to fund or arrange this type of training for their employees, 23 per cent compared to 34 per cent across the economy as a whole.

Whilst the level of qualification Managers hold will also vary by size of firm, with Managers in SMEs being less likely to have formal management or higher level qualifications, there is also evidence to suggest that experience is regarded as an important factor for UK Managers (Garrett *et al.*, 2010).

In conclusion, the evidence suggests there is a higher than average concentration of Managers in the sector, with a higher than average qualification level. The proportion of Managers with higher level qualifications is increasing despite the relatively low levels of management training provided by employers.

### 4.2.2 Provision of training

This section looks at the level and extent of training provision to gauge whether employers are investing adequately in training to raise workforce skills and increase productivity i.e. valuing skills in the workforce.

Employer provided training contributes to the supply of skills in the labour market, is often undertaken as a response to skills gaps and mismatches in the workforce (see Chapter 5) as well as upskilling, and is strongly linked to firm survival, job satisfaction and staff retention. In addition, both the firm and the individual gain from employer provided training but various studies shows that positive effect of training on productivity has between double and five times the impact that it does on wages, (Garrett *et al.*, 2010) indicating that increased skills through training has more value to employers than employees.

According to the UK Commission's Employer Skills Survey 2011, just 23 per cent of employers in the Information and communication technologies sector have a training plan, a much lower proportion than is the case across the whole economy (38 per cent) and, in fact, the lowest proportion across all sectors in the UK alongside the Creative media and entertainment sector.

Employers in the sector in Wales and Northern Ireland are more likely to have a training plan (32 per cent and 27 per cent respectively) and in Scotland a lower proportion of businesses in the sector have a training plan (15 per cent) [13]. A similar proportion of sector employers with a training plan have a training budget (24 per cent) but again this is lower than is the case across the whole economy (29 per cent). However, in Scotland, despite the lower proportion of businesses with a training plan (15 per cent), 54 per cent of employers in the sector report having a training budget.

The lack of training plans and budgets in the sector, in comparison to the all sector average, does not seem to overly affect the overall proportion of employers providing training with 54 per cent of employers in the Information and communication technologies sector in the UK providing training compared to 59 per cent across the economy as a whole (Table 4.14).

Employers in the sector in Scotland (83 per cent) and Wales (62 per cent) are more likely to provide training and employers in Northern Ireland less likely (44 per cent) than is average across the sector.

Looking at the proportion of the workforce receiving training (Table 4.15), employees in the sector are the least likely across all sectors to receive training with just 38 per cent of employees receiving training. This is well below the all sector average of 53 per cent.

Despite the fact that fewer than average employers in Northern Ireland say they train (44 per cent of employers in the sector in Northern Ireland compared to 64 per cent of all employers in Northern Ireland), the proportion of the workforce trained in the sector in Northern Ireland is higher than average - 65 per cent of the sector workforce in Northern Ireland compared to 38 per cent of employees in the sector across the UK and 54 per cent of employees across the whole economy in Northern Ireland (table 4.15).

In Scotland, despite the low proportion of employers with a training plan, a high proportion of employers have a training budget and there is both a high proportion of employers providing and employees receiving training (51 per cent) in the sector.

[13] Results from the UK Employer Skills Survey 2011 for the Information and communication technologies sector in Scotland should be treated with a degree of caution as there is a low base of employer respondents (58).

**Table 4.14: Employers providing training by sector and nation**

| | UK | | England | | Scotland | | Wales | | Northern Ireland | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Number | % | Number | % | Number | % | Number | % | Number | % |
| Agriculture, forestry and fishing | 58,869 | 53 | 42,577 | 54 | †7,737 | †58 | 3,536 | 34 | 5,019 | 71 |
| Energy production and utilities | 8,743 | 69 | 6,858 | 69 | 1,040 | 81 | 554 | 67 | 291 | 54 |
| Manufacturing | 73,972 | 57 | 61,935 | 55 | 6,629 | 71 | 3,464 | 64 | 1,944 | 51 |
| Construction | 163,641 | 53 | 137,473 | 53 | 13,506 | 63 | 7,193 | 55 | 5,469 | 51 |
| Wholesale and retail trade | 261,948 | 56 | 218,681 | 55 | 23,692 | 67 | 11,347 | 54 | 8,228 | 58 |
| Transportation and storage | 55,004 | 45 | 46,106 | 43 | 5,633 | 70 | 2,103 | 50 | 1,161 | 52 |
| Accommodation, food and tourism activities | 134,314 | 61 | 108,618 | 60 | 15,665 | 71 | 6,570 | 58 | 3,461 | 59 |
| Information and communication technologies | 39,090 | 54 | 34,418 | 52 | †2,974 | †83 | 1,215 | 62 | 483 | 44 |
| Creative media and entertainment | 74,069 | 52 | 63,945 | 51 | †5,976 | †54 | 2,690 | 57 | 1,457 | 71 |
| Financial, insurance & other professional services | 114,074 | 67 | 101,640 | 66 | 5,354 | 64 | 4,605 | 80 | 2,474 | 73 |
| Real estate and facilities management | 95,068 | 57 | 85,826 | 57 | †6,652 | †55 | 1,340 | 44 | 1,249 | 67 |
| Government | 41,608 | 76 | 32,980 | 74 | 4,715 | 85 | 2,343 | 87 | 1,571 | 77 |
| Education | 55,629 | 86 | 45,309 | 85 | 4,348 | 97 | 2,941 | 92 | 3,031 | 92 |
| Health | 44,797 | 86 | 38,133 | 85 | 3,208 | 99 | 2,216 | 79 | 1,239 | 84 |
| Care | 73,669 | 84 | 60,516 | 84 | 6,798 | 81 | 3,562 | 81 | 2,793 | 86 |
| All economy | 1,361,250 | 59 | 1,141,560 | 58 | 119,847 | 68 | 58,171 | 59 | 41,668 | 64 |
| *Weighted base* | 2,299,921 | | 1,960,298 | | 175,115 | | 98,952 | | 65,558 | |
| *Unweighted base* | 87,572 | | 75,053 | | 2,503 | | 6,012 | | 4,004 | |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*

*† Treat figures with caution due to small unweighted base size of 50-99 establishments in Scotland*

**Table 4.15: Employees receiving training by sector and nation**

| | UK | | England | | Scotland | | Wales | | Northern Ireland | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Number | % | Number | % | Number | % | Number | % | Number | % |
| Agriculture, forestry and fishing | 198,736 | 43 | 152,352 | 43 | †25,724 | †47 | 8,993 | 29 | 11,667 | 51 |
| Energy production and utilities | 167,507 | 50 | 120,687 | 49 | 32,976 | 55 | 11,072 | 66 | 2,772 | 38 |
| Manufacturing | 1,146,654 | 45 | 934,516 | 44 | 93,562 | 48 | 74,719 | 54 | 43,857 | 52 |
| Construction | 1,072,552 | 48 | 884,923 | 48 | 116,140 | 47 | 39,666 | 44 | 31,826 | 46 |
| Wholesale and retail trade | 2,340,353 | 50 | 1,960,109 | 49 | 201,879 | 55 | 109,603 | 55 | 68,761 | 48 |
| Transportation and storage | 538,494 | 41 | 448,580 | 39 | 49,954 | 44 | 22,489 | 58 | 17,468 | 63 |
| Accommodation, food and tourism activities | 1,221,736 | 53 | 1,017,791 | 53 | 124,328 | 55 | 48,807 | 49 | 30,809 | 50 |
| Information and communication | 233,240 | 38 | 205,944 | 37 | †15,377 | †51 | 5,255 | 28 | 6,663 | 65 |
| Creative media and entertainment | 524,081 | 48 | 451,335 | 47 | †30,017 | †43 | 24,215 | 69 | 18,513 | 69 |
| Financial, insurance & other professional services | 1,109,888 | 54 | 949,712 | 52 | 101,444 | 73 | 32,505 | 60 | 26,224 | 69 |
| Real estate and facilities management | 560,354 | 47 | 492,799 | 47 | †36,284 | †49 | 19,985 | 60 | 11,286 | 50 |
| Government | 1,004,866 | 56 | 835,514 | 58 | 82,550 | 47 | 49,901 | 53 | 36,901 | 59 |
| Education | 1,598,280 | 63 | 1,354,826 | 63 | 116,696 | 62 | 84,527 | 72 | 42,231 | 58 |
| Health | 1,300,684 | 65 | 1,032,851 | 64 | 187,638 | 81 | 58,505 | 49 | 21,690 | 52 |
| Care | 969,487 | 64 | 780,108 | 64 | 89,130 | 63 | 52,831 | 84 | 47,414 | 64 |
| All economy | 14,476,138 | 53 | 12,050,111 | 52 | 1,337,833 | 56 | 661,045 | 56 | 427,137 | 54 |
| *Weighted base* | 27,547,123 | | 23,198,475 | | 2,381,601 | | 1,182,314 | | 784,732 | |
| *Unweighted base* | 2,816,693 | | 2,345,213 | | 201,868 | | 178,922 | | 90,690 | |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*

*† Treat figures with caution due to small unweighted base size of 50-99 establishments in Scotland*

As is the case across the whole economy (Table 4.16), employers in the Information and communication technologies sector are most likely to provide training to Managers, Directors and Senior Officials with 58 per cent of employers in the sector who provide training saying they provide training to this occupational group. Over a fifth of employers in the sector (22 per cent) provide training to employees with Associate Professional and Technical occupations, in contrast to the whole economy where just nine per cent of employers provide training.

**Table 4.16: Employers providing training to employees by occupational group**

| | Information and communication technologies | | All economy | |
|---|---|---|---|---|
| | Number | % | Number | % |
| Managers, Directors and senior officials occupations | 22,670 | 58 | 825,928 | 61 |
| Professional occupations | 6,791 | 17 | 152,106 | 11 |
| Associate professional and technical occupations | 8,731 | 22 | 124,610 | 9 |
| Administrative and secretarial occupations | 8,013 | 21 | 372,218 | 27 |
| Skilled trades occupations | 3,963 | 10 | 192,480 | 14 |
| Personal service occupations | 181 | ** | 129,265 | 9 |
| Sales and customer service occupations | 6,679 | 17 | 261,082 | 19 |
| Process, plant and machine operatives | 645 | 2 | 96,592 | 7 |
| Elementary occupations | 886 | 2 | 217,981 | 16 |
| Other | 2,111 | 5 | 35,410 | 3 |
| Don't know | 486 | 1 | 20,638 | 2 |
| Arrange training for all categories of staff employed | 19,648 | 50 | 714,095 | 52 |
| Arrange training for some categories of staff employed | 19,441 | 50 | 647,154 | 48 |
| *Weighted base* | 39,090 | | 1,361,249 | |
| *Unweighted base* | 1,848 | | 66,916 | |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*
*Base: All establishments providing training*
*** denotes a figure greater than 0% but less than 0.5%*

As shown in Table 4.17, of employees receiving training, employees in each occupational group in the Information and communication technologies sector are less likely to receive training than employees in the same occupational groups across the economy.

In the Information and communication technologies sector, Skilled Trade occupations are the most likely to receive training (50 per cent of Skilled Trade employees) followed by Associate Professional and Technical (44 per cent) and Sales and Customer Service (44 per cent) occupations.

Just under a third (32 per cent) of Managers, Directors and Senior Officials in the sector received training compared to 45 per cent across the whole economy.

**Table 4.17: Employees receiving training by occupational group**

| | Information and communication technologies | | All economy | |
|---|---|---|---|---|
| | Number | % | Number | % |
| Managers, Directors and senior officials occupations | 50,036 | 32 | 2,413,145 | 45 |
| Professional occupations | 61,579 | 43 | 1,904,780 | 61 |
| Associate professional and technical occupations | 37,989 | 44 | 1,022,510 | 56 |
| Administrative and secretarial occupations | 21,841 | 30 | 1,607,984 | 45 |
| Skilled trades occupations | 11,186 | 50 | 1,041,373 | 55 |
| Personal service occupations | 1,238 | 7 | 1,606,254 | 70 |
| Sales and customer service occupations | 37,182 | 44 | 1,937,670 | 55 |
| Process, plant and machine operatives | 4,401 | 32 | 902,782 | 47 |
| Elementary occupations | 5,012 | 30 | 1,938,793 | 48 |
| Other | 2,776 | n/a | 100,845 | n/a |
| All occupations | 233,240 | | 14,476,137 | |
| *Weighted base* | 233,240 | | 14,476,137 | |
| *Unweighted base* | 20,344 | | 1,517,802 | |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*
*Base: All employees receiving training*

Using the Labour Force Survey measure of employees receiving training Table 4.18 shows that just one in ten employees (10 per cent) in the Information and communication technologies sector received training in the last four weeks compared to 13 per cent of the total UK workforce. As is the case across the whole economy, the proportion of employees receiving training in the Information and communication technologies sector has fallen from 2002 to 2010 although the decline in training in the sector (a change of three percentage points) would appear to be slightly more than across the economy as a whole (a two percentage points drop).

Those sectors that are predominantly public sector focused (Government services, Education, Health, and Care) have a higher than average proportion of the workforce receiving training in the last four weeks whereas in every other sector (except for Financial, insurance and other professional services) the proportion of employees receiving training in the last four weeks is lower than the overall average.

**Table 4.18: % of employees receiving training in last 4 weeks, 2002-2010 (UK)**

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|
| | % | % | % | % | % | % | % | % | % |
| Agriculture, forestry and fishing | 7 | 7 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Energy production and utilities | 15 | 14 | 13 | 13 | 13 | 13 | 12 | 11 | 12 |
| Manufacturing | 10 | 9 | 9 | 10 | 9 | 9 | 9 | 9 | 9 |
| Construction, building services, engineering and planning | 10 | 9 | 10 | 9 | 9 | 9 | 9 | 9 | 8 |
| Wholesale and retail trade | 11 | 10 | 10 | 10 | 10 | 10 | 9 | 8 | 8 |
| Transportation and storage | 10 | 10 | 9 | 9 | 8 | 8 | 8 | 7 | 7 |
| Hospitality, tourism and sport | 13 | 12 | 12 | 11 | 11 | 10 | 10 | 10 | 11 |
| Information and communication technologies | 13 | 12 | 12 | 11 | 11 | 10 | 10 | 10 | 10 |
| Creative media and entertainment | 13 | 12 | 12 | 12 | 11 | 11 | 10 | 9 | 8 |
| Financial, insurance & other professional services | 18 | 17 | 17 | 16 | 15 | 15 | 15 | 14 | 15 |
| Real estate and facilities management | 14 | 13 | 14 | 12 | 13 | 12 | 12 | 7 | 8 |
| Government services | 20 | 20 | 20 | 20 | 19 | 18 | 19 | 19 | 17 |
| Education | 22 | 21 | 21 | 21 | 20 | 20 | 20 | 20 | 18 |
| Health | 24 | 25 | 25 | 25 | 24 | 23 | 22 | 24 | 24 |
| Care | 24 | 25 | 25 | 25 | 24 | 23 | 22 | 21 | 20 |
| All economy | 15 | 14 | 14 | 14 | 14 | 13 | 13 | 13 | 13 |
| Weighted base (000s) | 4,095 | 3,987 | 4,074 | 4,061 | 3,949 | 3,863 | 3,834 | 3,685 | 3,642 |
| *Unweighted base (000s)* | *35.781* | *33.324* | *32.626* | *31.674* | *29.781* | *28.888* | *27.829* | *25.468* | *24.012* |

*Source: Labour Force Survey 2010, ONS*
**Sample size too small for reliable estimate*

Figures for training in the Information and communication technologies sector by nation are not available[14] but the incidence of employees across all sectors receiving training in the last four weeks across each nation is fairly similar (around 13 per cent as shown in Table 4.19) except for in Northern Ireland where just seven per cent of employees across all sectors received training.

[14] Data has been suppressed as the sample size is too small for reliable estimates.

**Table 4.19: % of employees receiving training in last 4 weeks, 2010 (all nations)**

| | UK | England | Scotland | Wales | Northern Ireland |
|---|---|---|---|---|---|
| | % | % | % | % | % |
| Agriculture, forestry and fishing | 6 | 7 | * | * | * |
| Energy production and utilities | 12 | 12 | 13 | * | * |
| Manufacturing | 9 | 9 | 9 | 11 | 8 |
| Construction, building services, engineering and planning | 8 | 8 | 9 | 10 | * |
| Wholesale and retail trade | 8 | 8 | 9 | 9 | 6 |
| Transportation and storage | 7 | 7 | 8 | * | * |
| Hospitality, tourism and sport | 11 | 11 | 12 | 15 | * |
| Information and communication technologies | 10 | 10 | * | * | * |
| Creative media and entertainment | 8 | 8 | * | * | * |
| Financial, insurance & other professional services | 15 | 15 | 17 | 19 | * |
| Real estate and facilities management | 8 | 8 | 11 | * | * |
| Government services | 17 | 17 | 18 | 16 | 8 |
| Education | 18 | 19 | 17 | 19 | * |
| Health | 24 | 25 | 21 | 22 | 11 |
| Care | 20 | 20 | 19 | 26 | * |
| All economy | 13 | 13 | 13 | 14 | 7 |
| Weighted base (000s) | 3,642 | 3,085 | 317 | 188 | 52 |
| *Unweighted base (000s)* | *24.012* | *20.155* | *2.164* | *1.215* | *0.478* |

*Source: Labour Force Survey 2010, ONS*
**Sample size too small for reliable estimate*

In line with the trend illustrated by employees who had received training over the past four weeks, the measure for training received in the past 13 weeks (Table 4.20) shows a downward trend in training since 2002 both across the economy as a whole and in the Information and communication technologies sector. The proportion of employees in the sector who received training in the last 13 weeks fell by nearly a third between 2002 and 2010 (from 27 per cent to 20 per cent), compared to a seven per cent fall in the overall proportion of employees receiving training.

**Table 4.20: % of employees receiving training in last 13 weeks, 2002-2010 (UK)**

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|
| | % | % | % | % | % | % | % | % | % |
| Agriculture, forestry and fishing | 15 | 13 | 14 | 13 | 13 | 12 | 13 | 13 | 13 |
| Energy production and utilities | 33 | 31 | 30 | 28 | 28 | 28 | 26 | 25 | 27 |
| Manufacturing | 21 | 20 | 19 | 20 | 19 | 20 | 19 | 18 | 18 |
| Construction, building services, engineering and planning | 19 | 19 | 20 | 19 | 19 | 19 | 19 | 19 | 18 |
| Wholesale and retail trade | 20 | 20 | 20 | 20 | 18 | 18 | 18 | 16 | 16 |
| Transportation and storage | 21 | 21 | 20 | 19 | 19 | 18 | 18 | 17 | 18 |
| Hospitality, tourism and sport | 24 | 22 | 22 | 21 | 21 | 20 | 19 | 19 | 19 |
| Information and communication technologies | 27 | 25 | 24 | 23 | 23 | 22 | 21 | 21 | 20 |
| Creative media and entertainment | 24 | 24 | 23 | 23 | 23 | 21 | 21 | 18 | 17 |
| Financial, insurance & other professional services | 35 | 33 | 32 | 33 | 30 | 30 | 29 | 29 | 29 |
| Real estate and facilities management | 27 | 26 | 27 | 26 | 26 | 25 | 24 | 15 | 16 |
| Government services | 40 | 41 | 40 | 39 | 38 | 37 | 36 | 37 | 35 |
| Education | 44 | 42 | 42 | 42 | 40 | 39 | 40 | 39 | 38 |
| Health | 45 | 46 | 46 | 47 | 46 | 44 | 44 | 47 | 46 |
| Care | 45 | 46 | 46 | 47 | 46 | 44 | 44 | 41 | 40 |
| All economy | 28 | 28 | 28 | 28 | 27 | 26 | 26 | 26 | 26 |
| Weighted base (000s) | 7,952 | 7,873 | 7,917 | 8,037 | 7,883 | 7,681 | 7,669 | 7,382 | 7,359 |
| *Unweighted base (000s)* | *69.767* | *65.973* | *63.658* | *63.118* | *59.87* | *57.81* | *56.008* | *51.497* | *48.93* |

*Source: Labour Force Survey 2010, ONS*
**Sample size too small for reliable estimate*

Table 4.21 shows that a higher proportion of the sector workforce received training in the last 13 weeks in Scotland (22 per cent) than across the UK as a whole (20 per cent), although this is still slightly less than the proportion receiving training across the whole workforce in Scotland (27 per cent).

Roughly one in ten employees (11 per cent) in the Repair of Computers and other goods sub-sector are least likely to have received training over the past 13 weeks, whereas nearly a third of those in the Telecommunications sub-sector (31 per cent) received training.

**Table 4.21: % of employees receiving training in last 13 weeks, 2010 (all nations)**

| | UK | England | Scotland | Wales | Northern Ireland |
|---|---|---|---|---|---|
| | % | % | % | % | % |
| Agriculture, forestry and fishing | 13 | 15 | 12 | * | * |
| Energy production and utilities | 27 | 27 | 30 | * | * |
| Manufacturing | 18 | 18 | 18 | 20 | 18 |
| Construction, building services, engineering and planning | 18 | 18 | 21 | 18 | 12 |
| Wholesale and retail trade | 16 | 17 | 17 | 15 | 13 |
| Transportation and storage | 18 | 18 | 19 | 16 | * |
| Hospitality, tourism and sport | 19 | 19 | 20 | 21 | * |
| Information and communication technologies | 20 | 20 | 22 | * | * |
| Creative media and entertainment | 17 | 17 | 18 | 20 | * |
| Financial, insurance & other professional services | 29 | 29 | 28 | 32 | 17 |
| Real estate and facilities management | 16 | 16 | 23 | 18 | * |
| Government services | 35 | 35 | 35 | 34 | 24 |
| Education | 38 | 39 | 34 | 38 | 26 |
| Health | 46 | 47 | 42 | 44 | 32 |
| Care | 40 | 40 | 40 | 46 | 27 |
| All economy | 25 | 25 | 27 | 24 | 18 |
| Weighted base (000s) | 7,181 | 6,065 | 668 | 312 | 137 |
| *Unweighted base (000s)* | *48.93* | *40.947* | *4.41* | *2.282* | *1.291* |

*Source: Labour Force Survey 2010, ONS*
**Sample size too small for reliable estimate*

Analysis of the UKCES Employer Perspectives Survey 2010 (Shury *et al.*, 2011) shows that in terms of providing external training for their employees, employers who train are most likely to use private training providers (54 per cent). Nearly a quarter (23 per cent) use Further Education Colleges, 19 per cent use Third sector or not for profit providers and 13 per cent Universities/Higher Education Institutions. Private training providers are also the external provider of choice for the Information and communication technologies sector employers who train (68 per cent). Employers in the sector are more likely to use Universities (16 per cent) than employers in general (13 per cent) and less likely to use Further Education Colleges (15 per cent compared to 23 per cent)[15].

Where employers provide training, the most common type of training provided both in the sector and across the economy as a whole is job specific training (82 per cent and 84 per cent respectively) as illustrated in Table 4.22.

[15] Information and communication technologies: Base: All employers who train. Unweighted responses 254. Weighted responses 18,808. All sectors: Base All employers who train: Unweighted responses 11,568 Weighted responses: 1,072,283.

In the Information and communication technologies sub-sector this is not surprisingly followed by training in new technologies (76 per cent of employers providing training saying they fund or arrange this type of training for employees), whereas for employers across the economy Health and safety / first aid training is the second most common type of training provided (72 per cent).

**Table 4.22: Type of training funded or arranged for employees**

| | Information and communication technologies | | All economy | |
|---|---|---|---|---|
| | Number | % | Number | % |
| Job specific training | 32,043 | 82 | 1,149,860 | 84 |
| Health and safety/first aid training | 18,513 | 47 | 970,183 | 71 |
| Induction training | 14,495 | 37 | 702,846 | 52 |
| Training in new technology | 29,606 | 76 | 641,023 | 47 |
| Management training | 8,855 | 23 | 457,763 | 34 |
| Supervisory training | 7,225 | 18 | 437,577 | 32 |
| Personal Development Training* | 1,480 | 4 | 45,451 | 3 |
| Other | 118 | ** | 4,101 | ** |
| None of these | 302 | 1 | 8,809 | 1 |
| Don't know | 25 | ** | 2,412 | ** |
| *Weighted base* | 39,090 | | 1,361,249 | |
| *Unweighted base* | 1,848 | | 66,916 | |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*
*Base: All establishments providing training*
*** denotes a figure greater than 0% but less than 0.5%*
*NB Column percentages sum to more than 100 since multiple responses were allowed*

The OECD (in Garrett *et al.*, 2010) reports that training provided in the UK is often short term and generic, a statement that is backed up by the evidence provided in the UK ESS survey showing the dominance of Health and safety and induction training across the economy. In contrast short-form/generic training is less commonly provided by employers in the Information and communication technologies sector and there would appear to be a more apparent link to appropriate, job related training that is tailored to organisational requirements.

Just over half (51 per cent) of those employers in the sector who provide training formally assess the performance of employees who have received training. This is lower than the all sector average of 65 per cent and employers in the sector are the least likely of all employers, except those in the Agriculture, forestry and fishing sector, to assess the performance of employees who have received training.

Barriers to training in the sector are set out in Table 4.23 and are similar to those expressed by employers across the economy, with the majority of employers (61 per cent of employers in the sector compared to 64 per cent of all employers) who do not train saying their staff are fully proficient or have no need for training.

The next most common reason for not training in the sector and across the economy as a whole is there is no money for training, with a larger proportion of employers in the Information and communication technologies sector (18 per cent) citing this as a barrier to training than across the economy as a whole (ten per cent). The cost of training as a significant barrier to training in the sector is corroborated by analysis of the Scottish Employer Skills Survey data presented in the Scottish Sector Profile (Alliance of Sector Skills Councils Scotland, 2011) where 30 per cent of employers in the sector who did not provide training in the last twelve months said it was because the establishment lacked funds compared to 16 per cent of all employers[16].

Only two per cent of sector employers across the UK did not provide training because they thought that trained staff will be poached by other employers. [17]

Barriers to training cited by employers also include being a small firm or that training is not needed due to size of establishment but this is only given as a reason for not training by 2 per cent of employers in the sector who do not train. A recent briefing on skills in small firms in the UK (Edwards, 2010) reports that there is evidence that informal training in small firms acts as a substitute for formal training but that there is great variation between small firms:

[16] Scottish Employer Skills Survey. Base: All employers who did not provide training in the last 12 months. Unweighted: IT & Telecoms = 70, all industries = 1,416. IT & Telecoms based on the following SIC: 5821 Publishing of computer games; 5829 Other software publishing; 61 Telecommunications; 62 Computer programming, consultancy and related activities, SIC 6311 Data processing, hosting and related activities; 6312 Web portals; 9511 Repair of computers and peripheral equipment; 9512 Repair of communication equipment.
[17] Data for Scotland, Wales and Northern Ireland has been suppressed as sample sizes are too small for reliable estimates.

**Table 4.23: Barriers to training within sector**

| | UK | | England | |
|---|---|---|---|---|
| | Number | % | Number | % |
| All our staff are fully proficient / no need for training | 20,056 | 61 | 18,731 | 61 |
| No money available for training | 5,915 | 18 | 5,703 | 19 |
| Training is not considered to be a priority for the establishment | 2,566 | 8 | 2,458 | 8 |
| No training available in relevant subject area | 2,174 | 7 | 2,121 | 7 |
| Managers have lacked the time to organise training | 1,350 | 4 | 1,350 | 4 |
| Learn by experience/learn as you go | 1,562 | 5 | 1,403 | 5 |
| External courses are too expensive | 1,401 | 4 | 1,272 | 4 |
| Small firm/training not needed due to size of establishment | 642 | 2 | 642 | 2 |
| Employees are too busy to undertake training and development | 734 | 2 | 692 | 2 |
| Employees are too busy to give training | 210 | 1 | 171 | 1 |
| Business not operating long enough/new business (inc. takeover transition) | 24 | ** | 24 | ** |
| Trained staff will be poached by other employers | 684 | 2 | 684 | 2 |
| I don't know what provision is available locally | 0 | 0 | 0 | 0 |
| The start dates or times of the courses are inconvenient | 375 | 1 | 375 | 1 |
| The courses interested in are not available locally | 66 | ** | 66 | ** |
| No new staff (only train new staff) | 0 | 0 | 0 | 0 |
| The quality of the courses or providers locally is not satisfactory | 42 | ** | 42 | ** |
| Difficult to get information about the courses available locally | 79 | ** | 79 | ** |
| Other | 1,144 | 3 | 1,113 | 4 |
| No particular reason | 1,587 | 5 | 1,546 | 5 |
| Don't know | 161 | ** | 161 | 1 |
| *Weighted base* | 32,701 | | 30,794 | |
| *Unweighted base* | 634 | | 582 | |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*
*Base: All establishments that do not provide training*
**Data unavailable for Scotland, Wales and Northern Ireland as sample sizes are too small for reliable estimates.*
*** Denotes a figures of greater than 0% but less than 0.5%*

### 4.2.3 Returns to qualifications and occupations

Employers look for qualifications and skills in recruits as an indicator of competence, investment in skills in their workforce to increase productivity and gain competitive edge. For individuals the value of skills and qualifications is predominantly to enter the labour market, to gain and retain employment - there is a strong correlation between skills/qualifications and employment rates and also salaries. Research[18] has consistently shown that most academic qualifications and higher level vocational qualifications at least have a substantial value in the UK labour market and therefore employers value these qualifications and associated skills.

A recent report for the Royal Academy of Engineering (Greenwood *et al*, 2011) looked at the labour market value of STEM (Science, Technology, Engineering and Maths) qualifications and occupations using Labour Force Survey data from 2004 to 2010. The findings show that although there is no consistent pattern there is a higher labour market value to a handful of technology[19] qualifications. There are however, sizeable wage premia, with those working in Technology occupations (including where there are elements of science or engineering) earning on average 26 per cent more than those who do not, whilst those working in occupations considered to be technology only earn, on average, 33 per cent more than individuals in non-STE occupations. The combination of a STE qualification and STE occupation (such as software professional) is seen to attract a further additional premium.

Drawing together the evidence on the value of skills indicates only partial enablement of effective skills use in the sector with employers in the sector tend to score highly in comparison to other sectors in key HPW measures linked to employee autonomy. However, training levels in the sector are relatively low and falling: employees in the sector are the least likely across all sectors to receive training with just 38 per cent of employees receiving training, well below the all sector average of 53 per cent.

The relatively low proportion of the sector workforce being trained could indicate an area of concern for the sector due to the strong link between training and economic performance (Garrett *et al*., 2010), however, this may not be an issue as the majority of employers report staff are fully proficient or have no need for training. This is corroborated by data showing relatively high workforce proficiency. In addition, there is a tendency for employees in the sector to self-up skill.

[18] A full discussion of returns to qualifications can be found in 'The Value of Skills: A Summary of the Evidence' (Garrett *et al.*, 2010).
[19] Including mainly those qualifications relevant to the Information and communication technologies sector but also some design and design technology subjects.

High proportions of highly skilled managers is another strong indicator of effective skills use but management training appears to be lacking with under a third (32 per cent) of Managers in the sector receiving training compared to 45 per cent across the whole economy.

## 4.3 Skills and sectoral performance

This section considers whether higher levels of workforce skill lead to better performance. Whilst the relationship between skills and performance is difficult to prove, research suggests there is a positive association between a highly skilled workforce and organisational performance.

The Information and communication technologies sector has a highly skilled workforce, with over half (55 per cent) the workforce qualified to Level 4 compared to 37 per cent across the UK economy. Qualification levels are rising, proficiency is high, and the high level of skills within the workforce reflects and aligns with the occupational structure in the workforce which is predominantly Professional and Managerial.

This highly skilled workforce enables the sector to pursue high value product market strategies and these high skills levels within the sector workforce are increasingly required in the highly competitive global marketplace in which the sector operates.

Skills levels in the sector have continued to rise alongside increases in GVA per head, with a greater proportion of employees at Level 4 and fewer at Level 2 and below. With the decrease in absolute employment in the sector from 2008, this means that there are fewer, but more highly skilled employees than previously with increased productivity per head although total sector GVA has decreased since the onset of the recession.

Overall, the sector shows signs of valuing and utilising the high level skills within the workforce for benefit to businesses and in driving a competitive and productive sector in the UK despite the recent recession. However, it is possible that sectoral performance is being driven by the existing level of qualification and skills in the workforce. Aside from addressing skills mismatches in the form of shortages, gaps and underemployment (the extent of which is outlined in Chapter 5), if training and High Performance Working practices in particular were exploited to a greater extent, the skills of the workforce could be better managed, improved and applied to further drive sectoral performance.

# 5 Extent of skills mismatch

This chapter explores the extent of skills mismatch in the sector to enable a view to be formed on the elements of skills development and the labour market that needs addressing. The extent of current vacancies and skills issues are explored followed by a consideration of the extent and impact of mismatches which can impact performance of individual businesses and the sector.

**Chapter Summary**

- Employers in the Information and communication technologies sector account for three per cent of all UK employers with vacancies, four per cent of those with hard to fill vacancies and five per cent of those with skills shortage vacancies (note SSVs are a sub-set of hard to fill vacancies).
- There are over 29,000 current vacancies in the Information and communications technologies sector, equivalent to five per cent of total employment in the sector and the highest proportion across all sectors.
- Where there are hard to fill vacancies in the sector (5,449), the vast majority (91 per cent or 4,937) of these are skills shortage vacancies. Hard to fill and skill shortage vacancies are concentrated in Professional and Associate Professional occupations and the most common skills thought lacking are job specific, and advanced IT or software skills.
- Nearly one in ten employers in the sector report skills gaps in the workforce, one of the lowest rates across all sectors. However, skills gaps affect a higher proportion of the workforce than average with six per cent of employees in the sector (34,775) having skills gaps. Skills lacking in the sector include technical, business and interpersonal skills.
- The demand for highly qualified and experienced labour and skills and mismatches in the sector are also indicated by: high average hourly wages; an increasing proportion of migrant labour, the use of Intra-company transfers and Software Developers for Games companies being on the MAC skills shortage list. The low levels of recruitment of young people indicates an under-utilised recruitment pool but also reflects employer preferences for recruiting highly skilled and experienced workers.
- Both skills shortages and gaps are causing an increase in workload for other staff, and are hampering growth in the sector, causing cause delays in developing new products and services and loss of business. Finding suitably skilled staff is a key challenge for employers in the sector.

## 5.1 Extent and nature of vacancies

This section provides information on the extent and nature of vacancies in the sector giving an indication of the level of demand, and where there are hard to fill vacancies unmet demand. The level of current skills shortages is set out along with an assessment of the issues employers face around retention of staff and the nature of recruitment.

### 5.1.1 Level of vacancies

Across the whole economy in the UK, 12 per cent of employers currently have vacancies. In the Information and communications technologies sector, 13 per cent of employers currently have vacancies.

Where employers have vacancies, a third (33 per cent) of these employers across the economy perceive the vacancies to be 'hard to fill'. This equates to four per cent of all employers in the UK economy experiencing hard to fill vacancies. Comparably, in the Information and communications technologies sector, 39 per cent of those with vacancies are finding them hard to fill (or five per cent of all employers in the sector).

Three per cent of all employers say they have a skills shortage vacancy (where a vacancy is hard to fill because applicants lack the skills, experience or qualification the company demands). In the Information and communications technologies sector, the situation is slightly worse with five per cent of all employers saying they have a skills shortage vacancy and 94 per cent of those employers with a hard to fill vacancy have skills shortage vacancy.

Table 5.1 shows that employers in the Information and communication technologies sector account for three per cent of all UK employers with vacancies, four per cent of those with hard to fill vacancies and five per cent of those with skills shortage vacancies (SSVs).

Employers in the sector in Scotland are much more likely to report vacancies (28 per cent), hard to fill vacancies (11 per cent) and skill shortage vacancies (ten per cent) than employers in the sector in England, Wales or Northern Ireland where the proportion of employers reporting vacancies, hard to fill vacancies and skills shortages are in line with the average for the sector across the UK.

**Table 5.1: Employers with vacancies, hard-to-fill vacancies and skills shortage vacancies**

| | Vacancies | | HTF vacancies | | SSV | | | |
|---|---|---|---|---|---|---|---|---|
| | Number | % | Number | % | Number | % | *Weighted base* | *Unweighted base* |
| Agriculture, forestry and fishing | 8,285 | 3 | 4,141 | 5 | 2,660 | 4 | 110,220 | 1,547 |
| Energy production and utilities | 1,783 | 1 | 635 | 1 | 532 | 1 | 12,610 | 1,614 |
| Manufacturing | 17,423 | 6 | 7,684 | 8 | 6,040 | 9 | 130,709 | 7,776 |
| Construction, building services, engineering and planning | 22,972 | 8 | 11,596 | 13 | 9,607 | 14 | 306,403 | 8,961 |
| Wholesale and retail trade | 50,681 | 18 | 13,499 | 15 | 9,778 | 14 | 470,200 | 16,150 |
| Transportation and storage | 13,036 | 5 | 4,127 | 5 | 2,662 | 4 | 122,058 | 4,735 |
| Hospitality, tourism and sport | 32,674 | 12 | 11,656 | 13 | 7,435 | 11 | 220,055 | 11,318 |
| Information and communication technologies | 9,146 | 3 | 3,596 | 4 | 3,386 | 5 | 72,281 | 2,510 |
| Creative media and entertainment | 16,182 | 6 | 5,506 | 6 | 4,746 | 7 | 143,772 | 3,762 |
| Financial, insurance & other professional services | 21,794 | 8 | 5,310 | 6 | 4,556 | 7 | 170,887 | 5,343 |
| Real estate and facilities management | 17,403 | 6 | 4,651 | 5 | 3,956 | 6 | 166,486 | 3,424 |
| Government services | 8,185 | 3 | 1,877 | 2 | 1,204 | 2 | 54,687 | 2,605 |
| Education | 14,466 | 5 | 3,220 | 4 | 2,386 | 4 | 64,540 | 5,439 |
| Health | 9,577 | 3 | 2,820 | 3 | 1,842 | 3 | 52,370 | 3,398 |
| Care | 15,589 | 6 | 3,956 | 4 | 2,054 | 3 | 87,899 | 4,763 |
| Not in scope | 15,583 | 6 | 6,497 | 7 | 5,121 | 8 | 114,744 | 4,227 |
| Total | 274,779 | 100 | 90,771 | 100 | 67,965 | 100 | 2,299,921 | 87,572 |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*
*Base: All establishments*

**Table 5.2: Profile of vacancies by sector**

| | Volume | | | % | | | | |
|---|---|---|---|---|---|---|---|---|
| | Vacancies | HTF vacancies | SSV (prompted and unprompted) | Vacancies as a % employment | HTF vacancies as a % vacancies | SSV as a % vacancies | *Weighted base* | *Unweighted base* |
| Agriculture, forestry and fishing | 14,641 | 5,785 | 4,238 | 3 | 40 | 29 | 466,870 | 19,506 |
| Energy production and utilities | 9,343 | 1,590 | 1,236 | 3 | 17 | 13 | 333,050 | 47,228 |
| Manufacturing | 40,252 | 11,834 | 9,711 | 2 | 29 | 24 | 2,541,188 | 291,593 |
| Construction, building services, engineering and planning | 47,241 | 19,103 | 12,394 | 2 | 40 | 26 | 2,235,270 | 150,111 |
| Wholesale and retail trade | 95,390 | 17,441 | 12,619 | 2 | 18 | 13 | 4,674,684 | 514,820 |
| Transportation and storage | 25,734 | 4,739 | 3,182 | 2 | 18 | 12 | 1,320,126 | 114,658 |
| Hospitality, tourism and sport | 73,886 | 18,245 | 11,179 | 3 | 25 | 15 | 2,313,487 | 258,524 |
| Information and communication technologies | 29,361 | 5,449 | 4,937 | 5 | 19 | 17 | 614,641 | 53,681 |
| Creative media and entertainment | 37,885 | 6,824 | 5,502 | 3 | 18 | 15 | 1,086,978 | 87,953 |
| Financial, insurance & other professional services | 58,847 | 11,732 | 10,623 | 3 | 20 | 18 | 2,052,039 | 112,945 |
| Real estate and facilities management | 31,155 | 5,773 | 4,252 | 3 | 19 | 14 | 1,183,601 | 91,204 |
| Government services | 35,917 | 9,330 | 5,938 | 2 | 26 | 17 | 1,780,058 | 223,796 |
| Education | 34,684 | 4,984 | 3,729 | 1 | 14 | 11 | 2,538,545 | 387,221 |
| Health | 27,811 | 5,281 | 3,330 | 1 | 19 | 12 | 2,004,436 | 219,765 |
| Care | 37,494 | 5,924 | 3,335 | 2 | 16 | 9 | 1,504,729 | 157,681 |
| Not in scope | 36,266 | 9,533 | 7,248 | 4 | 26 | 20 | 897,422 | 86,007 |
| Total | 635,907 | 143,564 | 103,453 | 2 | 23 | 16 | 27,547,123 | 2,816,693 |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*
*Bases: Vary.*
*Vacancies as a % of employment based on all employment.*
*Hard-to-fill vacancies as a % of vacancies based on all vacancies.*
*SSVs as a % of vacancies based on all vacancies.*

**Table 5.3: Profile of vacancies by sector and nation**

| | Vacancies as a % employment | | | | HTF vacancies as a % vacancies | | | | SSV as a % vacancies | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | England | Scotland | Wales | NI | England | Scotland | Wales | NI | England | Scotland | Wales | NI |
| Agriculture, forestry & fishing | 3 | †4 | 2 | 0 | 36 | †45 | 87 | 0 | 28 | †22 | 85 | 0 |
| Energy production & utilities | 2 | 7 | 4 | 1 | 11 | 22 | 32 | 49 | 9 | 17 | 22 | 25 |
| Manufacturing | 2 | 1 | 2 | 2 | 28 | 39 | 30 | 33 | 23 | 36 | 27 | 29 |
| Construction, Building Services Engineering and Planning | 2 | 2 | 2 | 1 | 42 | 29 | 41 | 27 | 26 | 24 | 34 | 16 |
| Wholesale & retail trade | 2 | 2 | 2 | 2 | 18 | 17 | 23 | 32 | 13 | 10 | 12 | 18 |
| Transportation and Storage | 2 | 2 | 3 | 1 | 17 | 6 | 48 | 60 | 12 | 3 | 29 | 11 |
| Hospitality, Tourism and Sport | 3 | 3 | 4 | 2 | 23 | 25 | 56 | 29 | 13 | 17 | 41 | 23 |
| Information and Communication Technologies | 5 | †5 | 3 | 3 | 18 | †35 | 19 | 13 | 16 | †28 | 17 | 13 |
| Creative media & entertainment | 3 | †2 | 5 | 11 | 20 | †1 | 18 | 7 | 16 | †0 | 16 | 4 |
| Financial, Insurance & other Professional Services | 3 | 2 | 2 | 11 | 19 | 7 | 12 | 44 | 17 | 6 | 12 | 44 |
| Real estate & facilities management | 3 | †1 | 2 | 1 | 18 | †29 | 17 | 0 | 14 | †22 | 12 | 0 |
| Government services | 2 | 1 | 2 | 2 | 25 | 10 | 46 | 43 | 17 | 5 | 4 | 36 |
| Education | 1 | 2 | 1 | 1 | 16 | 6 | 6 | 16 | 12 | 2 | 5 | 11 |
| Health | 2 | 1 | 1 | 1 | 19 | 19 | 17 | 27 | 12 | 9 | 13 | 27 |
| Care | 3 | 1 | 3 | 3 | 16 | 19 | 20 | 13 | 9 | 16 | 13 | 3 |
| Total | 2 | 2 | 2 | 2 | 22 | 20 | 36 | 44 | 16 | 14 | 22 | 22 |
| *Weighted base* | 23,198,476 | 2,381,601 | 1,182,314 | 784,732 | 545,064 | 45,749 | 25,542 | 19,552 | 545,064 | 45,749 | 25,542 | 19,552 |
| *Unweighted base* | 2,345,213 | 201,868 | 178,922 | 90,690 | 43,960 | 3,186 | 2,999 | 1,759 | 43,960 | 3,186 | 2,999 | 1,759 |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012. Bases vary. Vacancies as a % of employment based on all employment. Hard-to-fill vacancies as a % of vacancies based on all vacancies. SSVs as a % of vacancies based on all vacancies.*
*† Treat figures with caution due to small unweighted establishment base size of 50-99 in Scotland.*

Table 5.2 indicates that there are over 29,000 current vacancies in the Information and communications technologies sector, five per cent of total vacancies (635,907) in the UK. Current vacancies are equivalent to five per cent of total employment in the sector, the highest proportion across all sectors. Across the whole economy the current number of vacancies is equivalent to two per cent of employment.

Hard to fill vacancies make up 19 per cent of all vacancies in the sector (compared to 23 per cent across the whole economy), and skill shortage vacancies comprise 17 per cent of all vacancies in the sector (16 per cent across the whole economy).

Where there are hard to fill vacancies in the sector (5,449), the vast majority (91 per cent) of these are skills shortage vacancies (4,937).

Reflecting the high proportion of employers in Scotland reporting hard to fill vacancies and skills shortage vacancies, the proportion of hard to fill vacancies as a proportion of vacancies in Scotland in the sector is particularly high in comparison to other nations with over a third (35 per cent)[20] of vacancies being reported as hard to fill in Scotland in comparison to 18 per cent in England, 19 per cent in Wales and 13 per cent in Northern Ireland (Table 5.3). Likewise, 28 per cent of all vacancies in the sector in Scotland[21] are considered to be skill shortage vacancies (16 per cent in England, 17 per cent in Wales and 13 per cent in Northern Ireland). This is different to the situation across all sectors where skills shortage vacancies are more likely to occur in Wales and Northern Ireland, comprising over a fifth (22 per cent) of all vacancies.

### 5.1.2 Nature of vacancies

Employers in the Information and communications technologies sector in the UK are more likely to have vacancies for Professionals and Associate Professionals than any other occupational group, with five per cent of employers in the sector saying they currently have vacancies for Professionals and four per cent with vacancies for Associate Professionals. This compares to just two per cent of employers across all sectors who have vacancies for Professionals and two per cent of employers who have vacancies for Associate Professionals.

[20] As Table 5.3 suggests, please treat this figure with caution.
[21] See footnote above.

Employers in Scotland are most likely to have vacancies for Machine Operatives (12 per cent of all employers in the sector in Scotland) followed by Professionals (eight per cent). In Wales four per cent of employers in the sector have vacancies for Professionals and four per cent have vacancies for Associate Professionals. In Northern Ireland, six per cent of employers in the sector have vacancies for Professionals and five per cent have vacancies for Associate Professionals.

Table 5.4 sets out the profile of vacancies by occupation in the sector. Of the 29,361 vacancies in the sector in the UK, nearly a third (32 per cent) are for Sales and customer service staff. A further 27 per cent of vacancies are for Professionals and 26 per cent for Associate professionals.

Although vacancies for Sales and customer service are most numerous, they only account for a small proportion of hard to fill vacancies in the sector (five per cent). Where vacancies are above average but there is a low level of hard to fill or skills shortage vacancies, as is the case for Sales and Customer Service vacancies in the sector, the UK Employment and Skills Almanac (Hay *et al.*, 2011) suggests this could be linked to retention and high staff turnover rather than skill deficiencies.

Over half of the vacancies (51 per cent) for Skilled Trade occupations are hard to fill. Likewise, vacancies for Professionals and Associate Professionals are also more likely to be hard to fill, accounting for 28 per cent of all Professional vacancies and 24 per cent of all Associate Professional vacancies.

Whilst 17 per cent of all vacancies in the sector are thought to be skill shortage vacancies (SSVs), vacancies are more likely to be concentrated in some occupational groups: half (50 per cent) of Skilled Trade occupation vacancies are SSVs, a quarter (25 per cent) of Professional vacancies are SSVs and just over a fifth (22 per cent) of Associate Professional vacancies are skill shortage vacancies.

In total, employers in the sector report nearly 5,000 skill shortage vacancies, with nearly nine in ten of these vacancies (88 per cent) being for skilled occupations: 41 per cent of the SSVs are in Professional occupations, 33 per cent in Associate Professional occupations and 14 per cent in Skilled Trade occupations

**Table 5.4: Profile of vacancies by occupation within the sector**

| | Vacancies | HTF vacancies | SSV | HTF vacancies as a % vacancies | SSV as a % vacancies | *Weighted base (number of vacancies)* | *Unweighted base (number of vacancies)* | *Weighted base (all vacancies)* | *Unweighted base (establishments reporting vacancies)* |
|---|---|---|---|---|---|---|---|---|---|
| Managers | * | * | * | * | * | * | * | * | * |
| Professionals | 7,873 | 2,184 | 2,002 | 28 | 25 | 7,873 | 650 | 3,973 | 283 |
| Associate professionals | 7,530 | 1,785 | 1,626 | 24 | 22 | 7,530 | 609 | 3,228 | 257 |
| Administrative/ clerical staff | 1,940 | 205 | 130 | 11 | 7 | 1,940 | 218 | 826 | 74 |
| Skilled trades occupations | 1,416 | 725 | 715 | 51 | 50 | 1,416 | 98 | 871 | 50 |
| Caring, leisure and other services staff | * | * | * | * | * | * | * | * | * |
| Sales and customer services staff | 9,515 | 266 | 181 | 3 | 2 | 9,515 | 1,116 | 543 | 56 |
| Machine operatives | * | * | * | * | * | * | * | * | * |
| Elementary staff | * | * | * | * | * | * | * | * | * |
| Unclassified staff | * | * | * | * | * | * | * | * | * |
| *Total* | 29,361 | 5,450 | 4,939 | 19 | 17 | 29,361 | 2,749 | 9,146 | 763 |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*
*Bases: All vacancies*
*Establishment bases provided for suppression reasons.*
** Data suppressed as unweighted establishment base < 25*

### 5.1.3 Staff retention

Staff retention gives an indication of the nature of the labour market, as movement of staff (not as a direct result of company downsizing or redundancy) could indicate: demand for skills with a more attractive working package or salary compensation elsewhere in the sector or staff dissatisfaction with the work or employment.

For the labour market as a whole in the UK, the Office for National Statistics report a decline in people leaving their main job from 4.5% in the second quarter of 1998 to just 2.4% of all workers in the same quarter of 2011 (ONS, 2011b). This suggests the labour market is less dynamic now with fewer people leaving and changing their job.

The majority of employers across the economy do not perceive they have retention problems with just five per cent across the UK (excluding Scotland) reporting difficulties retaining staff. Just four per cent of employers in the Information and communication technologies sector report retention issues, one percentage point less than the average across the whole economy (Table 5.5).

The proportion of Information and communication technologies employers reporting retention issues rises to seven per cent in Northern Ireland, where the average across the economy is four per cent, indicating that the labour market for the sector in Northern Ireland is more dynamic than average across the sector in England and Wales.

Across all sectors as a whole, the main reason reported by employers with retention issues for those difficulties is that not enough people are interested in doing this type of work (51 per cent of employers with retention problems in the UK excluding Scotland). In contrast, of those employers in the Information and communication technologies sector with retention difficulties, the most commonly reported reason for why they find it difficult to retain employees is that the wages offered are lower than those offered by other firms. This was reported by 52 per cent of those with retention difficulties.

Other common reasons for retention issues reported by employers in the sector include unattractive conditions of employment (38 per cent), lack of career progression (34 per cent), not enough people interested in doing this type of work (28 per cent) and long/unsocial hours (26 per cent). Too much competition from other employers was reported by 24 per cent of employers in the sector with retention issues as a reason why retention is difficult.

**Table 5.5: Employers with retention problems by sector and nation**

| | UK (excl. Scotland) | | England | | Wales | | Northern Ireland | |
|---|---|---|---|---|---|---|---|---|
| | Number | % | Number | % | Number | % | Number | % |
| Agriculture, forestry and fishing | 4,954 | 5 | 4,236 | 5 | 360 | 3 | 358 | 5 |
| Energy production and utilities | 555 | 5 | 484 | 5 | 62 | 8 | 9 | 2 |
| Manufacturing | 6,493 | 5 | 5,883 | 5 | 433 | 8 | 177 | 5 |
| Construction, building services, engineering and planning | 10,569 | 4 | 9,710 | 4 | 722 | 5 | 138 | 1 |
| Wholesale and retail trade | 18,192 | 4 | 16,682 | 4 | 891 | 4 | 619 | 4 |
| Transportation and storage | 5,676 | 5 | 5,240 | 5 | 321 | 8 | 115 | 5 |
| Hospitality, tourism and sport | 18,345 | 9 | 16,670 | 9 | 1,126 | 10 | 548 | 9 |
| Information and communication technologies | 3,084 | 4 | 2,948 | 4 | 57 | 3 | 79 | 7 |
| Creative media and entertainment | 5,303 | 4 | 4,891 | 4 | 306 | 7 | 106 | 5 |
| Financial, insurance & other professional services | 6,271 | 4 | 5,876 | 4 | 339 | 6 | 55 | 2 |
| Real estate and facilities management | 5,826 | 4 | 5,649 | 4 | 139 | 5 | 38 | 2 |
| Government services | 2,496 | 5 | 2,200 | 5 | 208 | 8 | 88 | 4 |
| Education | 2,925 | 5 | 2,493 | 5 | 267 | 8 | 165 | 5 |
| Health | 3,297 | 7 | 2,961 | 7 | 249 | 9 | 87 | 6 |
| Care | 5,134 | 6 | 4,615 | 6 | 327 | 7 | 191 | 6 |
| Not within scope | 6,810 | 6 | 6,476 | 6 | 247 | 6 | 87 | 3 |
| Whole Economy | 105,929 | 5 | 97,014 | 5 | 6,054 | 6 | 2,860 | 4 |
| *Weighted base* | 2,124,807 | | 1,960,298 | | 98,952 | | 65,558 | |
| *Unweighted base* | 85,069 | | 75,053 | | 6,012 | | 4,004 | |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*
*Base: All establishments in England, NI, Wales (question not asked in Scotland)*

In contrast to employers with retention difficulties across the economy as a whole (where the most common reaction to retention problems is not to take any measures to overcome retention difficulties), employers in the Information and communication technologies sector are most likely to offer higher pay or more incentives than normal to overcome these problems (30 per cent of establishments in the UK excluding Scotland who find it difficult to retain staff). Further training/development opportunities are also a common remedy, with 23 per cent of employers offering this in response to retention difficulties.

The majority of employers with retention difficulties feel it puts more strain on the management of existing staff in covering the shortage with 89 per cent of Information and communication technologies sector employers and 79 per cent of employers across all sectors with retention difficulties suggesting this as the impact of retention difficulties. Furthermore, more than half of all Information and communication technologies sector employers feel the impact of retention difficulties is a loss of business to competitors (52 per cent) and also restricts business development activities (51 per cent).

### 5.1.4 Recruitment channels

Analysis of the Employer Perspectives survey 2010 (Shury *et al.*, 2011), shows that the most common channels used for recruitment by employers in the Information and communication technologies sector is Jobcentre Plus / jobs and benefits offices, although usage of this channel by employers in the sector (31 per cent of recruiting employers) is not as common as across employers as a whole (39 per cent). Word of mouth/personal recommendation (21 per cent) and online/web-based recruitment agencies (20 per cent) were also common recruitment channels. In contrast to employers overall (28 per cent), local newspapers are less frequently used by recruiting employers in the Information and communication technologies sector (19 per cent). The use of recruitment agencies is higher in the sector than amongst employers in general[22].

Just over one in five employers (21 per cent) in the Information and communication technologies sector have recruited someone into their first job (Table 5.6). Employers in Northern Ireland are slightly more likely to have recruited from this source (24 per cent), whereas employers in the sector in Wales are less likely to have done so (12 per cent). Regardless of location across the UK, employers in the sector are slightly less likely than is average across the economy to recruit young people to their first job.

There is a continued decline in the numbers of young people studying technology at school and university, and a pervasive gender imbalance (a much greater proportion of males) which means sector recruitment misses out on a large proportion of the talent pool. Graduates are an important source of recruits for the sector – 55 per cent of new graduates entering IT occupations have studied Computing at university. However, there has been a decline in the number of young people studying IT related subjects and gender imbalance is prevalent across IT related courses, and this is worsening over time throughout the education system. Data from UCAS[23] shows a 33 per cent reduction in applicants to Computing degree courses since 2002 and that just 13 per cent of applicants in 2010 are female. The proportion of females taking Computing A-level remains low at 9 per cent (JCQ, 2011). Current IT related education is being questioned in terms of quality, delivery and relevance not least because of this continuing decline in take up, gender imbalance and mismatch to sector employer requirements.

[22] Information and communication technologies: Base: All recruiting employers. Unweighted responses 226. Weighted responses 16,850. All sectors: Base All recruiting employers: Unweighted responses 9,785 Weighted responses: 774,850.
[23] UCAS statistics online. Available: http://www.ucas.ac.uk/about_us/stat_services/stats_online/

These factors combine with a general poor understanding of IT-related careers amongst students to make the recruitment market place more competitive for employers in the sector who need to attract the required quantity and quality of new recruits.

**Table 5.6: Recruitment of people in first jobs by sector and nation in 2011**

| | UK | | England | | Scotland | | Wales | | Northern Ireland | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Number | % | Number | % | Number | % | Number | % | Number | % |
| Agriculture, forestry & fishing | 21,769 | 20 | 14,815 | 19 | †2,725 | †20 | 1,183 | 11 | 3,046 | 43 |
| Energy production & utilities | 2,660 | 21 | 2,080 | 21 | 322 | 25 | 197 | 24 | 61 | 11 |
| Manufacturing | 31,047 | 24 | 26,304 | 23 | 2,442 | 26 | 1,437 | 27 | 863 | 23 |
| Construction, building services engineering and planning | 66,741 | 22 | 55,108 | 21 | 6,498 | 30 | 2,973 | 23 | 2,161 | 20 |
| Wholesale & retail trade | 120,702 | 26 | 101,878 | 25 | 9,862 | 28 | 5,297 | 25 | 3,665 | 26 |
| Transportation and storage | 18,432 | 15 | 16,069 | 15 | 1,496 | 19 | 476 | 11 | 391 | 17 |
| Hospitality, tourism and sport | 70,608 | 32 | 59,071 | 33 | 6,164 | 28 | 3,583 | 32 | 1,789 | 31 |
| Information and communication technologies | 14,960 | 21 | 13,659 | 21 | †794 | †22 | 241 | 12 | 266 | 24 |
| Creative media & entertainment | 31,843 | 22 | 28,704 | 23 | †1,573 | †14 | 1,082 | 23 | 484 | 24 |
| Financial, insurance & other professional services | 37,955 | 22 | 34,274 | 22 | 1,679 | 20 | 1,230 | 21 | 773 | 23 |
| Real estate & facilities management | 23,229 | 14 | 21,827 | 15 | †699 | †6 | 475 | 16 | 229 | 12 |
| Government services | 10,268 | 19 | 8,375 | 19 | 1,084 | 20 | 378 | 14 | 431 | 21 |
| Education | 28,641 | 44 | 24,132 | 45 | 1,812 | 41 | 1,450 | 45 | 1,247 | 38 |
| Health | 13,817 | 26 | 11,547 | 26 | 938 | 29 | 822 | 29 | 510 | 34 |
| Care | 26,557 | 30 | 22,175 | 31 | 1,955 | 23 | 1,481 | 34 | 947 | 29 |
| All economy | 552,385 | 24 | 467,925 | 24 | 43,211 | 25 | 23,664 | 24 | 17,584 | 27 |
| *Weighted base* | *2,124,807* | | *1,960,298* | | *175,115* | | *98,952* | | *65,558* | |
| *Unweighted base* | *85,069* | | *75,053* | | *2,503* | | *6,012* | | *4,004* | |

*Source:* UK Commission's Employer Skills Survey 2011, Davies et al, 2012. *Base: all establishments. NB: Scottish employers were asked a slightly different question; results cannot be compared directly to UK, England, Wales, or Northern Ireland figures. Scottish employers have not been included in the UK base. † Treat figures with caution due to small unweighted base size of 50-99 establishments in Scotland*

## 5.2 Extent and nature of skills issues

This section explores the reasons for hard to fill vacancies and skills shortages, the impact these recruitment difficulties have on employers and how employers are responding to these issues. The nature of the skills lacking in skill shortage vacancies is outlined as well as skills that need improving where there are skills gaps in the existing workforce.

### 5.2.1 Extent of hard to fill vacancies and skills shortages

Hard to fill vacancies are primarily caused by a low number of applicants with the required skills, a lack of work experience or not enough people interested in doing this type of work (sector/job attraction). Whilst these causes are the top three for both employers in the Information and communication technologies sector and employers across the economy as a whole, the proportion of employers in the sector with hard to fill vacancies reporting a low number of applicants with the required skills (64 per cent) and lack of work experience (36 per cent), the causes of hard to fill vacancies is higher than across the economy as a whole (40 per cent and 21 per cent respectively).

The impact of hard to fill vacancies on the employer, as set out in Table 5.7) is primarily an increase in workload for other staff covering for the vacancy that cannot be easily filled - nearly nine in ten (89 per cent) employers in the sector with hard to fill vacancies report this as an adverse effect. The other main impacts of hard to fill vacancies are a delay in developing new products or services (68 per cent) and losing business or orders to competitors (50 per cent). This is in contrast to employers as a whole, where difficulties meeting customer services objectives is seen as the second most likely effect of hard to fill vacancies.

In response to their hard to fill vacancies, more than half (52 per cent) of employers in the sector report they use new recruitment methods or channels to overcome the issue (see Table 5.8), a much higher proportion than is the case across employers as a whole (30 per cent). Increasing advertising/recruitment spend is used by 37 per cent of employers in the sector in response to hard to fill vacancies compared to 39 per cent of employers as a whole.

**Table 5.7: Impact of having hard-to-fill vacancies**

| | UK | | England | |
|---|---|---|---|---|
| | Number | % | Number | % |
| Increase workload for other staff | 3,196 | 89 | 2,659 | 87 |
| Have difficulties meeting customer services objectives | 1,392 | 39 | 1,193 | 39 |
| Lose business or orders to competitors | 1,795 | 50 | 1,516 | 50 |
| Delay developing new products or services | 2,443 | 68 | 1,977 | 65 |
| Experience increased operating costs | 1,615 | 45 | 1,391 | 46 |
| Have difficulties meeting quality standards | 646 | 18 | 597 | 20 |
| Have difficulties introducing new working practices | 1,187 | 33 | 1,068 | 35 |
| Outsource work | 1,416 | 39 | 1,326 | 43 |
| Withdraw from offering certain products or services altogether | 1,145 | 32 | 1,054 | 35 |
| Have difficulties introducing technological change | 1,447 | 40 | 1,354 | 44 |
| None | 152 | 4 | 144 | 5 |
| Don't know | 9 | ** | 9 | ** |
| *Weighted base* | 3,596 | | 3,050 | |
| *Unweighted base* | 225 | | 201 | |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*
*Base: All employers with hard to fill vacancies*
**Data unavailable for Scotland, Wales and Northern Ireland as unweighted base < 25 (<50 for Scotland)*
*** Denotes a figures of greater than 0% but less than 0.5%*
*NB Column percentages sum to more than 100 since multiple responses were allowed.*

**Table 5.8: Measures taken by employers to overcome hard-to-fill vacancies**

| | UK | | England | |
|---|---|---|---|---|
| | Number | % | Number | % |
| Increasing advertising / recruitment spend | 1,318 | 37 | 1,081 | 35 |
| Using NEW recruitment methods or channels | 1,856 | 52 | 1,619 | 53 |
| Redefining existing jobs | 592 | 16 | 550 | 18 |
| Increasing the training given to your existing workforce | 117 | 3 | 109 | 4 |
| Increasing / expanding trainee programmes | 240 | 7 | 232 | 8 |
| Being prepared to offer training to less well qualified recruits | 166 | 5 | 159 | 5 |
| Bringing in contractors to do the work, or contracting it out | 128 | 4 | 99 | 3 |
| Increasing salaries | 119 | 3 | 101 | 3 |
| Recruiting workers who are non-UK nationals | 106 | 3 | 98 | 3 |
| Making the job more attractive e.g. recruitment incentives, enhanced T&Cs, working hours | 36 | 1 | 36 | 1 |
| Other | 42 | 1 | 36 | 1 |
| Nothing | 382 | 11 | 355 | 12 |
| Don't know | 139 | 4 | 139 | 5 |
| *Weighted base* | 3,596 | | 3,050 | |
| *Unweighted base* | 225 | | 201 | |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*
*Base: All employers with hard to fill vacancies*
**Data unavailable for Scotland, Wales and Northern Ireland as unweighted base < 25 (<50 for Scotland)*
*** Denotes a figures of greater than 0% but less than 0.5%*
*NB Column percentages sum to more than 100 since multiple responses were allowed.*

A skills shortage vacancy (SSV) is used to describe vacancies that are ‘hard to fill’ specifically because of a lack of skills, work experience or qualifications in the applicants for the role.

As outlined in section 5.1, there are 3,386 employers with 4,937 skill shortage vacancies in the Information and communication technologies sector in 2010. This equates to 17 per cent of all vacancies in the sector. Skill shortage vacancies occur predominantly in skilled occupations such as Professional, Associate Professional and Skilled Trade occupations.

Skills lacking in skill shortage vacancies across the UK are predominantly job specific skills, technical and practical skills, planning and organisation skills and customer handling skills (Table 5.9). In the Information and communication technologies sector (see Table 5.10), job specific skills are also the most common skill thought to be lacking in skill shortage vacancies. However, advanced IT or software skills are the next most common skills lacking, reflecting the volume of technical IT occupations in the sector and that these occupations are overwhelmingly in the skilled occupational groups where skills shortage vacancies most often occur. Technical and practical skills and planning and organisation skills are also commonly lacking in applicants for skill shortage vacancies.

**Table 5.9: Skills lacking in Skills Shortage Vacancies – whole economy**

| | UK | | England | | Scotland | | Wales | | Northern Ireland | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Number | % | Number | % | Number | % | Number | % | Number | % |
| Basic computer literacy / using IT | 16,832 | 16 | 13,842 | 16 | * | * | 2,001 | 35 | 476 | 11 |
| Advanced IT or software skills | 21,988 | 21 | 18,190 | 21 | 1,160 | 18 | 1,976 | 35 | 661 | 15 |
| Oral communication skills | 39,113 | 38 | 33,997 | 39 | 1,910 | 30 | 1,993 | 35 | 1,213 | 28 |
| Written communication skills | 33,859 | 33 | 28,515 | 33 | 2,659 | 41 | 1,381 | 24 | 1,305 | 30 |
| Customer handling skills | 41,349 | 40 | 33,863 | 39 | 3,056 | 47 | 2,977 | 53 | 1,453 | 33 |
| Team working skills | 33,728 | 33 | 27,092 | 31 | 1,877 | 29 | 3,315 | 59 | 1,444 | 33 |
| Written Welsh language skills | 1,574 | 2 | 0 | 0 | 0 | 0 | 1,574 | 28 | 0 | 0 |
| Oral Welsh language skills | 1,680 | 2 | 0 | 0 | 0 | 0 | 1,680 | 30 | 0 | 0 |
| Foreign language skills | 16,773 | 16 | 14,601 | 17 | 1,451 | 22 | 385 | 7 | 336 | 8 |
| Problem solving skills | 37,882 | 37 | 32,338 | 37 | 2,453 | 38 | 2,209 | 39 | 882 | 20 |
| Planning and Organisation skills | 42,431 | 41 | 35,377 | 41 | 2,867 | 44 | 2,372 | 42 | 1,815 | 41 |
| Strategic Management skills | 29,853 | 29 | 24,828 | 29 | 2,122 | 33 | 1,564 | 28 | 1,340 | 31 |
| Numeracy skills | 26,775 | 26 | 23,194 | 27 | 1,866 | 29 | 1,149 | 20 | 567 | 13 |
| Literacy skills | 30,151 | 29 | 25,002 | 29 | 1,674 | 26 | 2,490 | 44 | 985 | 22 |
| Office admin skills | 17,559 | 17 | 15,320 | 18 | 967 | 15 | 797 | 14 | 475 | 11 |
| Technical or practical skills | 47,992 | 46 | 40,313 | 46 | 3,711 | 57 | 2,571 | 46 | 1,397 | 32 |
| Job specific skills | 68,385 | 66 | 56,716 | 65 | 5,064 | 78 | 4,401 | 78 | 2,204 | 50 |
| Experience/lack of product knowledge | 1,668 | 2 | 1,523 | 2 | 135 | 2 | 9 | 0 | 0 | 0 |
| Personal attributes e.g. motivation, work ethos, common sense, initiative, reliability, commitment... | 2,743 | 3 | 2,385 | 3 | 314 | 5 | 17 | 0 | 26 | 1 |
| Other | 911 | 1 | 835 | 1 | 0 | 0 | 13 | 0 | 62 | 1 |
| No particular skills difficulties | 7,129 | 7 | 5,588 | 6 | 148 | 2 | 135 | 2 | 1,258 | 29 |
| Don't know | 3,777 | 4 | 3,459 | 4 | 102 | 2 | 124 | 2 | 93 | 2 |
| Weighted base | 103,453 | | 86,950 | | 6,463 | | 5,650 | | 4,390 | |
| Unweighted base | 7,197 | | 5,959 | | 367 | | 482 | | 389 | |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*
*Base: All skills shortage vacancies*
*† Treat figures with caution due to small unweighted establishment base size of 50-99 in Scotland.*
*NB: Employment weight. Column percentages sum to more than 100 since multiple responses were allowed.*

**Table 5.10: Skills lacking in Skills Shortage Vacancies (sector)**

| | UK | | England | |
|---|---|---|---|---|
| | Number | % | Number | % |
| Basic computer literacy / using IT | 488 | 10 | 444 | 10 |
| Advanced IT or software skills | 2,617 | 53 | 2,145 | 49 |
| Oral communication skills | 1,801 | 36 | 1,750 | 40 |
| Written communication skills | 1,831 | 37 | 1,686 | 38 |
| Customer handling skills | 2,035 | 41 | 1,776 | 40 |
| Team working skills | 1,167 | 24 | 1,123 | 26 |
| Written Welsh language skills | 6 | ** | 0 | 0 |
| Oral Welsh language skills | 6 | ** | 0 | 0 |
| Foreign language skills | 955 | 19 | 825 | 19 |
| Problem solving skills | 2,210 | 45 | 1,835 | 42 |
| Planning and Organisation skills | 2,298 | 47 | 1,913 | 44 |
| Strategic Management skills | 1,227 | 25 | 1,106 | 25 |
| Numeracy skills | 1,103 | 22 | 804 | 18 |
| Literacy skills | 1,174 | 24 | 1,042 | 24 |
| Office admin skills | 589 | 12 | 391 | 9 |
| Technical or practical skills | 2,424 | 49 | 2,022 | 46 |
| Job specific skills | 3,931 | 80 | 3,446 | 79 |
| Experience/lack of product knowledge | 109 | 2 | 109 | 2 |
| Personal attributes e.g. motivation, work ethos, common sense, initiative, reliability, commitment, punctuality, flexibility | 51 | 1 | 51 | 1 |
| Other | 30 | 1 | 30 | 1 |
| No particular skills difficulties | 127 | 3 | 127 | 3 |
| Don't know | 93 | 2 | 82 | 2 |
| *Weighted base* | *4,937* | | *4,389* | |
| *Unweighted base* | *360* | | *333* | |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*
*Base: All skills shortage vacancies*
**Data unavailable for Scotland, Wales and Northern Ireland as unweighted establishment base < 25 (<50 for Scotland)*
*** Denotes a figures of greater than 0% but less than 0.5%*
*NB: Employment weight. Column percentages sum to more than 100 since multiple responses were allowed.*

### 5.2.2 Skills that need improving

Skills gaps within the existing workforce are evident when employees are not fully proficient in their job.

As shown in Table 5.12, nearly one in ten (nine per cent) employers in the sector report skills gaps in their workforce. This is fewer than across the economy as a whole where 13 per cent of employers report skills gaps in the workforce and is one of the lowest rates across all sectors. However, skills gaps affect a slightly higher proportion of the sector workforce than the average across the economy. Six per cent of employees in the sector (34,775) currently have skills gaps compared to five per cent of employees with skills gaps across the economy as a whole.

Employers in the sector in Wales (14 per cent) and Scotland (ten per cent) are more likely to report the existence of skills gaps than employers in England or Northern Ireland (Table 5.11). However, the proportion of the workforce that has skills gaps is lower than average (six per cent) in: Wales at two per cent equating to 400 employees; Northern Ireland at four per cent (460 employees); and Scotland, five per cent or 1,646 employees.

**Table 5.11: Employers and employees with skills gaps within sector by nation**

| | UK | | England | | Scotland | | Wales | | Northern Ireland | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Number | % | Number | % | Number | % | Number | % | Number | % |
| Employers with skills gaps | 6,647 | 9 | 5,899 | 9 | 375 | 10 | 272 | 14 | 101 | 9 |
| Employees with skills gaps | 34,775 | 6 | 32,269 | 6 | 1,646 | 5 | 400 | 2 | 460 | 4 |
| *Employer weighted base* | *72,281* | | *65,659* | | *3,581* | | *1,950* | | *1,091* | |
| *Employer unweighted base* | *2,510* | | *2,262* | | *56* | | *111* | | *81* | |
| *Employment weighted base* | *614,641* | | *555,147* | | *30,382* | | *18,801* | | *10,311* | |
| *Employment unweighted base* | *53,681* | | *46,987* | | *2,446* | | *2,960* | | *1,288* | |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*
*Bases: All establishments, all employees*
*Treat figures for Scotland with caution due to small unweighted establishment base size of 50-99*

**Table 5.12: Employers and employees with skills gaps by sector**

| | Employers with skills gaps | | | | Employees with skills gaps | | | |
|---|---|---|---|---|---|---|---|---|
| | Number | % | *Weighted base* | *Unweighted base* | Number | % | *Weighted base* | *Unweighted base* |
| Agriculture, forestry and fishing | 10,665 | 10 | 110,220 | 1,547 | 20,149 | 4 | 466,870 | 19,506 |
| Energy production and utilities | 2,000 | 16 | 12,610 | 1,614 | 17,250 | 5 | 333,050 | 47,228 |
| Manufacturing | 21,520 | 16 | 130,709 | 7,776 | 148,007 | 6 | 2,541,188 | 291,593 |
| Construction, building services, engineering and planning | 31,925 | 10 | 306,403 | 8,961 | 99,184 | 4 | 2,235,270 | 150,111 |
| Wholesale and retail trade | 72,233 | 15 | 470,200 | 16,150 | 300,344 | 6 | 4,674,684 | 514,820 |
| Transportation and storage | 11,540 | 9 | 122,058 | 4,735 | 55,391 | 4 | 1,320,126 | 114,658 |
| Hospitality, tourism and sport | 43,000 | 20 | 220,055 | 11,318 | 193,549 | 8 | 2,313,487 | 258,524 |
| Information and communication technologies | 6,647 | 9 | 72,281 | 2,510 | 34,775 | 6 | 614,641 | 53,681 |
| Creative media and entertainment | 9,155 | 6 | 143,772 | 3,762 | 41,091 | 4 | 1,086,978 | 87,953 |
| Financial, insurance & other professional services | 20,954 | 12 | 170,887 | 5,343 | 92,599 | 5 | 2,052,039 | 112,945 |
| Real estate and facilities management | 13,185 | 8 | 166,486 | 3,424 | 64,302 | 5 | 1,183,601 | 91,204 |
| Government services | 7,980 | 15 | 54,687 | 2,605 | 94,735 | 5 | 1,780,058 | 223,796 |
| Education | 12,304 | 19 | 64,540 | 5,439 | 94,884 | 4 | 2,538,545 | 387,221 |
| Health | 9,776 | 19 | 52,370 | 3,398 | 101,986 | 5 | 2,004,436 | 219,765 |
| Care | 14,886 | 17 | 87,899 | 4,763 | 78,458 | 5 | 1,504,729 | 157,681 |
| Whole economy | 300,941 | 13 | 2,299,921 | 87,572 | 1,489,540 | 5 | 27,547,123 | 2,816,693 |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*
*Bases: All establishments, all employees*

Table 5.13 shows that, as a proportion of employment, Administrative/clerical staff have the highest proportion of skills gaps (8 per cent). However, the largest volume of employees with skills gaps is to be found in Professional occupations where there are 9,414 employees with skills gaps, seven per cent of those working in the occupation. This is in contrast to the UK workforce as a whole where Sales and Customer Service and Elementary occupations experience the highest proportion of skills gaps. Managerial occupations in the sector have the lowest proportion of skills gaps, with just three per cent of Managers having skills gaps, equivalent to the proportion of Managers with skills gaps across the whole economy.

**Table 5.13: Skills gaps in the sector by occupation**

| | Total employment | Number with skills gaps | % with skills gaps |
|---|---|---|---|
| Managers | 157,739 | 4,947 | 3 |
| Professionals | 143,640 | 9,414 | 7 |
| Associate professionals | 85,729 | 4,340 | 5 |
| Administrative/clerical staff | 72,427 | 5,458 | 8 |
| Skilled trades occupations | 22,212 | 1,343 | 6 |
| Caring, leisure and other services staff | * | * | * |
| Sales and customer services staff | 85,164 | 5,722 | 7 |
| Machine operatives | * | * | * |
| Elementary staff | * | * | * |
| Weighted base | 614,641 | 34,775 | 6 |
| Unweighted base | 53,681 | 3,265 | |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*
*Base: All employees*
** suppressed due to unweighted establishment base <25*

The cause of skills gaps is reported by 44 per cent of employers in the sector to be due to the employees being new to the role, as is the case for employers across the economy as a whole (47 per cent). Employers in the sector also report common reasons for skills gaps as staff lacking motivation (40 per cent of employers) and that staff have been on training but their performance has not improved sufficiently (39 per cent), suggesting the training had not achieved its purpose.

Across the whole economy in the UK, job specific skills are the skill most lacking where there are skills gaps. In the Information and communication technologies sector, planning and organisation skills; problem solving skills; job specific skills; written communication skills; and customer handling skills were thought to be the most lacking where skills gaps exist.

These skills, missing where the existing workforce has skills gaps, vary slightly to the skills lacking where employers are recruiting and experience skill shortage vacancies, where technical and practical and advanced IT/software skills are also highlighted by employers as missing in applicants.

Skills lacking in the workforce vary slightly by nation and differences are highlighted in italics below and set out in Table 5.14.

In England the top five skills lacking where skills gaps occur is as across the UK.

In Scotland, job specific skills; problem solving skills; planning and organisation skills; customer handling skills and *Technical or practical skills* were thought to be the most lacking where skills gaps exist.

In Wales, job specific skills; *strategic management skills*; planning and organisation skills; customer handling skills; and *technical or practical skills*; were thought to be the most lacking where skills gaps exist. Welsh language skills were thought to be lacking in around a third of skills gaps in the sector (written welsh language skills in 32 per cent of skills gaps and oral welsh language skills in 30 per cent of gaps) in comparison to the average for all sectors in Wales of written welsh languages skills in 11 per cent of gaps and oral welsh in 12 per cent of gaps.

In Northern Ireland, *team working skills*, problem solving skills, planning and organisation skills; job specific skills and written communication skills were thought to be the most lacking where skills gaps exist.

**Table 5.14: Top five reported skills lacking in the workforce, by nation (ranked)**

| | All sector | Information and communication technologies sector | | | | |
|---|---|---|---|---|---|---|
| Rank | UK | UK | England | Scotland | Wales | Northern Ireland |
| 1 | Job specific | Planning and organisation | Planning and organisation | Job specific | Job specific | *Team working* |
| 2 | Planning and organisation | Problem solving | Problem solving | Problem solving | *Strategic Management* | Problem solving |
| 3 | Customer handling | Job specific | Job specific | Planning and organisation | Planning and organisation | Planning and organisation |
| 4 | Team working | Written communication | Written communication | Customer handling | Customer handling | Job specific |
| 5 | Problem solving | Customer handling | Customer handling | *Technical or practical* | *Technical or practical* | Written communication |
| *Weighted base* | 1,489,540 | 34,775 | 32,269 | 1,646 | 400 | 460 |
| *Unweighted base* | 166,795 | 3,265 | 2,996 | 157 | 50 | 62 |

*Source: UK Commission's Employer Skills Survey 2011, Davies et al, 2012*
*Base: All skills gaps followed up*
*Treat results for Scotland with caution due to small unweighted establishment base size of 50-99.*

Specific gaps in the sector include programme, project and supplier management (particularly for Managers and Professionals), Service management and delivery (for Managers and Associate Professional and Technical staff e.g. helpdesk, operations technicians). Customer handling skills including understanding customer requirements are increasingly required by those working in Software Professional and Operations Technician roles. Technical and specific technology skills gaps are most likely to occur in Software Professional and Associate Professional (operations, helpdesk) roles although Managers and Sales occupations also need a level of technical knowledge which can be a gap area.

As is the case for employers across the economy as a whole, the majority of employers in the sector (70 per cent) report that, where skills gaps have had an adverse impact on the performance of the business, it causes an increase in workload for other staff. Increasing operating costs are reported by 45 per cent of employers as a consequence of skills gaps (Table 5.15).

To overcome skills gaps the majority of employers (82 per cent), across all sectors, will increase training activity, or spend or increase/expand their trainee programmes. More supervision of staff (62 per cent) and more staff appraisals (55 per cent) are also common steps to try and address skills gaps in the workforce (Table 5.16).

Similarly, in the Information and communication technologies sector, increasing training activity, or spend (82 per cent), more supervision of staff (67 per cent) and more staff appraisals (58 per cent) are the most common actions employers take to address skills gaps in the workforce (Table 5.17).

Recruiting workers who are non-UK nationals is marginally more common in the sector than across all sectors, with 13 per cent of employers with skills gaps who have taken steps to improve the proficiency or skills of these staff or have plans to do so said they have would take this action compared to 10 per cent across the whole economy.

**Table 5.15: Consequences of skills gaps**

| | UK | | England | |
|---|---|---|---|---|
| | Number | % | Number | % |
| Increase workload for other staff | 2,981 | 70 | 2,673 | 69 |
| Increase operating costs | 1,917 | 45 | 1,801 | 47 |
| Have difficulties meeting quality standards | 1,689 | 40 | 1,580 | 41 |
| Have difficulties introducing new working practices | 1,131 | 26 | 1,027 | 27 |
| Lose business or orders to competitors | 1,286 | 30 | 1,230 | 32 |
| Delay developing new products or services | 1,677 | 39 | 1,578 | 41 |
| Outsource work | 964 | 23 | 825 | 21 |
| No particular problems / None of the above | 308 | 7 | 308 | 8 |
| Don't know | 24 | 1 | 24 | 0 |
| *Weighted base* | 4,274 | | 3,848 | |
| *Unweighted base* | 306 | | 277 | |

*Source: UK Commission's Employer Skills Survey 2011, UKCES, 2011*
*Base: All employers with skills gaps that have impact on establishment performance*
**Data unavailable for Scotland, Wales and Northern Ireland as unweighted establishment base < 25 (<50 for Scotland)*
*** Denotes a figures of greater than 0% but less than 0.5%*
*NB: Column percentages sum to more than 100 since multiple responses were allowed.*

**Table 5.16: Steps employers have taken to overcome skills gaps (all sector)**

| | UK | | England | | Scotland | | Wales | | Northern Ireland | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Number | % | Number | % | Number | % | Number | % | Number | % |
| Increase training activity / spend or increase/expand trainee programmes | 185,527 | 82 | 155,451 | 82 | 3,822 | 79 | 18,002 | 83 | 8,253 | 86 |
| More supervision of staff | 139,442 | 62 | 116,865 | 62 | 3,186 | 66 | 13,381 | 62 | 6,009 | 62 |
| More staff appraisals / performance reviews | 123,245 | 55 | 103,336 | 55 | 2,939 | 61 | 12,001 | 55 | 4,968 | 51 |
| Implementation of mentoring / buddying scheme | 113,645 | 50 | 94,041 | 50 | 2,350 | 49 | 12,376 | 57 | 4,878 | 51 |
| Reallocating work | 76,053 | 34 | 62,381 | 33 | 1,952 | 41 | 7,876 | 36 | 3,844 | 40 |
| Changing working practices | 69,850 | 31 | 59,408 | 31 | 1,499 | 31 | 6,406 | 29 | 2,537 | 26 |
| Increase recruitment activity / spend | 33,319 | 15 | 28,747 | 15 | 762 | 16 | 2,386 | 11 | 1,424 | 15 |
| Recruiting workers who are non-UK nationals | 21,589 | 10 | 18,782 | 10 | 572 | 12 | 1,373 | 6 | 862 | 9 |
| Other | 3,156 | 1 | 2,742 | 1 | ** | ** | 221 | 1 | 69 | 1 |
| Nothing | 3,541 | 2 | 2,736 | 1 | ** | ** | 617 | 3 | 152 | 2 |
| Don't know | 348 | ** | 322 | 0 | 0 | 0 | 0 | 0 | 25 | 0 |
| *Weighted base* | *225,379* | | *189,191* | | *21,730* | | *9,650* | | *4,807* | |
| *Unweighted base* | *16,506* | | *14,313* | | *655* | | *1,074* | | *464* | |

*Source: UK Commission's Employer Skills Survey 2011, UKCES, 2011*
*Base: All employers with skills gaps who have taken steps to improve the proficiency or skills of these staff or have plans to do so*
*** Denotes a figures of greater than 0% but less than 0.5%*
*NB: Column percentages sum to more than 100 since multiple responses were allowed.*

**Table 5.17: Steps employers in the sector have taken to overcome skills gaps**

| | UK | | England | |
|---|---|---|---|---|
| | Number | % | Number | % |
| Increase training activity / spend or increase/expand trainee programmes | 3,825 | 82 | 3,278 | 80 |
| More supervision of staff | 3,145 | 67 | 2,832 | 69 |
| More staff appraisals / performance reviews | 2,714 | 58 | 2,418 | 59 |
| Implementation of mentoring / buddying scheme | 2,406 | 52 | 2,094 | 51 |
| Reallocating work | 1,891 | 41 | 1,644 | 40 |
| Changing working practices | 1,381 | 30 | 1,295 | 32 |
| Increase recruitment activity / spend | 590 | 13 | 547 | 13 |
| Recruiting workers who are non-UK nationals | 602 | 13 | 588 | 14 |
| Other | 38 | 1 | 38 | 1 |
| Nothing | 30 | 1 | 30 | 1 |
| Don't know | 30 | 1 | 30 | 1 |
| *Weighted base* | *4,662* | | *4,105* | |
| *Unweighted base* | *372* | | *330* | |

*Source: UK Commission's Employer Skills Survey 2011, UKCES, 2011*
*Base: All employers with skills gaps who have taken steps to improve the proficiency or skills of these staff or have plans to do so*
**Data unavailable for Scotland, Wales and Northern Ireland as unweighted base < 25*
*NB: Column percentages sum to more than 100 since multiple responses were allowed.*

## 5.3 Extent of under-employment

This section sets out evidence of under-employment in the workforce. Under-employment is apparent where the qualifications and skills possessed by employees are not fully utilised in their current employment. The UKCES define under-employment in terms of individuals being either over qualified (where the qualifications an individual has are higher than is needed to get into their job) or over skilled (where there is little opportunity to use their past experience, skill or abilities in their job).

In the Information and communication technologies sector, 47 per cent of employers say they have (fully proficient) employees who are over qualified and over skilled – that is, the employees have both qualifications and skills that are more advanced than required for their current job role (Table 5.18). This is similar to the UK average where 49 per cent of employers say they have some employees who are over qualified or over skilled.

Whilst nearly half of employers report there is under-employment in their businesses, in terms of the proportion of the workforce that is over qualified or over skilled, this is estimated to be just 16 per cent of the workforce across all sectors. Again, the Information and communication technologies sector is around average with 15 per cent (93,637) of the workforce estimated to be 'over qualified' and 'over skilled'. The highest incidence of under-employment is in the Hospitality, Tourism and Sport sector where nearly a quarter (24 per cent) of the workforce is over qualified and over skilled.

Employees in the sector in Scotland (22 per cent of the workforce) and Northern Ireland (18 per cent of the workforce) are much more likely to be over qualified or over skilled in comparison to those in England (15 per cent) and Wales (13 per cent).

The Information and communication technologies sector is highly skilled with 55 per cent of the workforce educated to degree level or higher. In addition, over three quarters (77 per cent) of the workforce are employed as Managers or in Professional or Associate Professional or Technical occupations. It appears from the evidence of skills utilisation, over-qualification and over-skilling, that the skills of the workforce are, in general, being utilised and that under-employment is not a significant issue.

**Table 5.18: Extent to which workforce is 'over qualified' and 'over skilled' by sector**

| | Employers with employees who are over qualified and over skilled | | | | Employees who are over qualified and over skilled | | | |
|---|---|---|---|---|---|---|---|---|
| | Number | % | *Weighted base* | *Unweighted base* | Number | % | *Weighted base* | *Unweighted base* |
| Agriculture, forestry and fishing | 42,111 | 38 | 110,220 | 1,547 | 88,613 | 19 | 466,870 | 19,506 |
| Energy production and utilities | 5,458 | 43 | 12,610 | 1,614 | 43,319 | 13 | 333,050 | 47,228 |
| Manufacturing | 56,009 | 43 | 130,709 | 7,776 | 252,633 | 10 | 2,541,188 | 291,593 |
| Construction, building services, engineering and planning | 129,922 | 42 | 306,403 | 8,961 | 369,923 | 17 | 2,235,270 | 150,111 |
| Wholesale and retail trade | 241,146 | 51 | 470,200 | 16,150 | 846,216 | 18 | 4,674,684 | 514,820 |
| Transportation and storage | 61,038 | 50 | 122,058 | 4,735 | 202,809 | 15 | 1,320,126 | 114,658 |
| Hospitality, tourism and sport | 131,526 | 60 | 220,055 | 11,318 | 566,562 | 24 | 2,313,487 | 258,524 |
| Information and communication technologies | 33,764 | 47 | 72,281 | 2,510 | 93,637 | 15 | 614,641 | 53,681 |
| Creative media and entertainment | 66,845 | 46 | 143,772 | 3,762 | 205,573 | 19 | 1,086,978 | 87,953 |
| Financial, insurance & other professional services | 76,826 | 45 | 170,887 | 5,343 | 312,906 | 15 | 2,052,039 | 112,945 |
| Real estate and facilities management | 81,744 | 49 | 166,486 | 3,424 | 217,791 | 18 | 1,183,601 | 91,204 |
| Government services | 29,384 | 54 | 54,687 | 2,605 | 256,006 | 14 | 1,780,058 | 223,796 |
| Education | 34,623 | 54 | 64,540 | 5,439 | 341,455 | 13 | 2,538,545 | 387,221 |
| Health | 23,566 | 45 | 52,370 | 3,398 | 225,183 | 11 | 2,004,436 | 219,765 |
| Care | 47,114 | 54 | 87,899 | 4,763 | 258,385 | 17 | 1,504,729 | 157,681 |
| Whole economy | 1,118,691 | 49 | 2,299,921 | 87,572 | 4,456,192 | 16 | 27,547,123 | 2,816,693 |
| *Weighted base* | 2,299,921 | | | | 27,547,123 | | | |
| *Unweighted base* | 87,572 | | | | 2,816,693 | | | |

*Source: UK Commission's Employer Skills Survey 2011, UKCES, 2011*
*Bases vary.*
*"Employers" columns based on all establishments.*
*"Employees" columns based on all employment.*

## 5.4 Impact of mismatches

Evidence in this chapter so far has indicated that there are specific areas where workforce skills in the Information and communication technologies sector do not match jobs, namely:

- Nearly 5,000 skill shortage vacancies, and just under nine in ten of these vacancies (88 per cent) being for skilled occupations.
- A higher proportion of the workforce (six per cent) than average affected by skills gaps although these are often transitory where employees are new to the job[24].
- Under-employment, which is a greater issue in terms of volume than skills gaps and shortages with 15% (93,637) of the sector workforce over qualified or over skilled, similar to the average for the workforce across all sectors (16%).

Skills mismatches, whether they are skills shortages, gaps in the skills of the workforce or under-employment have a variety of consequences. In addition to adversely impacting business performance and competitiveness through increased workload for other staff, increased operating costs, quality issues, delays in new product/service development and loss of business to competitors (the main consequences of skills gaps and hard to fill vacancies), skills mismatches can also contribute to wage inflation and migration of labour.

### 5.4.1 Wages

The UKCES National Strategic Skills Audit (UKCES 2010) sets out the reasons for wage premia as: an indication of a short term increase in employer demand; providing an incentive for individuals to develop certain skills; existence of persistent skills shortages; and reflecting the distribution of rare skills (a reward for scarce skills that are not easily learnt).

Average hourly wages in the Information and communication technologies sector are the second highest across all sectors, at £20.40 compared to a UK average of £14.60 (see Table 5.19). The average hourly wage in the sector is 40 per cent higher than the average wage across the UK economy, reflecting the reasons for wage premia outlined above and the highly qualified workforce in the sector.

Despite the recession in the UK economy and decline in the number of people employed in the sector workforce, average wages in the sector have risen since 2008, although not at the same rate as across the whole economy.

[24] As outlined in section 5.2.2 and based on UK ESS 2011 data.

Wages in each sub-sector would also seem to reflect the demand for, and nature of, skills used and qualification levels, with workers in the Computer programming, consultancy and related activities sub-sector having the highest average hourly wage at £22. In contrast, those in the Repair of Computers and other goods sub-sector have an average hourly wage of £15.

**Table 5.19: Average hourly wage by sector (£) (UK)**

| | 2008 | 2009 | 2010 |
|---|---|---|---|
| | £ | £ | £ |
| Agriculture, forestry and fishing | 10.42 | 11.18 | 10.38 |
| Energy production and utilities | 15.93 | 16.41 | 16.62 |
| Manufacturing | 13.86 | 14.28 | 14.37 |
| Construction, building services, engineering and planning | 14.66 | 15.29 | 15.39 |
| Wholesale and retail trade | 11.00 | 11.27 | 11.36 |
| Transportation and storage | 12.44 | 13.16 | 13.21 |
| Hospitality, tourism and sport | 9.14 | 9.35 | 9.52 |
| Information and communication technologies | 20.05 | 20.26 | 20.40 |
| Creative media and entertainment | 17.14 | 17.29 | 17.50 |
| Financial, insurance & other professional services | 21.06 | 21.45 | 21.99 |
| Real estate and facilities management | 11.36 | 11.64 | 11.71 |
| Government services | 14.40 | 14.87 | 15.62 |
| Education | 14.67 | 15.39 | 15.71 |
| Health | 14.97 | 15.79 | 16.45 |
| Care | 10.21 | 10.30 | 10.49 |
| All economy | 13.94 | 14.39 | 14.60 |

*Source: Annual Survey of Hours and Earnings, 2010 (ONS)*

### 5.4.2 Migration

Migration can be seen as a measure of skills imbalance. The National Strategic Skills Audit for England (UKCES 2010) assessment of migration reports that the migrant labour market "reflects a mismatch between the skills required by the labour market and those available in the domestic labour force".

Migrants can be defined by place of birth, nationality and length of stay in the UK. The non-UK born definition is the most commonly used in analysis (Rienzo, 2011), although it should be noted this includes those migrants who have been in the UK for a long period of time and some non-UK born employees will be UK nationals (Hay *et al.*, 2011).

Currently, thirteen per cent, (3.8 million people) in employment are born outside of the UK (Table 5.20). This has increased from nine per cent in 2002. There was a significant increase in the number of non-UK born workers during 2006, coinciding with the opening of the UK labour markets to 'A8' country workers, when 317,000 more foreign born people were employed in the UK than in 2005.

**Table 5.20: Employment by country of birth and nation, 2010**

| | UK | | England | | Scotland | | Wales | | Northern Ireland | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 000s | % | 000s | % | 000s | % | 000s | % | 000s | % |
| UK | 25,054 | 87 | 20,856 | 86 | 2,264 | 93 | 1,228 | 94 | 706 | 92 |
| Rest of Europe (EU 27) | 1,340 | 5 | 1,176 | 5 | 85 | 3 | 37 | 3 | 42 | 5 |
| Rest of world | 2,457 | 9 | 2,295 | 9 | 96 | 4 | 47 | 4 | 18 | 2 |
| Total | 28,851 | 100 | 24,327 | 100 | 2,446 | 100 | 1,312 | 100 | 766 | 100 |
| *Unweighted base* | 194 | | 161 | | 17 | | 9 | | 7 | |

*Source: Labour Force Survey 2010, ONS*

The share of non-UK born workers in employment varies between sectors – the Information and communication technologies sector has one of the highest proportions of the workforce from rest of world. Twelve per cent of the sector's workforce was born outside the UK and Europe, the highest proportion in any sector except Hospitality, tourism and sport, Health, and the Real estate and facilities management sectors, as illustrated in Table 5.21. The proportion of the sector from the rest of the world has mirrored the UK total workforce trend, increasing from nine per cent in 2002 to twelve per cent in 2010.

The Information Service activities sub-sector has a much higher proportion of the workforce born outside the UK and Europe. A fifth of the Information Service activities workforce (20 per cent) was born in the 'rest of the world' compared to 13 per cent for the sector as a whole and eight per cent for the whole economy workforce.

**Table 5.21: Employment by country of birth and sector, UK (2010)**

| | UK | Rest of Europe (EU 27) | Rest of world | Total | UK | Rest of Europe (EU 27) | Rest of world | Total |
|---|---|---|---|---|---|---|---|---|
| | '000 | '000 | '000 | '000 | % | % | % | % |
| Agriculture, forestry and fishing | 377 | 21 | 8 | 406 | 93 | 5 | 2 | 100 |
| Energy production and utilities | 431 | 15 | 26 | 472 | 91 | 3 | 6 | 100 |
| Manufacturing | 2,567 | 210 | 193 | 2,969 | 86 | 7 | 6 | 100 |
| Construction, building services, engineering and planning | 2,446 | 124 | 126 | 2,696 | 91 | 5 | 5 | 100 |
| Wholesale and retail trade | 3,644 | 177 | 318 | 4,140 | 88 | 4 | 8 | 100 |
| Transportation and storage | 1,213 | 77 | 158 | 1,448 | 84 | 5 | 11 | 100 |
| Hospitality, tourism and sport | 1,630 | 156 | 260 | 2,046 | 80 | 8 | 13 | 100 |
| Information and communication technologies | 640 | 33 | 88 | 761 | 84 | 4 | 12 | 100 |
| Creative media and entertainment | 850 | 51 | 87 | 987 | 86 | 5 | 9 | 100 |
| Financial, insurance & other professional services | 1,719 | 79 | 202 | 2,001 | 86 | 4 | 10 | 100 |
| Real estate and facilities management | 808 | 55 | 114 | 978 | 83 | 6 | 12 | 100 |
| Government services | 2,011 | 46 | 152 | 2,208 | 91 | 2 | 7 | 100 |
| Education | 2,769 | 106 | 213 | 3,088 | 90 | 3 | 7 | 100 |
| Health | 1,737 | 83 | 266 | 2,086 | 83 | 4 | 13 | 100 |
| Care | 1,490 | 65 | 174 | 1,729 | 86 | 4 | 10 | 100 |
| Other sectors | 722 | 43 | 71 | 836 | 86 | 5 | 9 | 100 |
| All economy | 25,054 | 1,340 | 2,457 | 28,851 | 87 | 5 | 9 | 100 |

*Source: Labour Force Survey 2010, ONS*

The share of migrants or foreign born workers also varies across occupation. The National Strategic Skills Audit (UKCES 2010) analysis of LFS data from 2008 shows that 'rest of world' migrants tend to be employed in high level occupations including Information and communication technology professionals where 16% of employment is occupied by non-EEA migrants.

The current shortage occupation list from the Migration Advisory Committee (MAC 2011a) includes the Software professionals (SOC 2132) roles of Software Developer and Systems Engineer within "visual effects and 2D/3D computer animation for film, television or video games".

The impact on the Information and communication technologies sector is for those companies in the Computer programming and consultancy sub-sector who are involved in ready-made interactive leisure and entertainment software development i.e. Computer Games. Should companies in this area experience domestic labour shortages for these roles they can use the Tier 2 shortage occupation migration route.

More commonly in the sector is the use of Intra-company transfers (ICTs) by large organisations who move staff from their overseas operations to the UK. ICTs can be used by global companies to: transfer established, skilled employees to fill a post that cannot be filled through recruitment from the domestic labour market; transfer recent graduate employees as part of a structured graduate training programme; or transfer new graduate employees to learn skills and knowledge to perform their job overseas or to impart specialist skills or knowledge to the UK workforce.

The Public Accounts Committee published figures in May 2011 (House of Commons, 2011) showing that two thirds of migrants using Intra-company Transfers (between December 2008 and September 2010) are in IT occupations, meaning that employers across the economy have brought in 42,000 IT workers using this route. The committee's conclusion on these figures was that these migrants were "potentially displacing resident workers with IT skills". There is currently no volume cap on ICTs but there are minimum salary requirements depending on the length of stay to minimise the risk of migrants displacing domestic workers.

## 5.5 Extent to which skills deficiencies are hampering growth

This section concludes Chapter 5 on skills mismatches, by considering the extent to which skills deficiencies outlined in this chapter are hampering growth in the Information and communication technologies sector.

Evidence presented shows that deficiencies do affect business performance and, in turn, this often hampers business growth but, to put the impact of skills deficiencies on growth in context, it should be remembered that the Information and communication technologies sector has also been affected by the recent recession with a decrease in total GVA contribution and a fall in employment since 2008.

Nearly two-thirds of employers with skills gaps say they have an impact on establishment performance – this equates to six per cent of all employers in the sector. Skills gaps and hard to fill vacancies in the sector both cause an increase in workload for other staff, and this is the most common and detrimental effect.

However, the impact of skills gaps on business growth is apparent in that employers report skills gaps also increase operating costs (with 45 per cent of employers with skills gaps that have an impact on establishment performance reporting this) and delay the development of new products and services (39 per cent).

A similar proportion (five per cent) of employers in the sector report hard to fill vacancies. However, the impact of hard to fill vacancies (aside from an increased workload for other staff) is more likely than with gaps to be reported to cause delays in developing new products and services (68 per cent) and additionally, half of employers (50 per cent) with hard to fill vacancies say they cause a loss of business or orders to competitors. Hard to fill vacancies are more likely to impact growth in the sector than across the rest of the economy where the impact of these skills mismatches is more likely to affect customer service objectives.

Although smaller in volume, hard to fill vacancies (which on the whole are skills shortage vacancies) would seem to have a greater impact on business growth indicators than skills gaps although other factors such as consumer demand and financial matters including economic stability are seen to be greater business challenges in the short term. Analysis of the UK Employer Perspectives Survey data also shows that finding suitably skilled workers is the third biggest business challenge employers in the sector face with one in seven employers citing this reason (14.5 per cent) [25]. This concern about the availability of skilled staff is high in comparison to all sectors where four per cent said finding suitably skilled workers was likely to be a business challenge. Furthermore, the Employer Perspectives report links the challenge of finding suitably skilled staff to business growth:

> Finding suitably skilled staff is considerably more likely to be a challenge for establishments that have grown over the past year and have ambitions to continue growing over the coming year. (Shury *et al.*, 2011).

As employers in the Information and communication technologies sector are positive about prospects for growth in the short term (with over a third expecting their workforce to increase in size), and with forecasts suggesting substantial growth in the longer term (See Chapter 7), finding suitably skilled staff is likely to remain a challenging area for the sector particularly because of the known difficulties with attracting new entrants.

[25] Information and communication technologies: Base: All employers. Unweighted responses 316. Weighted responses 33,345.

Whilst it is difficult to quantify the extent to which skills deficiencies in the sector hamper growth, in comparison to other forces, for example the impact of the recession, it would seem that employers in the sector are also prepared to ‘work round’ skills deficiencies through increasing wages, distributing work amongst existing staff and using migration and Intra-company transfers to meet their expectations and aspirations of growth.

# 6 Drivers of change and their skills implications

This chapter investigates the main forces stimulating change and the impact these key drivers have on employment and skills within the Information and communication technologies sector. Scale and significant differences in the drivers across the four nations of the UK have also been outlined.

**Chapter Summary**

- The drivers of change considered in this report are: Regulation and multi-level governance; Demographics and population change; Environmental change; Economics and globalisation; Technological change; Changing values and identities and Changing consumer demand.
- Each of the above drivers is discussed in this chapter and ranked (Table 6.1) indicating the relative scale of impact, with the most significant drivers for the sector indentified as technological change, cyber security and the economy.
- Of these, technological change not only drives the sector itself from within (through innovation and research) but is also driven by the demand of business customers and tech-savvy consumers.
- Specific technologies with important skills implications are: Cloud Computing; social and mobile computing; ‘big data’, smart computing and analytics; and security and data protection.
- In addition to technological change and the challenge posed by cyber crime the current economic and global environment are also significant drivers of change for the sector effecting jobs and skills across the sector.
- Skills and employment implications are particularly associated with technological change, consumer demand and cyber-security where new skills needs are emerging and increasing demand creates job opportunities. Globalisation is increasing the requirement for higher value added skills and innovation.
- Differences across the nations are most evident in the respective national responses to the economy (including the emphasis on supporting priority sectors) and in raising consumer demand through digital inclusion. In both of these areas, the development of government policy could raise demand and impact skills and jobs in the sector.

## 6.1 Drivers of change

This section sets out the major drivers of change for the sector using the standardised framework developed for the National Strategic Skills Audit (UKCES, 2010). Macro-level trends which have importance in the medium to long term are contextualised for the Information and communication technologies sector and discussed in terms of the impact they have on employment and skills.

The framework covers the following 'seven drivers of change' which are presented diagrammatically in Figure 6.1. The UKCES report notes that:

> It is the relationships between the drivers that are critical to determining impact. The dependencies meant that each may mitigate or reinforce each other's impact, and it is therefore important to recognise these dynamics in analysing the trends in the demand for, and supply of, skills.

**Figure 6.1: The major drivers of change**


*Source: National Strategic Skills Audit 2010, UKCES*

Drawing on a multitude of sources as well as the National Strategic Skills Audit report for England (UKCES, 2010) each of the following sections has a summary of the driver in general, the impact on the Information and communication technologies sector and on skills.

### 6.1.1 Regulation and governance

Regulation and governance covers the key issues of: border management, threats to security, changes in global power and conflict and domestic regulation.

For the Information and communication technologies sector, security (particularly cyber security) and regulation are major drivers and have an important influence on the direction of the sector and skills supply.

The threat to national, business and individual data and information security from **cyber crime** has emerged over recent years as a key driver of change. Cyber crime is an increasing concern for as it is an expanding threat and costly to the economy. One estimate is that the cost cyber crime (including IP theft and industrial espionage) to UK business is £21 billion (DETICA, 2011) and the financial impact of cybercrime is predicted by global industry analysts to grow by 10 per cent per year through to 2016, due to the continuing discovery of new vulnerabilities (Gartner, 2011). Furthermore, the cost of cybercrime is expected to increase even in times of economic hardship with the 2012 Global State of Information Security Survey[26] (PWC, 2011), suggesting cyber risks often increase during contractions in the business cycle, particularly if budgets used to maintain information security practices are frozen or used to support other areas of the business

The combination of continued economic volatility, emergence of cloud computing and increased use of mobile devices and social media all indicate an ever increasing need for skill requirements around prevention, detection and web related technologies and an opportunities for the sector as the National Strategic Skills Audit (UKCES 2010) outlines:

> A number of sources identify concerns around international crime, in particular that which makes use of the internet for organising its activities, and the internet itself as a source of security risk from data theft (DCDC, 2007; Wilson, 2009). Attempting to regulate these spaces will be a key challenge for governments but may also open up increasing opportunities for organisations in the security sector (SAMI Consulting Ltd, 2010).

The sector recognises security and secure products and services as an increasingly important selling point to consumers and Intellect, the UK trade association for the technology industry says that as well as being a solution provider, the sector also has an important role as an intelligence provider through the “vast swathes of threat information collected” (Intellect, 2011).

[26] Interviews with 9,600 IT, security and business executives in 138 countries across all industries.

In addition to a potential increase in demand from businesses and consumers for recognisably secure products, the impact on skills in the Information and communication technologies sector is wide-ranging. Work is already underway to certify cyber security specialists, improving the skills of existing information assurance and cyber security professionals. There will be a need for more of these specialists, including those with post-graduate education.

Increasing security skills at all levels will mean that other people working in the sector will need to update and improve their security skills, from software design and development as products and services need to meet ever more stringent security measures to technical support to ensure that data and systems are routinely protected and end users supported against cyber attacks.

The Information and communication technologies industries are also affected by **national and international regulation** on parts of the economy, in particular the financial services industry where compliance and locally determined banking reforms have long impacted demand for new technology solutions.

Regulation also has an impact on the sector in terms of competition, mergers and acquisitions and is a key driver for the Telecommunications sub-sector. The Communications Act (2003) which sets out the role and power of Ofcom, the industry regulator, is currently being reviewed. The view of the industry trade association Intellect is that the Act has worked well with the UK being one of the most liberalised competitive markets in the world. However, it is likely that the Act will be updated to reflect changes in technology and the industry.

Potential legislation in the United States (the Stop Online Piracy Act (SOPA) and Protect Intellectual Property Act (PIPA)) aims to block web sites with unauthorised copyright material and combat piracy in support of the entertainment and traditional publishing industries in particular against foreign rogue websites. Whilst one argument is that the new legislation will preserve jobs dependent in IP and encourage innovation, some businesses disagree with the approach being pursued, saying investment and new start ups in the user generated content area could, in particular, be adversely affected.

The current government commitment to localism brings a new dimension alongside **efficiency and reform** and the drive to cut 'red-tape' for business. This may provide more opportunities for the sector but it will be in a more complex public sector market. There is also commitment in the UK government's ICT strategy to transparency and opening up public sector opportunities for smaller Information and communication technologies sector employers who have traditionally found it particularly difficult to win government contracts.

On the other hand, the emphasis on aggregating demand and 'bulk buying' may limit the opportunity for smaller companies in the sector to respond. Overall, the UK trade association (Intellect, 2011) reports that public sector demand for software services has slowed and is expected to deteriorate further.

The Information and communication technologies sector is also affected by recent and the potential future changes to UK **migration policy**. The Coalition for Government paper (HM Government, 2010) commits to an annual limit on the number of economic migrants admitted into the UK from outside the EU to live and work, however limits to the number of Intra company transfers – for which parts of the Information and communication technologies sector are the main users - have not been changed following recent MAC recommendations.

Any subsequent changes to migration legislation are pivotal to not only how companies are able to transfer skills and knowledge across the workforce in their global business (see section 5.4.2) but also to the attractiveness of the UK to international businesses and in turn to the competitiveness of the sector. Current work permit policy, in particular the use of minimum wage levels as a criteria within the Borders Agency 'Points based system', affects employers in Scotland, Wales and Northern Ireland differently as average wages for IT occupations are lower than across the sector in the UK as a whole.

### 6.1.2 Demographics and population change

Demographics and population changes are not only a key influence on the sector workforce itself but also drive consumer demand for Information and communication technology products and services and in turn drive new skills challenges within the sector.

The changing demographics of consumers and an ageing population means that as those familiar with technology get older the overall size of the technology market grows with increasing demand for newer, faster and more advanced technology goods and services. Key initiatives are encouraging citizens who are not already online, (particularly those aged over 65, the unemployed and families) to access the internet for personal, social and public sector benefit (Race Online 2012, 2010).

It is likely that as the overall population ages, working lives will be extended and the average retirement age will rise. The default retirement age has already been removed and the state pension age increased. Whilst this could alleviate potential loss of talent from the sector in the short term (and may affect the volume of replacement demand) it will contribute to challenges in managing an ageing workforce including handling flexible working requests, job opportunities and progression routes alongside training and up-skilling requirements to keep workforce skills up to date with new technologies.

As discussed in section 3.3.2, the sector is ageing with the proportion of aged under 25 having fallen from nine per cent in 2002 to 7 per cent in 2010, whilst over the same time period, the proportion aged 45+ has increased from just over a quarter of the workforce to a third. Whilst the age profile of the sector may be ‘normalising’ towards that of the economy overall, the skills implications of these changes are intensified by increasing competition from other industries for graduate employees in particular. With the population in the UK aged 15-29 predicted to be lower in 2020 than in 2010 (ONS, 2011d), employers will need to consider new recruitment pipelines which attract greater volumes of talented people into IT occupations and into their companies. In a highly competitive global environment, they need these people to become productive as quickly as possible, and to remain loyal to their companies once they are productive. Skills acquisition by those already in the workforce will need to keep up with the fast paced and constantly changing nature of the industry.

### 6.1.3 Environmental change

Environmental change is a particular issue for the sector not only in terms of the energy usage of the sector itself but also as a provider of products and services for others. Increasing demands for energy are fuelled by technology and so whilst there is pressure on the sector to be more efficient there is also an opportunity as 'greener' technologies provide attractive environmentally friendly solutions for businesses and consumers.

Green IT refers to sustainable IT: the invention, analysis, design, implementation, use and disposal of services, systems and infrastructure while minimising their environmental impact. The sector clearly has the potential to enhance its own environmental performance as well as that of clients / users.

An increase in global awareness of the environmental challenge means that businesses need to remain competitive in their offer by ensuring that employees have the relevant skills, fully understand user consumption, environmental impact assessment and management, as well as technology utilisation and re-cycling and possess technical design skills related to power management. The OECD report on the outlook for the sector (OECD, 2010), reports that green technology is a promising area for new jobs in the sector, with opportunities in the development of more efficient applications, virtualisation software as well as in R&D and production. The extent of consumer, societal and government pressure will be a key factor in the pace and scale of development of green technologies.

The trade association for the UK's technology industry (Intellect, 2011) says that current environmental policy offers both challenges (in terms of regulatory uncertainty) and opportunities for the sector, for example in the smart meter roll out and for services in relation to the development of a smart grid. The report predicts "a continuation, even an increase, in the level of scrutiny imposed on the ICT sector in terms of energy use" but, concludes that there is currently a lack of consumer demand for low carbon goods and services from the sector.

There are already some moves to change traditional approaches, for example new build data centres which traditionally have had a large carbon footprint, full power back up and latent overcapacity are being challenged by modular / mobile data centres and cloud based solutions. This offers businesses benefits of scalability, rapid response, lower fixed costs and with the benefit of a smaller carbon footprint.

Implications for the sector include the increasing demand for innovation, technical design skills for power management, process and technology redesign skills and skills to measure the environmental impact of technology.

### 6.1.4 Economics and globalisation

This driver covers the outlook for international and domestic economic growth, competition and the impact of globalisation and emerging markets on the sector.

Instability and uncertainty in the **global, European and UK economy** are key determinants on the level of growth and arguably one of the biggest challenges to the Information and communication technologies sector however industry experts believe the sector has a key role to play in securing economic prosperity in the UK.

Though the EIU report 'Resilience amid turmoil, Benchmarking IT industry competitiveness 2009' (EUI, 2009) acknowledges the IT industry is not immune to the current downturn, it makes the important point that the fundamental drivers of growth remain. The OECD also describes how, unlike the 2001-2002 recession which began with the bursting of the Internet bubble, the current recession began in the financial services sector due to deep-seated systemic weaknesses in banks and insurance companies (EIU, 2009).

Strong balance sheets and growth in the sector are said by industry commentators to have attracted investors and led to increasing sector performance and a 'healthy' increase in mergers and acquisitions (Bristow and Miller, 2012). The same analysts say that with the government pledge of support to the sector (particularly in broadband and education) the UK could become the worldwide hub for technology.

The current economic climate has implications for the sector workforce and investment in skills. Businesses have been cost cutting, trying to doing more with less and managing uncertain product, service and labour demands. There is a potential for even greater concentration in the workforce in the high skilled technical occupations with cost reduction and loss of labour in administrative and support functions.

**Globalisation** has been accelerated by technology and is likely to increase further. The impact on the Information and communication technologies sector in the UK has been the shift of lower cost activities and increased specialisation in high value add activities. However, technology companies in emerging markets are thought to have been less close to their consumer base in recent years but are now investing aggressively in new technologies and innovating to develop products and services (Oxford Economics, 2011).

The upsurge in the higher value add activities that the BRIC (Brazil, Russia, India and China) countries are aspiring to, especially in India where the substantial supply of graduates, may give rise to considerable competitive advantage. In respect of this, the SAMI 2010 Horizon Scanning report says:

> The scale of investment by countries such as China and India, including in higher education, is likely to have moved them up the value-added chain by 2020. They will pose greater competition to knowledge-based and other higher-tech industries in the UK. It is not safe to assume that the UK will continue to have a technological lead over them after 2020.

However, the Information and communication technologies sector in the UK, particularly large and global companies, has already embraced globalism over a period of time, developing partnerships and subsidiaries worldwide. Skills implications for the sector in this increasingly global sector include managing knowledge exchange and an overseas workforce.

In addition, the rise of CIVETS countries, (Columbia, Indonesia, Vietnam, Egypt, Turkey and South Africa) will be watched. Some commentators have suggested these countries, whilst still relatively unstable, are developing and overtaking the BRIC nations in terms of growth, with dynamic and diverse economies and young and growing populations.

One opportunity within increasing globalisation might be the requirement for overseas companies to have a UK (European) base and local knowledge, as well as a high level of technology skills. Software and Computing are in the top ten for Foreign Direct Investment employment in the UK, with ‘Computers’ in Scotland and ‘Software’ in Northern Ireland in the top three employment generators (Ernst & Young, 2011).

### 6.1.5 Technological change

Technological change is at the heart of changing skills demand in the Information and communication technologies sector. The sector itself both drives technological change and, on a wider scale, has to respond to the new innovations, products and services developed in order to deliver high quality goods and services to both business customers and consumers. Businesses across all sectors are realising the power of technology to provide “new, innovative, more convenient, and cost-effective ways to interact with today’s mobile, tech-savvy customers.” (Gends *et al*, 2011) There is a direct effect on skills within the industry and technology is also driving skills changes across the economy in the use of new technology.

The five key technology trends that dominate current and future demand are identified as: Cloud Computing; Social Computing; Mobile Computing; Cyber security; and Big data/Smart computing.

**Cloud Computing** is expected to be a top investment priority for cutting edge businesses in order to simplify operations and make cost savings. Public and private sector growth in demand is expected for cloud services, Software as a Service (SaaS) and cloud management software.

In addition to dealing with this growth in demand, skills implications for the sector include maintaining security levels to the standard of an on-premise infrastructure. TechMarketView analysis for Intellect suggests Cloud and SaaS creates opportunities for innovation and for smaller companies in particular. The skills implications are thought to be more emphasis on service integrators (as opposed to product specialists) and service management and partner/supplier management will become more complex. (Intellect, 2011)

**Mobile Computing** – is becoming the platform of choice for employees and customers. In the Telecommunications sub-sector, market growth has been in data and not voice. Mobile broadband and mobile internet are areas for growth. The 4G auction in 2012 and subsequent roll out are likely to create great pressure on data prices, if the UK follows the international example (Intellect, 2011).

ONS report that 45 per cent of internet users accessed the internet through their mobile phone in 2011, an increase from 23 per cent in 2009 (ONS, 2011e). The increase in consumer mobile technologies is challenging the sector to develop new security models for managing and securing devices and services.

Software and applications need to run on various and multiple devices requiring constant innovation and new technology solutions. With fierce competition on prices across the sector and, as the market reaches saturation, the emphasis is on keeping customers, leading to an increasing need for better customer service skills to increase customer satisfaction and retention. Business customers are also looking to connect with clients and improve employee productivity through mobile technology.

In terms of fixed line telecommunications, higher broadband speeds are the main driver with the growing availability of Next Generation Access (NGA). However, high speed access in rural areas remains an issue although there is government commitment across each nation to increasing access.

**Social Computing.** With the continued spread of social computing in the consumer world, more organizations are realizing the potential power of social networks to enhance employee collaboration and productivity within their enterprises, and better connect with customers, partners and other stakeholders.

Greater use of advanced social networking technologies to enhance employee collaboration, improve efficiency, employee satisfaction, and overall client service levels is expected and provides a key area of growth for the sector in transforming more consumer applications into business tools. Cloud computing, and more commonly social networking, is likely to be more widely rolled out in business settings, particularly in IT savvy and heavy user industries such as the financial services sector.

**Big Data / Smart Computing.** The ever increasing amounts of data being generated and stored by business creates opportunities for the sector in storage and in supplying advanced analytical technologies with the aim of showing customers how 'big data' can be used to enter new markets, reduce costs and increase customer satisfaction. This will require employees to have the analytical and business skills to use the data to improve business performance.

**Cyber-security.** As outlined in section 6.1.1, cyber-security is a key driver for the sector. There is likely to be an increase in pre-emptive security operations, consisting of dedicated analysts and advanced data analytics software, to identify threats before they cause significant damage. Cyber attacks are also highlighted by the World Economic Forum Global Risks report (2012) as having the highest likelihood of all technological risks and a high impact.

### 6.1.6 Changing values and identities

'Changing values and identities' encompasses family structures and general attitudes to government, work and society. The impact on the sector of these changes includes an increasing demand for new products and services enabling different ways of working to suit changing values. For example the expansion of home based, flexible working for parents and carers; enabling work away from a traditional workplace; the use of technology to address environmental (travel) concerns and remote access to skilled labour.

The Information and communication technologies sector has already responded in the form of enabling faster and more efficient mobile and remote working, access to the 'cloud', web conferencing, collaboration software and web-based file sharing. The Horizon scanning report from SAMI calls this trend the "death of distance" (SAMI Consulting Ltd, 2010). On the other hand, the National Strategic Skills Audit for England (UKCES, 2010) notes that intensive working patterns are often in conflict with the increasing individualisation of personal interests. New technologies that enable employees to work anywhere and at any time also have disadvantages as well as the benefits described above.

The impact on the sector of more remote and flexible, 24/7 working includes an increase in demand for remote technical support and in customer service skills as well as the continual development and improvement of products and services that make remote working faster, more efficient and crucially, more secure. This will particularly be the case as the rising trend of employees using their own 'devices' (i.e. Smartphone, laptop) for work purposes continues (Socitm, 2012).

Changing values also encompass the phenomenon of using the internet to communicate to the masses, and for individuals or small groups to widely publicise their cause, challenging existing laws and institutions. Recent examples of this include the role of social media in the summer riots of 2012 in English cities, through Wiki-leaks, the exposition of super-injunctions through Twitter and the mobilisation (and international coverage) of the Arab Spring through mobile and multi-media.

Social media guidance to businesses and employees is a growing area of demand and there is also increasing pressure on the sector and individual service providers to give authorities access to individual user information, for example in relation to illegal downloading.

Attitudes to work are a key influence on skills supply to the sector. In the Information and communication technologies sector, despite increasing employer demand, job security and comparably good salaries, there has been a falling uptake of IT education and a restricted pool of talent as insufficient numbers of people, particularly women, choose to enter technical roles (see Section 5.1.4 on recruitment). Over half of employed IT/Computing graduates (56 per cent) are not working in IT occupations six months after graduating (HESCU/AGCAS, 2011). A report for BIS on STEM graduates and jobs suggests is often because of a lack of knowledge about work and careers in the sector and also "because the graduates perceive other areas (of work) to be of more interest" (Mellors-Bourne *et al.*, 2011).

There is now a question as to whether changing values and the increasing penetration of technology will increase ambition to work in the sector. Horizon scanning working by SAMI says that “Those born in the years leading up to the millennium, Generation Y, have been shaped by growing up with instant communication technologies, new media and social networking.” (SAMI Consulting Ltd, 2010) Similarly, work by e-skills UK and Gartner reports suggests that those born after 1985 and who have grown up in an IT-intensive environment are not only customers for the sector, but also the source of tomorrow’s workers. To cope with this influx of new generation workers, senior and managerial staff (i.e. ‘digital immigrants’ who have come across computing later in life) will need to manage diverse workforces with different capabilities as well as handle greater scales of technological complexity and also process design.

Will young people in particular equate their everyday experiences with technology, new technology role models, and companies such as Facebook and Google with a desire to work in the industry or will they continue to see it as an unexciting, desk based and basement job?

An additional factor as ‘Generation Y’ enters the workforce might be that they are likely to challenge established ways of working as they move into work and ‘middle management’.

### 6.1.7 Changing consumer demand

Changing consumer demand considers expectations about the type and quality of products and services produced, and consumer preferences and expectations.

Whilst there has been a recent squeeze on consumer spending with increasing food and energy prices, consumer use of technology and online activity continues to increase. The range of activities spans: different and more flexible ways of working; shopping/buying and selling; entertainment including socialising listening and sharing music, reading, watching film, video and TV online and gaming; learning, communicating and being part of society, including for example through voting online, paying taxes and e-petitions.

This range of online, mobile and technology centric activities is continually expanding IT products and services, generating new demand and expanding markets for the sector. For example, according to the IMRG Capgemini e-retail sales index (Hall, 2012), the UK is now the second largest global market for e-commerce and record online sales were recorded in December 2011 with growth of nearly 17 per cent on the previous year.

Faster, ‘always available’ demands of the consumer can be met through technology – for example the roll out of superfast broadband is a key driver in the Telecommunications sub-sector but also provides opportunities for other parts of the sector. In addition to the challenges for the sector in terms of hardware, infrastructure and bandwidth to keep up with demand, the sector needs to protect against data loss, ensure customer privacy and security - currently one in five internet users say their own skills are not sufficient to protect their personal data or prevent a computer virus (ONS, 2011e) - and protect Intellectual Property (IP).

Increasingly tech-savvy workforces and increasing use of consumer devices in the workplace means ‘i-workers’ and consumers both have the same powerful and widely available tools and applications to stay informed, connected and productive in their work and personal lives. This combined with changing usage demands of an ‘always-on environment’ and ‘anytime/anywhere’ access is described by industry analysts IDC as having fundamentally changed support and service requirements.

There are opportunities for the sector to manage and support popular consumer technologies, secure and protect consumers from the wide-range of online and technology related threats, offer the interactive experience consumers are looking for when dealing with businesses, and manage increased transaction loads.

## 6.2 Scale of drivers

This section sets out the relative scale of the drivers of change in terms of impact on the sector and timescale. For each driver, and in some cases the key trends in that driver, the scale of impact has been assessed by considering:

- whether the driver affects the supply or demand for labour or skills;
- whether the driver is new or emerging, current or ongoing, increasing, decreasing or changing;
- whether the driver provides opportunities for growth for the sector or whether it poses significant risks;
- the extent to which the driver affects the whole sector or whether sub-sectors or certain occupations are particularly affected.

Each driver has then been ranked indicating the relative scale of impact. Table 6.1 shows the most significant drivers for the sector are technological change, cyber-security and the economy (rated red). Consumer demand, globalisation, and demographics/population change and environmental drivers are thought to be important drivers for the sector (rated pink) with developments in the public sector and regulation, values and identities and migration policy considered fairly important but with a smaller scale of impact on the sector (rated amber).

**Table 6.1 Scale of drivers**

| Driver of demand | Sectoral driver (if applicable) | Driver is new/emerging/current / ongoing , increasing, decreasing | Affects supply or demand for labour and/or skills | Scale of opportunities or risks | Scale of impact on sector, sub-sectors or occupations. |
|---|---|---|---|---|---|
| **Technological change** | | • The key driver for the sector which is ongoing and ever changing. | • Drives demand for new skills and potentially new jobs. | • Opportunities for new products and services to be developed and redeveloped, increasing demand.<br>• Growing customer demand and expectations | |
| **Regulation and governance** | Cyber-security / Data protection | • Increasing trend of growing importance | • Driving demand for new skills and jobs, both specialist and across all occupations | • Potentially a growth /expanding market area.<br>• Could be a risk area to the industry and economy if the supply of labour and jobs is not met. | • Specialist information assurance/cyber security jobs as well as across many other occupations |
| | National / International regulation | • Ongoing, increasing | • Potential affect on skills rather than volume of jobs | • Increasing regulation could inhibit growth and innovation<br>• Could increase consumer confidence in the sector | • Sub-sectors particularly affected include telecommunications and internet providers |
| | Public sector ICT strategy, efficiency and reform | • Current | | • Although the volume of opportunities may be less, there is a move to less bureaucracy opening up of public sector work for more businesses in the sector | • Potentially more access to SMEs in the sector to public sector work |

| Driver of demand | Sectoral driver (if applicable) | Driver is new/emerging/current / ongoing , increasing, decreasing | Affects supply or demand for labour and/or skills | Scale of opportunities or risks | Scale of impact on sector, sub-sectors or occupations. |
|---|---|---|---|---|---|
| | Migration policy | • New, current and changing policy<br>• Politically sensitive | • Affects the supply of skilled migrants<br>• Potential to drive further investment in skills in the UK workforce if migration limits are reduced | • Could have an effect on the ability of some companies to compete if barriers to migration impact competitiveness | |

| Driver of demand | Sectoral driver (if applicable) | Driver is new/emerging/current / ongoing , increasing, decreasing | Affects supply or demand for labour and/or skills | Scale of opportunities or risks | Scale of impact on sector, sub-sectors or occupations. |
|---|---|---|---|---|---|
| **Economics and globalisation** | Economic growth/uncertainty | • Current and immediate concern | • Supply of skills could be effected by the scaling back of training in the workforce<br>• The level of overall economic growth will impact jobs in the sector. | • Opportunities for growth where technology underpins economic recovery, delivers efficiency and innovation | |
| | Globalisation | • Longer term, increasing driver | • Increases the need for innovation in the workforce,<br>• Requires new skills<br>• Focus on higher value add activities | • Technology is driving globalisation<br>• Increasing competition<br>• Opportunities for inward investment | |

| Driver of demand | Sectoral driver (if applicable) | Driver is new/emerging/current / ongoing , increasing, decreasing | Affects supply or demand for labour and/or skills | Scale of opportunities or risks | Scale of impact on sector, sub-sectors or occupations. |
|---|---|---|---|---|---|
| **Demographic change** | | • Emerging trend for the sector as demographic change and legislation take effect | • Traditional supply of labour/recruitment pools affected<br>• Increasing training requirements for the existing workforce<br>• Possible effect in the short term on replacement demand if employees choose to retire later<br>• Skills to manage an aging workforce | • Changing demographics is driving consumer demand and expanding markets | |
| **Environmental change** | | • Current | • New skills requirements | • Opportunities for development of green technologies and ways of working<br>• Potential for expanding markets depending on increases in consumer demand and government pressure | |
| **Driver of demand** | **Sectoral driver (if applicable)** | **Driver is new/emerging/current / ongoing , increasing, decreasing** | **Affects supply or demand for labour and/or skills** | **Scale of opportunities or risks** | **Scale of impact on sector, sub-sectors or occupations.** |
| **Values and identities** | | • Ongoing and increasing | • Impact on supply where young people are not identifying with the sector<br>• Changing skills needs as technology evolves and demand increases. | • The sector can provide solutions to societal and environmental changes and technology is both enabling and changing demand<br>• Growing consumer market as digital natives, tech-savvy and i-workers increase demand for products and services. | |

| Driver of demand | Sectoral driver (if applicable) | Driver is new/emerging/current / ongoing , increasing, decreasing | Affects supply or demand for labour and/or skills | Scale of opportunities or risks | Scale of impact on sector, sub-sectors or occupations. |
|---|---|---|---|---|---|
| **Consumer demand** | | • Ongoing and increasing | • Creates demand for skills to meet customer expectations and new technology skills<br>• Innovation<br>• Security skills | • Increasing demand for products and services<br>• Increase in tech-savvy and i-workers grow demand<br>• Balance between standardised products (volume) and niche/bespoke products (high value) | |

## 6.3 Differences in drivers across the four nations

This section outlines the differences in drivers across the four nations of the UK. The drivers of change are largely common for the sector across the UK but government policy in particular means that there are some differences in response to the drivers.

**Regulation and governance** is significant across all nations although largely driven by the UK government. The sector is a global industry where inter-UK borders tend to matter less and the market operates on a national/international basis.

Many of the drivers around **demographics** and population change are similar across the UK. The migration of highly skilled workers has been encouraged in Northern Ireland and Scotland with initiatives like 'C'mon Over' and through Talent Scotland. The workforce in Northern Ireland is overall much younger and faster growing potentially increasing demand for technology products and services.

Whilst **environmental change** is a key policy area across the nations, no particular emphasis on the sector's role is highlighted by national governments.

**Economic growth** is a top priority in each nation but there are significant differences in each nation's approach to tackling government debt and securing growth, with Scotland in particular advocating even greater investment in jobs and skills. The 'Plan for Growth', (HM Treasury, 2011) is the UK wide plan for sustainable, long term economic growth. There is also a focus on the need for government to remove the barriers to growth (including by addressing skills issues) in particular sectors of the economy including the Digital & Creative industries and Business and Professional Services (including Computer Services).

Growing the Scottish economy focuses on improving employment opportunities and making Scotland the most attractive place for doing business in Europe by establishing an environment that is attractive to growth companies that will create and support jobs in Scotland; building up sectors that drive future growth (including the Information and communication technologies sector); and aligning growth towards international growth markets.

Jobs and the economy are also the overriding priorities for the Welsh Government. Information Technology (IT) and Telecommunications sectors are highlighted as an Economic Renewal Priority Sector where targeted intervention could help improve the global competitiveness of the Welsh economy.

Likewise, the sector is a priority in Northern Ireland where the drive for sustainable growth and prosperity is through creating a dynamic and innovative economy.

Importantly for the sector in Northern Ireland, the skills strategy aims to address subject imbalance through increasing the proportion of graduate leavers from STEM subjects including Computer Science.

Inward investment is well established for the sector in Northern Ireland but also of importance in Scotland and increasingly so in Wales.

**Technological change** is key to the sector across all nations and is nuanced where there are sub-sector specialism's, for example software development in Northern Ireland, Games development in specific locations in England and Scotland and where the public sector is a key customer for local businesses in Wales and Northern Ireland in particular.

The 'Skills for Jobs: Today and Tomorrow' report identifies technology as one of seven key drivers of change that will affect the demand for skills in the future across all sectors and the Computing industry is said to have the greatest current economic significance and greatest skills deficiency. (UKCES, 2010)

The question of Scotland devolution and increasing self-governance may have implications for **changing values** and behaviours which could harness the power of technology.

Across the UK there is an increasing emphasis on digital inclusion relating to the drivers of changing values, consumerisation and technological change. The level of **consumer demand** is dependent on a digitally literate population and workforce, whether from 'i-workers' or the population in general. Across the UK, 17 per cent of the population has never used the internet, but this rises to over one in four (27 per cent) in Northern Ireland, 20 per cent in Wales and 18 per cent in Scotland (ONS, 2011f).

As well as Race Online 2012, set up to inspire, encourage and support millions more people in the UK to get online by the end of the 2012, each nation has a slightly different approach to digital infrastructure, the exploitation of broadband and the digital divide in society. In Northern Ireland, Digital Northern Ireland 2020 (DNI2020)[27] exists to promote and exploit the benefits of a digital platform for the Northern Ireland economy, maximising economic growth, improved quality of life and social uplift life for all citizens. 'Scotland's Digital Future' outlines how Scotland will achieve its digital ambition through public service delivery, the digital economy, digital participation and broadband connectivity and 'Delivering a Digital Wales'

[27] http://www.dni2020.com/about-dni2010 Accessed 31.10.11

focuses on inclusivity, skills (from basic digital literacy to specialist skills for all ages and levels), economy, public services and infrastructure.

# 7 Future skills needs

This chapter sets out possible future trends and skills needs for the Information and communication technologies sector drawing on labour market projections provided by Working Futures 2010-2020, and an analysis of drivers of future demand for skills.

**Chapter Summary**

- The sector is considered in its own right to be a major driver of the economy over the next ten years.
- Employers are optimistic about recovery in the immediate future. Key issues and developments in the short term include security and data protection, innovation, cloud computing, convergence of communications and IT and the real world web.
- Green IT, the transformation of business using IT and reshaping the data centre are considered medium term or developing issues. In the medium term (2010-2015) output and productivity growth for the Telecommunications and Computer programming consultancy and related activities subsectors is forecast to be the highest level of all sectors.
- Long term/horizon issues include backshoring, industrialisation of IT delivery, and the pool of talent and gender issues. Output in the sector in the long term is forecast to grow at 5.8 per cent per annum and productivity at 5.2 per cent, well above the average for all sectors.
- Within the Information and communication technologies workforce there is forecast to be an increase of 50,000 workplace jobs by 2020 through growth of six per cent between 2010 and 2020. Growth is predominantly in the high skill, high value areas of Managerial, Professional and Associate Professional and Technical occupations.
- Replacement demand will generate an additional 321,000 job openings in the sector which in addition to the 50,000 jobs created by growth means there is a total requirement of 371,000 between 2010 and 2020. As with growth, replacement demand is expected to be in Professional occupations (125,000), Managerial positions (57,000) and Associate Professional and Technical occupations (53,000).
- Future skills needs in the sector can be grouped into five areas: security skills, business skills, technology specific skills, interpersonal skills and analytical skills.

## 7.1 Future trends

Future trends in the sector are set out in relation to the short, medium and long term drawing on a variety of sources to present the best possible view of developments in the sector that will impact employment and skills. These trends are followed with detailed forecasts on the future occupational profile, using the latest projections from Working Futures.

Finally, future skill needs, as articulated by employers in the sector, are summarised giving a view of potential areas of growth and development. Although a wide variety of sources have been reviewed, as with any forward looking research, the findings in this section should be treated with caution.

### 7.1.1 Drivers

This section explores possible or likely future trends in the sector and the associated skills needs that these may bring, based mainly on the report 'IT & Telecoms Insights 2011: Trends and UK skills implications' (e-skills UK and Experian, 2011). It can often be difficult for employers to distinguish between current and future skills needs and so combinations of methods were used to identify key trends within the sector. This piece of work combined desk research on key trends with a survey of 200 employers of IT and Telecoms professionals across the whole economy to explore the implications for recruitment and skills development.

The scope of the survey included employers outside of the Information and communication technologies industry as defined in this report, and responses were used unweighted to provide depth information on future trends and skills implications. The research has been reviewed for this report to establish which of these future drivers are most applicable to the Information and communication technologies sector, as defined in this report, which only constitutes a part of the original research. Trends by individual UK nation and sub-sector are not available.

Fifteen future drivers identified by employers in 2010 include immediate, developing and horizon issues. Many of these future drivers follow on from the macro level trends explored in Chapter six of this report but tend to be more specific to the sector. This chapter articulates future skills trends in more detail.

In addition to the drivers set out below, the National Strategic Skills Audit for England (UKCES, 2010) outlines why the Information and communication technologies sector can be seen in its own right to be a driver of change, saying:

> The emerging digital sector – based at least in part on the computing and telecommunications sectors – is widely considered to have the potential to be perhaps the major driver of the economy over the next 10 years both in its own right, and through the transformational properties of the goods and services it produces.

**Short-term / immediate issues**: those that many employers say will have a major impact on business, and typically in the next 1 to 3 years. The immediate key issues for employers appear to be security and data protection (as explored in Section 6.1.1), but innovation is also considered important, followed by cloud computing, convergence of communications & IT and the real world web.

Recent analysis of future prospects for the sector in Working Future 2010-2020 (Wilson and Homenidou, 2011) summarises short term prospects for the sector saying:

> In information & communication, recent results from some of the largest computing services firms are promising, and show evidence of an increasing trend in big contracts, rather than smaller IT projects. The industry is forecast to see a good recovery in 2011, as relatively strong demand from the private sector is expected to more than offset the negative impact of the government spending cuts.

Employers in the Information and communication technologies sector surveyed in the Employer Perspectives Survey 2010 (Shury *et al.*, 2011) were also optimistic about short term recovery. Analysis of the survey data shows that employers in the sector were more likely than average to be positive about their prospects for workforce growth over the next 12 months with over a third (36 per cent) said they expected their workforce to increase in size compared to 20 per cent of all employers. Just four per cent of employers in the sector said their workforce would contract compared to eight per cent of all employers[28].

Sustained growth (defined in the report as growth over the past 12 months as well as expected growth over the coming year) is reported for 16 per cent of all employers in the sector compared to seven per cent of employers across all sectors.

[28] Information and communication technologies: Base: All employers. Unweighted responses 316. Weighted responses 33,345. All sectors: Base All employers: Unweighted responses 14,390 Weighted responses: 1,774,876.

**Medium term / developing issues** are those that will have a major impact on only on a selection of businesses, or alternatively may have a widespread impact, but in the medium term. Medium term issues include: Green IT; the transformation of business using IT; reshaping the data centre; consumerisation of IT; Information and Analytics; Borderless Business and Digital Natives.

'Developing' does not necessarily mean new - some of these issues have been around for some time, for example green IT and the transformation of businesses using IT, but it can take time for the impact to be felt. Other issues are new, for example the possibility of reshaping the data centre has emerged in the last 5 years, but only those businesses with intensive computing needs will be directly affected.

Projections of output and productivity for the 'IT sector' (defined as SIC 61 Telecommunications and SIC 62 Computer programming, consultancy and related activities) show the highest level of growth of all sectors in the short to medium term (2010 to 2015). The projections show growth of 5.7 per cent per annum in output (2.1 per cent across all sectors) and similarly 5.7 per cent per annum in productivity (1.8 per cent across all sectors). (Wilson and Homenidou, 2011)

**Long term / horizon issues** include: Backshoring; industrialisation of IT and the pool of talent/gender balance. These are wider, ongoing issues, impacting at different times, on different businesses, but not affecting a majority of businesses all at once. For example, quite a few large businesses are thinking about backshoring, but it is not regarded as an immediate issue and smaller employers do not appear to be very concerned by it. In contrast, industrialisation of IT delivery will only really impact on small employers in any great number, while the pool of talent and gender balance is an issue for employers across the Information and communication technologies sector itself, and is an issue that employers consider can only be fixed structurally in the long term.

Output and productivity for the 'IT sector' continue to grow in the long term (2015-2020) with growth of 5.8 per cent per annum in output and 5.2 per cent in productivity compared to an all sector average of 2.7 per cent per annum growth in output and two per cent growth in productivity. (Wilson and Homenidou, 2011)

### 7.1.2 Impact on employment and skills

The impact of these trends on employment and skills is outlined in this section. Particular skills needs are highlighted in *italics.*

The projected increase in demand for goods and services in the sector will impact patterns of employment with increasing demand for output expected to lead to a rise in employment. However, the rising rate of productivity in the IT sector also predicted in Working Futures (Wilson and Homenidou, 2011) will have the effect of dampening demand for labour somewhat:

> Changing patterns of employment by sector are largely dominated by longer-term trends in the demand for goods and services. Increasing demand for a sector's output can be expected to result in increasing employment levels (and conversely) all else being equal. However rising output is not a sufficient condition to guarantee increasing employment levels. Employment prospects also depend upon how rapidly productivity rises in the sector. While productivity growth is a key element in maintaining competitiveness and reducing costs, it also has a direct impact on employment levels. All else being equal, increases in productivity imply fewer people employed.

**Short /immediate issues and the impact on skills**

**Security and Data Protection** (see also Section 6.1.1). Increasing use of electronic channels and information-intensive products creates greater convenience and more efficient channels, but also a new market for theft and illegal activities. The increasing use of personal devices in IT opens up new channels into networks and repositories of data. Employees across the sector will need skills to develop *integrated security solutions*, and *manage risk*. Workers in this area will need to keep up to date through research into new security schemes and policies, and understand the vulnerabilities of the underlying architecture and infrastructure. Security and information assurance professionals will be in increasing demand across the sector.

**Innovation** is the process that renews or makes an improvement on something that already exists. With technologies, products and services for the renewal to take place it is necessary for people to change the way they make decisions, they must choose to do things differently, make choices outside of their norm. Innovation is also about how the design process is managed, about changing cultural attitudes that enables further innovations. Alongside *creativity skills*, innovations need to be driven through using *re-appraisal, project management* and *testing skills* to ensure ideas become reality.

**Cloud computing** (see also section 6.1.5) delivers internet-based information and technology services in real time and will impact skills in the Telecommunications, Computer programming and consultancy and Information services sub-sectors. Cloud computing promises to speed application deployment, increase innovation, and lower costs, while increasing business agility. *Project* and *integrated solutions management skills* are required to realise these potential advantages, as are further *architecture and infrastructure, networking* and *quality assurance testing skills*.

**Communication & IT Convergence and Integration** - telecommunications, computing and networking are converging and moving from hardware intensive to a software intensive platform. Patterns of work and collaboration are changing as communications, devices and applications are integrating more into day to day work, for example mobile devices that integrate phones with internal systems. *Security maintenance skills* will be the main priority for employers, followed by *technical expertise in the new technologies*.

**Real World Web** is focused on generating real time content and reacting to the surrounding world, for example tracking real world traffic / experiences of users. Mobile devices are beginning to augment interactions with real world items. *Technological communications infrastructure skills* will be particularly necessary, and so too will *collaborative commerce skills* to develop and market applications in line with 'real world' developments.

**Medium term issues and the impact on skills**

**Green IT** (see also section 6.1.3). An increase in global awareness of the environmental challenge means that businesses need to remain competitive in their offer by ensuring that employees have the relevant skills. Employees across the sector, including those in the Repair sub-sector, will be required to *fully understand user consumption, environmental impact assessment and management,* as well as *technology utilisation and re-cycling* and possess *technical design skills related to power management*.

**Transformation through IT**- the transformational power of IT comes from bringing together business people and technologists to address business issues. The role of technology is expanding all the time, moving from a model of technology deployment to technology enablement. Increasingly in an e-commerce environment the centrality of those working in the sector in achieving business objectives will only grow enabling transformation of key functions such as customer relationships, sales and procurement through the exploitation of new technologies. Professionals now need to be not only 'versatilists' with depth abilities to identify *business issues* and strategic challenges, but also mediators with the *interpersonal skills* to deal with people across the business in *enabling change*.

**Information and Analytics** is the use of business intelligence to gain insight and enable the planning and implementation of appropriate responses. For businesses to take advantage of the competitive advantage their intelligence holds, they clearly need the basic ability to generate, gather and analyse data, and hence staff will need advanced skills in *modelling, simulation and analytics*. But this is only one stage – businesses also need the maturity to integrate their various analytical operations and draw out lessons that can shape overall business strategy.

**Reshaping the Data Centre** – as outlined in section 6.1.5, new models offer modular / mobile data centres and cloud based solutions but this will only be fulfilled with enhanced *hardware utilisation, security maintenance and power and thermal management skills*. *Project management skills* will also be required to facilitate rapid and effective response to client needs, as will greater understanding of *technical and network architectures*.

**Borderless Business** - the borders of business networks are expanding over geographical divides, across devices and across an increasing range of applications. Borderless services and applications should deliver to anyone, anywhere, on any device and at any time. Security is clearly paramount. But there are also *specialised technical skills needs in the areas of voice, data, and video technologies* together with a higher understanding of the *architectures and infrastructures* that underpin these systems.

**Digital Natives** (see also section 6.1.6). Those born after 1985 and who have grown up in an IT-intensive environment - are not only customers for the sector, but also the source of tomorrow's workers. To cope with this influx of new generation workers, senior and managerial staff (i.e. 'digital immigrants' who have come across computing later in life) will need to *manage diverse workforces* with different capabilities as well as handle greater scales of *technological complexity* and also *process design*.

**Consumerisation of IT** (see also section 6.1.7). Many employees now personally consume more advanced technology than they use at work, and they now expect to use the same technologies in a work environment. An obvious cost-saving solution is to integrate personal devices into business, requiring *integration and customisation skills* to do this and the *architecture and infrastructure skills* to understand interoperability. More generally, greater expectations also require better *commercial design* and *product development skills*.

**Long term issues and the impact on skills**

**The Pool of Talent and Gender Balance** - enrolments in technology-intensive courses continue to decline and women, in particular, remain unconvinced about a career in IT. However, the need to attract high quality recruits in the future is a key issue for employers. The sector needs not only a vibrant, well skilled recruitment pool but also more innovative and skilful approaches to recruitment, workforce development and *HR management* in order to secure the *technical, business, design* and *innovation skills* needed for the future. The Working Futures 2010-202 report (Wilson and Homenidou, 2011) also comments on potential employment resource problems in the long term for 'computing services' saying:

> There are concerns that certain skills gaps could be opening up in the sector, owing to large numbers of workers in certain fields reaching retirement age in the next ten years or so. At the same time, computing and IT subjects are falling in popularity among students.

**Backshoring** - when off shoring fails some companies choose to bring services back onshore. This is not new technology, and nor is it the norm, but where it does happen employers need to recruit the right people. In a backshoring situation, staff (and managers and leaders in particular) need to be able to handle the disruption caused, to *deal with internal / external clients, manage teams* and ensure that the company's *security* is protected at all times.

**Industrialisation of Technology Delivery** - increasingly the sector is driven by automation, process and service standardisation. With products sourced from multiple suppliers, there needs to be common standards and frameworks that are adhered to as delivery of technology operates on a larger and larger scale. This requires specific skills in solution design and the ability to *design and re-engineer business processes*. However, it is also about these experts having the skills to *manage customer accounts and relationships*.

### 7.1.3 Future occupational profile

This section looks at likely patterns of labour market projections and occupational change using data from the latest “Working Futures” project which provides projections for a ten year horizon from 2010 to 2020. Growth and replacement demand are presented.

The forecasts and projections presented in this section should be considered as indicative as they are based on historic trends and best possible current knowledge intended to provide a “benchmark for debate and reflection and to inform policy development” (Wilson and Homenidou, 2011).

The projections are based on official employment data and factor in the impact of government economic policies. Data in this section presents employment using a workplace jobs definition (rather than number of people) and include self-employment.

There is forecast to be a gradual recovery in the UK economy and renewed growth leading to an increase in the number of workplace jobs between 2010 and 2020 with over 1.5 million additional jobs created across the economy (Table 7.1). Growth in the total number of jobs is mainly in Professional, Associate Professional and Managerial occupations. This will be offset by other occupational groups, such as Administrative and Secretarial and Skilled Trades where an overall decline in the number of jobs is forecast.

Other key issues emerging from the Working Futures study (Wilson and Homenidou, 2011) are that labour market participation rates are expected to fall due to the aging population, that 57 per cent of additional jobs created will be part time and that growth will be predominantly in the “white collar” occupational groups of Managers, Professionals and Associate Professionals, driving demand for higher level skills and qualifications. “Computing services” are highlighted within the broad “business and other services” sector as expected to see the fastest growth.

Workplace jobs growth across the whole economy in the UK between 2010 and 2015 is expected to be 1.3 per cent but will pick up thereafter to 3.7 per cent over the period 2015 to 2020. Workplace job growth across the economy is expected to be greatest in Northern Ireland and Wales over the period to 2020.

**Table 7.1 Workplace job growth by occupation, whole economy (UK)**

| Employment growth | 2010 | 2015 | 2020 | 2010 | 2015 | 2020 | 2010-2020 |
|---|---|---|---|---|---|---|---|
| | Numbers (000s) | | | % shares | | | Net change (000s) |
| Managers, directors and senior officials | 3,016 | 3,279 | 3,560 | 9.9 | 10.6 | 11.1 | 544 |
| Professional occupations | 5,843 | 6,189 | 6,712 | 19.2 | 20.1 | 21.0 | 869 |
| Associate professional and technical | 3,926 | 4,138 | 4,476 | 12.9 | 13.4 | 14.0 | 551 |
| Administrative and secretarial | 3,698 | 3,466 | 3,312 | 12.1 | 11.2 | 10.3 | -387 |
| Skilled trades occupations | 3,526 | 3,389 | 3,295 | 11.6 | 11.0 | 10.3 | -230 |
| Caring, leisure and other service | 2,719 | 2,801 | 3,032 | 8.9 | 9.1 | 9.5 | 313 |
| Sales and customer service | 2,608 | 2,555 | 2,610 | 8.6 | 8.3 | 8.2 | 2 |
| Process, plant and machine operatives | 1,950 | 1,829 | 1,737 | 6.4 | 5.9 | 5.4 | -213 |
| Elementary occupations | 3,173 | 3,209 | 3,274 | 10.4 | 10.4 | 10.2 | 101 |
| All occupations | 30,458 | 30,855 | 32,008 | 100.0 | 100.0 | 100.0 | 1,550 |

*Source: Working Futures, Warwick Institute for Employment Research / Cambridge Econometrics, 2011*

Table 7.2 shows that, within the Information and communication technologies sector, there is forecast to be an increase of 50,000 workplace jobs between 2010 and 2020. The growth in jobs in the sector is six per cent across the decade, slightly higher than the average across the UK economy.

**Table 7.2 Workplace job growth by occupation in sector (UK)**

| Employment growth | 2010 | 2015 | 2020 | 2010 | 2015 | 2020 | 2010-2020 |
|---|---|---|---|---|---|---|---|
| | Numbers (000s) | | | % shares | | | Net change (000s) |
| Managers, directors and senior officials | 136 | 145 | 157 | 16.1 | 17.0 | 17.6 | 22 |
| Professional occupations | 339 | 348 | 371 | 40.2 | 40.8 | 41.6 | 33 |
| Associate professional and technical | 147 | 150 | 157 | 17.5 | 17.5 | 17.6 | 10 |
| Administrative and secretarial | 58 | 53 | 50 | 6.9 | 6.2 | 5.6 | -8 |
| Skilled trades occupations | 72 | 67 | 63 | 8.5 | 7.8 | 7.1 | -9 |
| Caring, leisure and other service | 11 | 13 | 14 | 1.4 | 1.5 | 1.6 | 3 |
| Sales and customer service | 54 | 53 | 53 | 6.4 | 6.2 | 6.0 | 0 |
| Process, plant and machine operatives | 12 | 11 | 11 | 1.4 | 1.3 | 1.2 | -1 |
| Elementary occupations | 14 | 15 | 15 | 1.7 | 1.7 | 1.7 | 1 |
| All occupations | 843 | 853 | 893 | 100.0 | 100.0 | 100.0 | 50 |

*Source: Working Futures, Warwick Institute for Employment Research / Cambridge Econometrics, 2011*

Growth is predominantly in the high skills occupational areas that already account for 74 per cent of workplace jobs in the sector in 2010. Managerial, Professional and Associate Professional and Technical occupations will increase their share of employment in the sector to 77 per cent by 2020. In contrast, Skilled Trades, Administrative and Secretarial, and Process, Plant and Machine Operatives will all see a decline in total employment by 2020 and a decreasing share of sector employment.

### 7.1.4 Replacement demand

In addition to the forecast continued growth in the Information and communication technologies sector, there is additional 'replacement demands' which are created when employees leave the labour market, to retire for example. Across the whole economy, it is estimated that replacement demand will generate around 12 million job openings between 2010 and 2020, "many times more than the 1.5m openings from the creation of new jobs." (Wilson and Homenidou, 2011)

In the Information and communication technologies sector, replacement demand is expected to generate 321,000 job openings in addition to the 50,000 created by growth, creating a total requirement of 371,000 (see Table 7.7).

As with growth, replacement demand is expected to be mainly in the occupational areas of Professional occupations (125,000), Managers, Directors and Senior Officials (57,000 to 2020), and Associate Professional and Technical occupations (53,000). However, even in occupational areas that are not expected to grow within the sector, replacement demand will create job openings with 27,000 in Administrative and Secretarial roles, 27,000 in Skilled Trade occupations and 17,000 in Sales and Customer Service roles between 2010 and 2020.

**Table 7.3 Employment growth and replacement demand by occupation in sector (000s) (UK)**

| | 1990 | 2000 | 2010 | 2015 | 2020 | | Net change | Replacement demands | Total requirement |
|---|---|---|---|---|---|---|---|---|---|
| | 000s | 000s | 000s | 000s | 000s | | 000s | 000s | 000s |
| Managers, directors and senior officials | 62 | 103 | 136 | 145 | 157 | | 21 | 57 | 78 |
| Professional occupations | 153 | 290 | 338 | 348 | 371 | | 33 | 125 | 157 |
| Associate professional and technical | 76 | 142 | 147 | 150 | 157 | | 10 | 53 | 64 |
| Administrative and secretarial | 55 | 100 | 58 | 53 | 50 | | -8 | 27 | 18 |
| Skilled trades occupations | 88 | 97 | 72 | 67 | 63 | | -9 | 27 | 18 |
| Caring, leisure and other service | 5 | 10 | 11 | 13 | 14 | | 3 | 5 | 8 |
| Sales and customer service | 43 | 65 | 54 | 53 | 53 | | 0 | 17 | 17 |
| Process, plant and machine operatives | 7 | 11 | 12 | 11 | 11 | | -1 | 5 | 4 |
| Elementary occupations | 11 | 18 | 14 | 15 | 15 | | 1 | 5 | 6 |
| All occupations | 500 | 837 | 843 | 853 | 893 | | 50 | 321 | 371 |

*Source: Working Futures, Warwick Institute for Employment Research / Cambridge Econometrics, 2011*

Predicted growth in the Information and communication technologies sector is slightly higher than across the economy as a whole and future trends and forecasts all predict the continuation of the demand for high level skills in the sector. Growth and replacement demand, as summarised in Table 7.7, suggests that the sector requires a large number of recruits at professional, manager and associate levels – with these occupations making up over 80 per cent of the total requirement.

These occupational areas are precisely those that are forecast as the greatest areas of need across the whole economy and so, whilst Working Futures predicts the supply of people holding higher level qualifications is also predicted to grow, the increasing demand for skills and entrants to these occupations may lead to increasing competition between sectors for highly skilled recruits, with a potential increase in skills shortages, wages and migration if the supply of labour is not able to meet employer demand.

### 7.1.5 Future skill needs

Looking across the future drivers and occupational changes in the sector explored in this chapter, it is apparent that growth (and also replacement) demand in the sector will be predominantly in managerial, professional and associate professional occupations. Employees in these occupations in the sector are, in the main, already highly skilled and it is likely that future skills needs will also be concentrated at higher levels with some intermediate level skills, intensifying the existing profile in the sector to higher skills and an even higher value workforce.

Research on skills implications (e-skills UK / Experian, 2011) identifies five future skill areas that cut across the sector:

- Security skills;
- Business skills;
- Technology specific skills;
- Interpersonal skills;
- Analytical and research skills.

**Security skills**

Security and data protection is one of the clearest and most immediate skills needs for the sector. It is an apparent need across occupations in the sector and in multiple drivers of skills needs. The ability of the sector to deal with security issues is a key priority skills area.

Data protection is an important consideration for those working in the sector. Those providing and utilising cloud computing services need to think about the ramifications of storing data off-site, particularly in terms of legal issues and the potential damage incurred by temporary outages. The consumerisation of IT runs the risk of insecure personal device and social network usage resulting in data leaks. And as IT and communications devices converge, and businesses become increasingly borderless there are questions emerging about data transfer and accessibility. The number of access points, into and within, networks is increasing in scale and diversity, and the scale of personal data held growing exponentially.

Security also incorporates broader issues, such as business continuity. In reshaping the data centre businesses need to plan for the future, but modular and mobile data centres affect the way technical staff weigh up cost pressures against certainty of future capacity. Similarly, cloud computing offers scalable flexibility and reduced cost, but not without security challenges. Security may also be a factor in assessing the success or failure of outsourcing and back-shoring.

**Business skills**

Increasingly, employees in the sector must have core business skills. Creative, technical and entrepreneurial skills alone are not enough, particularly in small businesses – as Professionals and Associate Professionals (as well as Managers) need to manage lifecycles of product development, and solve real business issues such as the link between mobile technologies and workforce planning, or social media and marketing. In order to apply this knowledge they need to be able to manage projects and change, as new products are designed and deployed. Technical skills need to be complemented by a balanced understanding of businesses' broader objectives. For example, where cost cutting is a major goal, energy efficiency, modular data centres or cloud computing offer potential business savings, but they may also lead to outsourcing of the knowledge and capabilities that are needed internally for product development. Resourcing issues might require businesses to re-think their approach to workforce development, and intelligence analysis can potentially shape the entire business strategy.

**Technology specific skills**

Central to nearly all future trends and occupations in the sector is specific and high level technical knowledge. For example, the systems that underpin the convergence of communications and IT and borderless businesses are similar - networks and devices that support voice, video and data communications and mobile devices. Expertise in these devices also underpins real world web development, and the possibilities and challenges of the use of personal devices.

A number of future trends address other fundamental challenges about technology architecture and infrastructure. Demand for skills in power management, thermal solutions and utilisation are common issues in reshaping data centres, and in making IT greener. The sector needs a workforce with a deep understanding of a wide variety of technical issues if cloud computing is to become a reality, and without this knowledge it is also hard to understand how data security issues can be addressed successfully.

### Interpersonal skills

As information technology and services become more embedded in everyday life, business and social, workers in the sector need to be able to deal with and better understand customer challenges and consumer choices. Interpersonal skills needs reach across the breadth of occupations within the sector, from managers and leaders with responsibility for supply chains, customer relationships, sales and procurement, to technical specialists who not only need to solve problems for business functions but are increasingly closely integrated with the customer to innovate and explore the ramifications and benefits of exploiting new technologies to existing business processes.

With the rise of social computing, powered by a set of internet-based technologies, IT & Telecoms professionals need to apply social networking, interactive design and social / technical skills to these internet based channels.

Where businesses face fierce competition to maintain their customer base, such as in the Telecommunications sub-sector, customer service skills are increasingly important.

### Analytical and research skills

In some senses analytics is a sub-set of generic business skills and technology, but it is a vital component of connecting information and technology to business problems. This will require organisations to have strong data architecture in place and then to develop new analytics skills to bring business meaning to operational data. While analytics are deeply embedded in business performance and strategy, they also underpin a businesses' ability to innovate with skills in business simulation, performance modelling and information analytics key to future success.

# 8 Priority areas for action

This chapter sets out the core and strategic areas for action for the Information and communication technologies sector, based on the evidence presented in this report. The intention is to provide insight and foresight about strategic skills needs so that stakeholders can make informed decisions on the skills and employment system in each nation.

**Chapter Summary**

- Priority areas for action, based on the evidence in this report set out the core and strategic areas that require action over the short, medium and longer term if the Information and communication technologies sector in the UK is to maintain and increase its contribution to the UK.
- High priority skills needs for immediate action include the requirement to address the supply of new entrants into the sector, ensuring there is a sufficient and ongoing pipeline of talent and a broad and diverse enough recruitment pool for employers. Without this, the growth of the sector could be restricted and future skills demand will be difficult to meet.
- Security and data protection skills, across all occupations in the sector are a critical area for immediate action, along with the need to address technical skills gaps and technical skills shortages within Professional occupations in the sector.
- Skills needs of importance include the increasing needs for business and interpersonal skills across most occupations in the sector. Management skills are regarded as an area of current need in Wales in particular but across all nations in the UK, there could be a future issue if the current lack of investment in management skills continues.
- Non-technical skills needs (for example business and interpersonal skills) for Professionals and technical skills shortages for Associate Professional and Technical occupations are also rated as important but are noted to be smaller in scale.
- Within the self-employed workforce in the sector, there is some need for skills development around business and management skills and although these are needs are of a more moderate scale, they are important as tends show the self-employed are less likely to participate in work-related training or education.
- Moderate skills priorities are apparent in the smaller Skilled Trade occupational group and for Sales and Customer Service occupations.

## 8.1 Approach to developing priority skills needs

The chapter uses a risk based approach following the model developed by Skills Australia and used in the National Strategic Skills Audit for England 2010 and the National Strategic Skills Audit for Wales 2011.

Each strategic area for action has been formulated on the basis of the evidence in this report where there are:

- Current and/or future anticipated skills needs which are significant in scale or volume;
- Significant current and/or emerging skills needs with a significant contribution to economic performance but more moderate in scale;
- Concerns over whether the skills needs will be adequately met.

Each issue has been assessed using four criteria to determine the level of priority:

- **Degree of certainty** – considering the likelihood of the drivers of demand materialising or the risk of supply failure;
- **Magnitude** – considering the scale of action by looking at the magnitude of skills need, existing or new job requirements;
- **Lead time** – assess the length of time required to 'fix' the problem and considers the availability of existing solutions, for example existing training solutions, learning time and whether new provision needs to be developed;
- **Criticality** – this seeks to assess the potential risk to sector growth and contribution of the sector to the economy.

Likely skills and occupational deficits in the sector can be expressed in terms of capacity and also capability and have been given an importance rating using colours to indicate the level of priority for action:

- **Red** – high priority skills needs for immediate action;
- **Pink** – high priority skills needs which are of importance rather than critical to the sector and where deficits are smaller in scale and require a shorter lead time to rectify than those rated red;
- **Amber** – medium priority skills needs of moderate scale and/or timeframe for action where the degree of certainty of their impact may be less critical.

Green ratings are not identified in this report as these are considered to be where there is a better match between supply and demand and therefore fewer skills issues.

Important issues and trends in the sector, in the context of which the main priorities should be seen, include the following:

- **Current demand** and occupational structure of the sector where the largest proportion of the workforce are employed as Professionals and Managers. Vacancies account for five per cent of employment and are concentrated in Sales, Professional and Associate Professional occupations;
- **Skills mismatches** including skills shortages which account for the majority of hard to fill vacancies, skills gaps which affect a slightly higher proportion of the sector workforce than average and under-employment;
- **Current and future drivers of change** which are expected to continue the demand for high level skills in the sector;
- **Future demand** where forecasts of continued growth in the sector mean an increasing demand for professionals in particular but also highlight replacement demand across all occupations as a potential problem.

The main priorities for the Information and communication technologies sector are presented below. Appendix C presents a priority action matrix summarising the skills needs by occupational group based on the evidence in this report and should be referred to as part of Chapter 8. Where a priority may be more or less significant for a nation this has been highlighted.

## 8.2 High priority skills needs for immediate action

**Red – high priority skills needs for immediate action**

High priority strategic skills needs have been identified for **occupations across the sector** and for **professionals** and draw together all the high priority skills needs.

### 8.2.1 High priority skills needs across occupations

**Recruitment for forecast growth in the sector and future skills needs will be difficult to meet**.

Future demand for labour in the sector through to 2020 is very significant with a total requirement of 371,000 new entrants made up of 50,000 additional workplace jobs through industry expansion (growth) and 321,000 job openings due to replacement. Demand overall will be particularly in high skills, higher level occupations such as Professional, Managerial and Associate Professional and Technical.

However industry demographics are also challenging. The sector workforce is aging and current recruitment practices are restricted to only parts of the talent pool with employer preference for graduate recruits and a lower proportion of employers recruiting young people (21 per cent compared to 24 per cent across the economy). There is a current gender imbalance in the workforce (with only 23 per cent of the workforce female) and also female participation in IT related educational supply is an issue. Current IT related education is being questioned both in terms of quality, delivery and relevance and because of the continuing downward trend in take up. There is an overriding negative perception of careers in the sector by young people in particular.

The scale of predicted growth and breadth of supply issues indicate the extent of the recruitment issue is large. Long term solutions are required to develop the workforce of the future as well as action to address current supply issues in terms of skills shortages.

There is a critical risk to growth and employment in the sector if the recruitment pool is not available in volume or quality (skills shortages) and in resulting skills gaps (as a consequence of skills shortages). Furthermore, the sector is a key contributor to the wider economy with one of the highest levels of productivity per head. Technology is key to driving productivity and efficiency in both the public and private sector and skills issues in the sector will have an additional effect on ongoing technological progress across the whole economy.

In addition to failing to meet the predicted growth potential (in terms of both employment and output), consequences in the long term could include a) continuing and accelerated aging of the workforce b) diminishing recruitment pool of young and female talent c) increasing reliance on recruitment 'outside' of the sector (for example from other parts of the economy and non-IT degrees) with associated skills mismatches and d) global sourcing of labour: including migration to the UK and also a potential increase in off-shoring.

This recruitment priority is apparent across each nation. Predicted workforce job growth rates in the sector in Northern Ireland are set to outperform the other nations in terms of forecast growth of 23 per cent from 2010 to 2020. In addition, Northern Ireland has a particularly high proportion of the workforce aged 25-44. Employment growth of ten per cent is forecast for the sector in Wales, although significantly not in professional occupations. Growth in Scotland is likely to be slower and in the medium term (from 2015 rather than earlier) and already has a larger proportion of the sector workforce aged under 25 (12 per cent).

**Security and data protection skills**

Security and data protection skills are highlighted as a clear priority area for action for the Information and communication technology sector across the UK. Security and data protection is the most immediate of the current and future drivers recognised by employers and the impact is likely to be extensive as the associated skills needs cut across the whole sector workforce. Security is seen as a key skills development area for the sector - Managers, Software designers and developers, Technical support and IT Operations will all need to update and improve their security skills, implementing security measures and routinely protecting data and systems.

There will be specialist skills needs for cyber security and information assurance professionals and whilst these specialist IT security roles are relatively small in number currently, as demand grows there will be a need for more of these specialists including those with post-graduate education.

This is an immediate and ongoing priority for action because of the ever evolving nature of technology and cyber crime. It is also categorised as critical as the cost and extent of cyber-crime is rising. The issue is UK wide and again, the extent of the impact of this priority reaches beyond the sector itself as the sector provides technology prevention and detection solutions and services to businesses across the economy and the public sector.

### 8.2.2 High priority skills needs for professionals.

For professionals working in the Information and communication technologies sector, technical skills gaps and shortages have been assessed as high priority skills needs for immediate actions. Professionals are the largest occupational group in the sector (267,000) and software professionals are the largest occupation (141,000).

**Technical skills gaps for professionals** are highlighted as a key area for immediate action. Whilst many employers (44 per cent) say skills gaps are due to employees being new to the role and therefore can be seen as ‘transitory’ gaps, skills gaps in the sector workforce affect one in ten employers and a larger proportion of the workforce than average (6% or 34,775). Gaps in the sector workforce are highest in England but technical and practical skills are cited in Scotland and Wales as significant areas of skills gaps.

The largest volume of skills gaps in the sector are in professionals (9,414 or 7 per cent of all professionals), and job specific skills are the third largest skills gap area in the sector in the UK. For professional occupations in the sector, job specific skills gaps are most likely to be technical in nature and at a high skills level, encompassing software and solution development, analysis and design, implementation and security. Specific gaps will always be found in new and developing skills due to the fast paced nature of change in the sector.

There are current solutions to skills gaps in the workforce (particularly transitory gaps) and training in new technologies is the second most common type of training provided in the sector, after "job specific" which could also be technology related in this case.

However, there are low levels of training (43 per cent of professionals trained in the sector compared to 61 per cent across the economy) and nearly one in five employers (18 per cent of those who do not train) identifies cost as a barrier to training.

Skills gaps are adversely affecting businesses in the sector: increasing workload for other staff (potentially affecting productivity, morale, and retention); operating costs and causing difficulties meeting quality standards. Other consequences of skills gaps to the sector (and in particular where there are technical skills gaps in professional employees) are loss of business orders (30 per cent), delays in developing new products and services (39 per cent) and nearly one in four employers (23%) report outsourcing work as a consequence of skills gaps.

**Technical skills shortages for professionals** include advanced IT or software skills and the current 'in demand' skills of SQL, C, C#, .NET and SQLServer. These skills shortages affect professionals working across the sector but in particular in Games development which is part of the Computing programming, consultancy and related activities sub-sector.

One in four of current professional vacancies are categorised as skill shortage vacancies and professional SSVs make up 41 per cent of SSVs in the sector. Job specific skills, and specifically advanced IT and software are the most common skills lacking. Software professionals (software developer and systems engineer) in "visual effects and 2D/3D computer animation for film, television and video games" are currently on the MAC skills shortage list.

Professionals are the largest occupational group in the sector (267,000 or 35% of the workforce) and predicted growth of 33,000 for this occupational group to 2020 coupled with replacement demand of 125,000 equates to a total demand forecast of 157,000 through to 2020 in this occupational group. If the current SSV ratio (one quarter of vacancies) continues over the forecast period, this would mean that 39,250 of the projected job growth and replacement opportunities to 2020 would be skills shortage vacancies.

Skill shortage vacancies in the sector in Scotland are 28 per cent of all vacancies, which is higher than the rest of the UK. Whilst the proportion of professional SSVs in Scotland is not known, a larger proportion of employers in the sector in Scotland report vacancies for professionals than across the rest of the UK indicating that the issue of professional shortages in Scotland could be more severe.

Although in Northern Ireland a lower proportion of all vacancies in the sector are Skill Shortage Vacancies (13 per cent compared to 17 per cent), 42 per cent of the workforce is employed in professional occupations, signifying a greater reliance on this occupation than elsewhere in the UK. Whilst the proportion of professionals SSVs in Northern Ireland is not known, a slightly higher proportion of employers than average report vacancies for professionals in Northern Ireland. Additionally, employers in Northern Ireland are more likely to have retention issues suggesting staff are more likely to move to another job or employer with the possible impact of wage inflation and a less stable labour market.

The most immediate response by employers to hard to fill vacancies is to use new recruitment methods. In the medium term ensuring a better flow of skills in to the sector, and recruitment from alternative sources would help to ease medium to long term supply.

The main impact of technical skills shortages on the sector is an increase in workload for existing staff. This has possible consequences in terms of productivity (GVA per head is currently one of the highest across all sectors) and staff morale and retention. Other consequences, particularly associated with technical skills shortages in professional jobs, are an impact in the ability to develop new products and the loss of business to competitors.

Additionally, employer demand that is not met risks wage inflation in an already high paying sector and could lead to reliance on inward migration to meet short term needs (either through the Resident Labour market Test or the MAC Skills Shortage List). Again this has consequential and profound economic and social impacts.

## 8.3 High priority skills needs of importance

**Pink – high priority skills needs which are of importance rather than critical to the sector and where deficits are smaller in scale and require a shorter lead time**

High priority strategic skills needs that are important to the sector have been identified for **occupations across the sector, Managers, Professionals** and **Associate Professionals**.

### 8.3.1 Important skills needs across occupations

**Business skills** are a main area of skills gaps in the Information and communication technologies sector. Rated in the top five largest skills gaps areas in the sector, business skills gaps include: Planning and organisation skills (across all nations), Problem solving skills (in England, Scotland and Northern Ireland), and written communication skills (in England and Northern Ireland). Business skills in general are consistently reported by employers who also cite more specifically skills lacking in programme, project and supplier management. In terms of skills shortage vacancies, the business skills are most lacking in planning and organisation skills and problem solving skills.

In Wales strategic management skills are particularly highlighted as a skills gap, appearing as the second largest skills gap area. Team working is noted in Northern Ireland as the largest skills gap area in the workforce. The scale of business skills needs is significant in terms of business skills being three of the top five skills gap areas reported by employers in the sector and two of the top five skills lacking in skills shortage vacancies in the sector. Business skills are also seen as an increasing area of need as employers look to expand markets and increase their interaction with clients.

Solutions to develop business skills do exist but in the medium to long term there needs to be a re-adjustment of educational supply to integrate and develop business skills alongside technical skills.

The development of more effective business skills is seen as very important to the sector in terms of maximising business benefit and efficiency from the core technical and technology skills that are required, and complementing the technical skills through a broader understanding of business objectives.

**Interpersonal skills** including customer service for client facing occupations whether first line or business development are seen as a potential area for skills development and future skills needs.

Customer handling is the fifth largest skills gap area in the sector across the UK (although notably does not feature in the top five skills gaps in Northern Ireland), team working is the most common skills gap in Northern Ireland and leadership skills are also highlighted as a gap by employers. A larger proportion of employees are increasingly interacting with clients and the consumer sector with the consequent need for interpersonal skills to deal with, and better understand, customer challenges and consumer choices. However, where training is provided, personal development training is the least likely type of training to be organised by employers for their employees.

Whilst interpersonal skills are a skills need across most of the occupational areas in the sector, issues with interpersonal skills are more likely to be found in the traditionally technical occupations, for example in professional occupations where interpersonal skills are needed to understand customer requirements in order to provide technical solutions. In contrast, in occupations such as Sales and customer service/Helpdesk interpersonal skills have always been and are inherently core to the job requirements.

Again, whilst existing training and development solutions exist, there is a need for a re-adjustment of educational supply to integrate and develop interpersonal skills which will only take effect in the medium to long term.

For the sector, interpersonal skills are important to develop both business to business and business to consumer demand. It is crucial for the technical workforce to have the skills to interact with colleagues in terms of meeting customer requirements as well as the interpersonal skills required for interaction with clients.

### 8.3.2 Important skills needs for Managers

Management skills including non-technical management skills (such as financial management and people management) and technical management skills including: Programme, project and supplier management; Business process and change management; Information management and security; and Service management and delivery are seen as an important skills priority to develop.

This priority is regarded to be of likely importance rather than critical to the sector because management skills gaps are not currently that extensive in the sector - just three per cent of Managers (4,947 Managers) have skills gaps, equivalent to the UK whole sector average. In addition, within the sector the proportion of Managers and Professionals without a Level 4 degree is 40 per cent, about the UK average.

In Wales however, employers highlight that strategic management skills are already the most common area of skills gap in the Information and communication technologies workforce.

However, just one third of Managers (32 per cent) in the sector receive training and management training (regardless of occupation) is less common in the sector than elsewhere across the economy indicating a potential future problem with management skills.

In addition, the scale of a potential skills issue could be large as there are 212,000 managers in the sector in 2010 and the occupational group is predicted to grow. Information and Communication Technology Managers are the second largest occupational role in the sector (105,000) and Marketing and Sales Managers are the 4th most common occupation in the sector (43,000).

Management skills have emerged in some areas (for example Wales) as a current skills issue but there could be a far greater problem in the future, with the lack of current training potentially contributing to increasing management skills issues. Management skills issues are likely to impact growth in the sector, particularly as management skills are necessary in enabling effective skills utilisation across the business: "better managed firms have more highly educated managers".

### 8.3.3 Important skills needs for Professionals

Non-technical skills including Planning and organisation skills, problem solving, written communication skills and customer handling skills are all identified as areas of skill gaps in the sector. Project management, Programme and supplier management and leadership are also identified as areas needed for professionals.

Whilst business and interpersonal skills are required across occupations in the sector (and are highlighted as 'pink' skills priority across occupations), there is deemed to be a particular requirement for these skills in professional occupations.

Interpersonal and business skills are more likely to have been needed by IT Strategy & Planning professionals (who are likely to be client/customer/supplier facing) than by Software Professionals but increasingly more professional occupations need interpersonal skills to understand customer requirements in order to develop and implement technical solutions. Additionally, interpersonal, business and management skills are needed to work effectively in teams.

The scale of non-technical skills needs is difficult to determine but judged to be 'medium' as gaps in the sector workforce affect one in ten employers and a larger proportion of the workforce (6% or 34,775) than average. Professionals are the largest occupational group in the sector (267,000) and Software Professionals are the largest occupation (141,000) with another 89,000 employees working in IT Strategy & Planning roles. The largest volume of skills gaps in the sector are in professionals (9,414 or 7 per cent of all professionals) – and non-technical skills make up four out of five of the top skills gap areas.

Whilst non-technical skills needs are still considered important, in reality, these skills are further down the priority scale for employers, although for individuals working in key occupations such as IT Strategy and Planning occupations these skills will be become more critical to undertake their jobs.

### 8.3.4 Important skills needs for Associate Professional and Technical

Technical skills shortages, particularly for advanced IT or software skills are seen as an important skills priority to address in the sector.

Associate professional and technical occupations have the second highest number of Skill Shortage Vacancies in the sector amounting to 1,626 SSVs. Just over one in five (22 per cent) of current vacancies for Associate Professionals are SSVs and skills lacking are predominantly job specific, and specifically cited by employers as being in advanced IT or software skills.

Skill shortage vacancies in the sector in Scotland are 28 per cent of all vacancies which is higher than the rest of the UK, but the proportion of Associate Professional and Technical SSVs in Scotland is not known. However, a smaller proportion of employers in the sector in Scotland report vacancies for Associate Professionals than across the rest of the UK indicating the issue of Associate Professional shortages in Scotland may be less severe.

Whilst the extent of technical skills shortages is apparent, we estimate the magnitude of the issue to be mid-range. Currently, Associate Professionals are the third largest occupational group in the sector (107,000 employees) with growth of 10,000 for this occupational group and replacement demand of 53,000, meaning total demand to 2020 will be 64,000. If the current SSV ratio continues because technical skills shortages for Associate Professionals are not addressed, this could create 14,080 skill shortage vacancies between 2010 and 2020.

Solutions to technical skills shortages are expected to be of short/medium lead time. The most immediate response by employers is to use new recruitment methods. In the medium term developing conversion courses and expanding apprenticeships could ensure a better flow of skills in to the sector, and recruitment from alternative sources would help to address medium to long term supply.

The main impacts of technical skills shortages for Associate professionals are similar to those noted for professional skills shortages including an increase in workload for existing staff.

Although job volumes (current and future) are lower in Associate Professional and Technical group, than for Professionals with a consequent decrease in criticality of this skills priority, there are still possible consequences in terms of productivity (GVA per head is currently one of the highest across all sectors) and staff morale and retention. Other consequences are an impact in the ability to develop new products and the loss of business to competitors.

Additionally, employer demand that is not met risks wage inflation in an already high paying sector and could lead to reliance on inward migration to meet short term needs (either through the RLMT or MAC Skills Shortage List) although this is less likely with Associate Professional occupations.

## 8.4 Medium priority skills needs

Amber – medium priority skills needs of moderate scale and/or timeframe for action where impact or degree of certainty is less certain or critical.

Medium priority skills needs in the sector have been identified for those in the Information and communication technologies workforce who are **self-employed,** in **Skilled Trade** occupations and **Sales and Customer Service** occupations.

### 8.4.1 Medium priority skills needs for the self-employed

Skills for the relatively large segment of the workforce (124,000 or 16 per cent) who are self-employed are seen as a medium priority skills need. These skills needs cover all occupations and parts of the sector but the self-employed are particularly concentrated in the Repair of computers and other goods sub-sector where 43 per cent of the workforce is self-employed.

This skills priority could be seen as of greater importance in Wales (where nearly a quarter of the sector workforce is self-employed) and Scotland (18 per cent).

Skills needs for the self-employed are seen to be of 'possible' certainty due to a number of factors and also because of gaps in available information and intelligence on this part of the sector workforce. So, whilst it is known that a large proportion of the workforce is self-employed, the extent of skills issues for this part of the workforce *specifically* is not known. However the nature of the skills needed is likely to be broader than for employees as the self-employed also need the skills to run a business (business skills, staff management and soft skills) as well as undertake a technology related role. It is also known that across all sectors, the self-employed are less likely to participate in work related training or education.

The extent of the skills issue could be large with 124,000 self-employed or 16 per cent of the workforce. This rises to 43 per cent in the Repair of computers and other goods sub-sector. In addition, the proportion of self-employed has grown 40 per cent since 2002 (double the all sector average). Innovation in the sector (a key strength) is reliant on entrepreneurs and small business start ups although CIPD report that the rise in self employment (across the economy as a whole) during the recession is due to 'part-time odd-jobbers' who wish to avoid unemployment and may not suggest a surge in genuine entrepreneurial zeal. However, over the longer term, self-employment and the related skills are important in keeping people in employment and contributing to the economy.

### 8.4.2 Medium priority skills needs for Skilled Trade occupations

Technical skills including advanced IT or software skills are seen as a skills priority for Skilled Trade occupations although the scale of the problem is comparably small.

Whilst the number of vacancies for Skilled Trade occupations in the sector is quite small (1,416), half of vacancies in this occupational group are skills shortages (715) which is the highest proportion across all occupational groups in the sector. Skills missing are job specific, and specifically advanced IT or software.

Additionally, Skilled Trade occupations are a relatively small occupational group (80,000 employees) and the group is declining in terms of net change (a decrease of 9,000 workplace jobs to 2020). However, with replacement demand there is still a need for 18,000 workplace jobs to be filled to 2020. This might mean 9,000 of the 'vacancies' would be SSVs to 2020 if the current SSV ratio continued.

SSVs in the sector in Scotland are 28 per cent of all vacancies which is higher than the rest of the UK and whilst the number of SSVs for Skilled Trade occupations in Scotland is not known, employers are more likely to report vacancies in this occupation in Scotland than elsewhere across the UK indicating that Skilled Trade skills issues could be more prevalent in Scotland.

In the short term, the most immediate response by employers is to use new recruitment methods but in the medium term ensuring a better flow of skills in to the occupation, and recruitment from alternative sources would help to mitigate skills issues.

One in two vacancies in this occupation are currently SSVs and whilst the number of vacancies is significantly less than Professionals and Associate Professionals, and the group is one of the smaller occupational groups, this SSV/Vacancy ratio reflects recruitment problems in this area and is thus an important skills priority area to consider.

The main impacts are an increase in workload for existing staff with possible consequences in terms of productivity. Delays in developing new products may still occur as a consequence of technical skills shortages for Skilled Trade occupations as will loss of business to competitors. However, job volumes (current and future) for Skilled Trade are much lower than in Associate Professional and Professional groups with a consequent decrease in criticality.

### 8.4.3 Medium priority skills needs for Sales and Customer Service occupations

Sales and Customer Service occupations are seen as a priority area largely due to the volume of vacancies and extent of skills gaps in this area.

Over 9,500 or 32 per cent of all current vacancies are for Sales and Customer Services staff, however, few of these vacancies are hard to fill (just three per cent of the vacancies) or Skills Shortage Vacancies (two per cent). So, despite the volume of vacancies to be filled, the likelihood of employers not being able to recruit successfully is much lower than in other occupational groups. However, and despite relatively high levels of the Sales and Customer Services workforce receiving training (44 per cent) compared to others in the sector, these occupations experience the second largest volume of skills gaps (5,722 or 7 per cent of Sales and Customer service staff) and customer handling skills is the fifth most reported skills gap area in the sector.

This data leads us to conclude that employers do not have difficulties recruiting for Sales occupations but within the existing workforce there is a lack of proficiency as is the case for this occupation across the economy.

The scale of the problem is judged to be medium with 32,000 people currently working in this occupational group in the sector. No workforce jobs growth is forecast although there is replacement demand of 17,000 to 2020.

Sales staff in the sector are less likely than across other sectors to receive training and employers report the cost of training as a significant barrier. As across other occupations, skills gaps in Sales and Customer Service occupations adversely affect businesses in the sector, increasing workload for other staff, operating costs and causing difficulties meeting quality standards. Other consequences of skills gaps to the sector are loss of business orders.

# Bibliography

Adams, R., (2011) 'The distribution of innovation activity across UK industry', University of Exeter, Department for Business Innovation and Skills, London

Alliance of Sector Skills Councils Scotland, (2011) 'Software, Internet and Web, IT services, Telecommunications and Business change: Scottish Sector Profile 2011', Edinburgh

BBC News 'Viewpoints: Sites go offline in US piracy laws protest' Available: http://www.bbc.co.uk/news/technology-16604990 [Accessed 18th January 2012]

BCS, Intellect and e-skills UK (2009), 'Women in IT Scorecard: a definitive up to date evidence base for data and commentary on Women in IT employment and education', London.

Bristow, A., and Miller, N., (2012) 'UK Tech sector is positioned for global challenge.' Article for City AM 31st January 2012, London

Cabinet Office, (2011) 'The UK Cyber Security Strategy – Protecting and promoting the UK in a digital world', London

Chamberlain, L., (2011) 'Surge in self-employment down to 'odd-jobbers' says CIPD' in Personnel Today 18th January 2012 Available: http://www.personneltoday.com/articles/article.aspx?liarticleid=58271&printerfriendly=true [Accessed 31st January 2012]

Davies, B., Gore, K., Shury, J., Vivian, D. and Winterbotham, M. (2012) 'UK Commission's Employer Skills Survey 2011: UK results', UKCES, London.

Department for Business Innovation and Skills, (2009) 'The 2009 Value Added Scoreboard – The top 800 UK and 750 European companies by Value Added', London

DETICA, (2011) 'The cost of cyber crime', in partnership with the Office of Cyber Security and Information Assurance in the Cabinet Office, Guildford

Desvaux, G., Devillard-Hoellinger, S. and Baumgarten, P., (2007) 'Women Matter: Gender diversity, a corporate performance driver'. A McKinsey & Company report, Paris

Desvaux, G. and Devillard, S., (2008) 'Women Matter 2: Female leadership, a competitive edge for the future', A McKinsey & Company report, Paris

Desvaux, G., Devillard, S. and Sancier-Sultan, S., (2010), 'Women Matter 2010. Women at the top of corporations: Making it happen'. A McKinsey & Company report, Paris

Economist Intelligence Unit, (2011) 'Investment for the future, Benchmarking IT industry competitiveness 2011', Sponsored by the Business Software Alliance, Washington D.C.

- - - (2009) 'Resilience amid turmoil, Benchmarking IT industry competitiveness 2009' Sponsored by the Business Software Alliance, Washington D.C.

Edwards, P., (2010) 'Skills and the small firm: A research and policy briefing', Stanfield, C. (ed.), Warwick University Business School for UK Commission for Employment and Skills, Wath-upon-Dearne

Ernst & Young, (2011) 'Destination UK: sustaining success in the new economy, Ernst & Young;s 2011 UK attractiveness Survey', London

e-skills UK and Experian, (2011) 'IT & Telecoms Insights 2011: Trends and UK skills implications'. London

Evans, N. (2012) '2012 IT Predictions: Disruptive IT Trends Move into the Fabric of Mission-Critical Systems' Author blog hosted by Unisys. Available: http://blogs.unisys.com/disruptiveittrends/2012/01/17/2012-it-predictions-disruptive-it-trends-move-into-the-fabric-of-mission-critical-systems/ [Accessed 17 January 2012]

Garrett, R., Campbell, M., and Mason, G., (2010) 'The Value of Skills: A Summary of the Evidence' UK Commission for Employment and Skills and National Institute for Economic and Social Research, Wath-upon-Dearne

Gartner Inc, (2011) 'The Gartner 2012 Information Technology Predictions and Trends', Available: http://horizonwatching.typepad.com/horizonwatching/2011/12/gartner-2012-information-technology-predictions-and-trends.html [accessed 20 January 2012]

Gends, F., Levitas D., and Segal, R. (2011) '2011 Consumerization of IT Study: Closing the "Consumerization Gap"' A report by IDC, sponsored by Unysis. Available: http://www.unisys.com/unisys/ri/report/detail.jsp?id=1120000970016710178 [Accessed 17 January 2012]

Gillespie, G., (2011) 'The State of the Economy' Report of the from the Office of the Chief Economic Advisor to The Scottish Government November 2011, Edinburgh

Greenwood, C., Harrison, M. and Vignoles, A., (2011) "The labour market value of STEM qualifications and occupations" Institute of Education analysis for the Royal Academy of Engineering, London

Hall, K. (2012) 'Online sales reach record £7.9bn in December', Article for Computer Weekly. Available: http://www.computerweekly.com/news/2240114099/December-sees-record-online-sales-of-79bn [Accessed 20th January 2012]

Hay, G., and Faruq, R., (2011), 'The UK Employment and Skills Almanac 2010', Cambridge Econometrics and Warwick Institute of Employment Research for UK Commission for Employment and Skills Evidence report 26, Wath-upon-Dearne

HESCU/AGCAS, (2011), 'What Do Graduates Do?', Manchester. Available: http://www.hecsu.ac.uk/research_reports_what_do_graduates_do_2011.htm

HM Government, (2010), 'The coalition: our programme for Government', London

HM Treasury and the Department for Business Innovation and Skills, (2011) 'The Plan for Growth', London

House of Commons, Committee of Public Accounts (2011) 'Immigration: the Points Based System – Work Routes Thirty-fourth Report of Session 2010–12', HC913, London

Intellect, (2011), 'The President's report: The state of the UK Technology Sector 2011', London

Joint Council for Qualifications, (2011), 'A, AS and AEA Provisional Results June 2011', London Available: http://www.jcq.org.uk/attachments/published/1575/JCQ%20RESULTS%2018-08-11.pdf

McNair, S., (2011) 'Older People and Skills in a Changing Economy', UK Commission for Employment and Skills, Wath-upon-Dearne

Meager, N. and Higgins, T., (2011) 'Disability and skills in a changing economy', Institute for Employment Studies for the UK Commission for Employment and Skills, Wath-upon-Dearne

Mellors-Bourne, R., Connor H. and Jackson C., (2011) 'STEM graduates in Non STEM Jobs' Research Paper Number 30 prepared by CRAC – the Careers Advisory Research Centre for the Department of Business Innovation and Skills (BIS), Cambridge

Migration Advisory Committee, (2011a) 'Skilled Shortage Sensible – Full review of the recommended shortage occupation lists for the UK and Scotland', London

- - - (2011b) 'Call for evidence by the Migration Advisory Committee on the level of the 2012/13 annual limit on Tier 2 and associated policies', London

OECD, (2011) 'United Kingdom - Economic Forecast Summary, November 2011' http://www.oecd.org/document/60/0,3746,en_2649_34573_45267516_1_1_1_1,00.html [Accessed 20th January 2012]

- - - (2010) 'Information Technology Outlook 2010 Highlights', Paris

- - - (2010a) 'Recommendations of the Council on Information and Communication Technologies and the Environment', Paris Available: http://webnet.oecd.org/oecdacts/Instruments/ShowInstrumentView.aspx?InstrumentID=259&InstrumentPID=259&Lang=en [Accessed 16 January 2012]

Office for National Statistics, (2012) 'Hours worked in the labour market', Newport

- - - (2011) 'Statistical Bulletin Balance of Payments 4th quarter and annual 2010', Newport

- - - (2011b) 'Reasons for leaving last job – November 2011', Newport

- - - (2011c) 'Annual Business Survey, 2010 provisional results', Newport, Available: http://www.ons.gov.uk/ons/rel/abs/annual-business-inquiry/2010-national-provisional/index.html [Accessed 22/11/2011]

- - - (2011d) 'Statistical Bulletin 2010-based national population projections – principal projection and key variants', Newport, Available: http://www.ons.gov.uk/ons/dcp171778_235886.pdf [Accessed 22/11/2011]

- - - (2011e) 'Statistical Bulletin Internet Access – Households and Individuals, 2011', Newport, Available: http://www.ons.gov.uk/ons/dcp171778_227158.pdf Accessed 17 January 2012]

- - - (2011f), 'Internet Access Quarterly Update 2011, Q3), Newport, Available http://www.ons.gov.uk/ons/dcp171766_242415.pdf [Accessed 17 January 2012]

- - - (2011g), 'UK Business: Activity, Size and Location – 2011' Data from the Inter-Departmental Business Register (IDBR), Newport, Available http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-227577 [Accessed 21 March 2012]

- - - (2009) 'UK Standard Industrial Classification of Economic Activities 2007 (SIC 2007) Structure and explanatory note.' Prosser L (ed.), Hampshire

Oxford Economics, (2011) 'Capturing the ICT Dividend: Using technology to drive productivity and growth in the EU', prepared for AT&T, London

Plummer, D., (2010) 'Gartner Top Predictions for 2011: IT's Growing Transparency and Consumerization' For Gartner Inc.

PricewaterhouseCoopers, (2011) 'Eye of the storm, key findings from the 2012 global state of information security survey', Delaware

QAA, Scottish Credit and Qualifications Framework Partnership, CEA, Ofqual, CQFW Welsh Assembly Government and The National Qualifications Authority of Ireland, (2011) 'Qualifications can cross boundaries A rough guide to comparing qualifications in the UK and Ireland'.

Race Online 2012, (2010) 'Manifesto for a Networked Nation', London

Rienzo, C., (2011) 'Migrants in the UK Labour Market: An Overview', The Migration Observatory, Oxford

Royal Society (2012), 'Shut down or restart: the way forward for computing in UK schools', London

SAMI Consulting Ltd, 2010, 'Horizon Scanning and Scenario Building: Scenarios for Skills 2020, A report for the National Strategic Skills Audit for England 2010', Executive summary produced for the UK Commission for Employment and Skills, Wath-upon-Dearne

Scottish Government, (2011) 'Scotland's Digital Future: A Strategy for Scotland', Edinburgh

- - - (2010) 'Skills Utilisation E-bulletin No.7', Available: http://www.scotland.gov.uk/Topics/Education/skills-strategy/making-skills-work/utilisation/ebulletins/bulletin7 [Accessed 26th January 2012]

- - - (2007) 'The Government Economic Strategy', Edinburgh

Shury, J., Vivian, D., Davies, B., and Gore, K. (2011) 'UK Employer Perspectives Survey 2010', IFF Research for the UK Commission for Employment and Skills Evidence Report 25, Wath-upon-Dearne

SOCITM, (2012) 'IT Trends 2011/12' Available: http://www.socitm.net/press/article/193/influence_of_it_managers_increasing_as_local_public_services_turn_to_technology_to_bring_service_delivery_costs_down_says_it_trends_201112 [Accessed 20th January 2012]

UCAS statistics online. Available: http://www.ucas.ac.uk/about_us/stat_services/stats_online/ [Accessed 17 January 2012]

UK Commission for Employment and Skills, (2009) 'Information to Intelligence: A Common LMI Framework for Sector Skills Councils.', Wath-upon-Dearne

- - - (2009b) 'High Performance Working: A Synthesis of Key Literature. Executive Summary 4', Wath-upon-Dearne

- - - (2010) 'Skills for Jobs: Today and Tomorrow. The National Strategic Skills Audit for England 2010. Volume2: The Evidence Report', Wath-upon-Dearne

- - - (2010b) 'High Performance Working: A Policy Review. Executive Summary 18', Wath-upon-Dearne

- - - (2011) 'Skills for self-employment – executive summary', Wath-upon-Dearne

UKRC (2010) Women Mean Business: why gender equality is essential in science, engineering and technology, Bradford

Welsh Assembly Government, (2010a) 'Delivering a Digital Wales: The Welsh Assembly Government's Outline Framework for Action'

- - - (2010b) 'Economic Renewal: a new direction'

Wilson, R.A. and Homenidou, K., (2011) 'Working Futures 2010-2010: Main Report', Produced by the Institute for Employment Research and Cambridge Econometrics for the UK Commission for Employment and Skills, Wath-upon-Dearne

World Economic Forum, (2012) 'Global Risks 2012 Seventh Edition' Produced in collaboration with Marsh & McLennan Companies, Swiss Reinsurance Company, Wharton Center for Risk Management, University of Pennsylvania, Zurich Financial Services, Geneva. Available: http://www3.weforum.org/docs/WEF_GlobalRisks_Report_2012.pdf [Accessed 17 January 2012]

# Glossary

| | |
|---|---|
| ABI | Annual Business Inquiry |
| ASHE | Annual Survey of Hours and Earnings |
| BAME | Black, Asian and Minority Ethnic |
| BIS | Department for Business Innovation and Skills |
| BRES | Business Register and Employment Survey |
| EU | European Union |
| EEA | European Economic Area |
| GDP | Gross Domestic Product. A measure of the value of total economic activity. |
| GVA | Gross Value Added. GVA is the difference between the value of the output produced by a sector and its intermediate consumption. Intermediate consumption is the cost of raw materials and other inputs that are used up in the production process. |
| HPW | High Performance Working |
| ICTs | Intra-company transfers |
| IDBR | Inter-departmental Business Register |
| LFS | Labour Force Survey |
| LMI | Labour Market Intelligence |
| MAC | Migration Advisory Committee |
| NESS | National Employer Skills Survey (England) |
| NGA | Next Generation Access |
| ONS | Office National Statistics |
| RLMT | Resident Labour Market Test |
| SaaS | Software as a Service |
| SIC | Standard Industrial Classification |
| SOC | Standard Occupational Classification |
| SSA | Sector Skills Assessment |
| STE | Science, Technology and Engineering |
| STEM | Science, Technology, Engineering and Mathematics |
| SSC | Sector Skills Council |
| SSVs | Skills Shortage Vacancies |

| | |
|---|---|
| UKCES | UK Commission for Employment and Skills |
| UKRC | UK Research Council |

# Appendix A: Technical appendix

This report was produced by the e-skills UK research team, commissioned by the UK Commission for Employment and Skills. This technical appendix provides information on the approach to producing the report, information on core data sets and other secondary quantitative data sources, and the outline of the literature review.

## Report approach, data analysis and interpretation, quality assurance

Data analysis and interpretation was undertaken on the core and additional sources to translate information and data into intelligence and insight. This process is aided through the sector expertise and range of qualitative insights held within e-skills UK. Qualitative insight is gained through extensive research work in the sector over a period of years and ongoing employer engagement across the UK and interaction with employer representatives.

As well as the quality assurance undertaken on the core data tables provided, quality assurance was undertaken on all additional data analysis to ensure guidelines provided by UKCES and the data sources themselves were adhered to.

## The provision of core data

To ensure consistency and comparability across all 15 SSA reports, data from core labour market information sources was centrally collected, processed and formatted. It was then distributed by the UK Commission to Sector Skills Councils for inclusion within the reports.

Core data was centrally produced from the following sources:

- The Labour Force Survey;
- The UK Commission's Employer Skills Survey 2011;
- Working Futures 2010-2020;
- Regional Accounts (information on Gross Value Added);
- Mid Year Population Estimates;
- European Continuing Vocational Training Survey;
- Business Demography Statistics.

Data from the Labour Force Survey, regional accounts and mid-year population estimates was collated, processed and formatted by Cambridge Econometrics and the Institute for Employment Research (IER), Warwick.

Data from the UK Commission's Employer Skills Survey 2011 was collated and processed by IFF Research and formatted by the UK Commission.

Data from Working Futures was collated, processed and formatted by IER.

Data from the European Continuing Vocational Training Survey and Business Demography Statistics was collated, processed and formatted by the UK Commission.

All data was quality assured by contractors, the UK Commission and by Sector Skills Councils.

It has been necessary to suppress some data within the reports to adhere to official guidelines regarding data quality. The details of suppression strategies applied to data from specific sources are described in more detail below. Data for Scotland, Wales and Northern Ireland for the three smallest SSA sectors is most likely to be suppressed.

These are:

- Agriculture, forestry and fishing;
- Energy production and utilities;
- Information and communication technologies.

## Methodological information for core labour market information sources

### *Method used to derive estimates of gross value added (GVA) per employee job by SSA sector and nation*

No official estimates are currently available for the level of productivity by sector and UK nation. The figures presented in this report have therefore been estimated by the UK Commission using the following process.

Levels of workplace gross value added at current basic prices by SIC 2007 Section were derived from the official estimates published by the Office for National Statistics as part of its Regional Accounts series. Levels of employee jobs were taken from the Business Register and Employment Survey for 2009.

The sectoral "footprint" definitions used as the basis for the SSA reports are not coterminous with SIC Sections, however, and in some cases draw on 2-digit SIC divisions. At present the official GVA estimates for nations and regions are only available at a SIC section level.

To overcome this an approach was adopted which has been developed by Welsh Government to derive gross value added estimates for its priority sectors. This approach was applied to the UK and all four nations. Approximate estimates of GVA at 2-digit level are available for much of the economy from the Annual Business Survey (ABS). These were used to allocate GVA at the 2-digit level with the results being constrained to the official GVA totals by SIC section taken from the Regional Accounts. For those areas of the economy not covered by the ABS, shares of employment at the 2-digit level were used instead, taken from the Annual Population Survey.

## Labour Force Survey

### About the survey

One of the key data sources used within this report is the Office for National Statistics' (ONS) Labour Force Survey (LFS). The LFS is a survey of households living at private addresses (plus in NHS accommodation and student halls of residence) in the UK.

The survey is carried on a quarterly basis. The sample is made up of around 41,000 responding (or imputed) households in Great Britain every quarter, and around 1,600 households in Northern Ireland. The LFS uses a rotational sampling design which means that, once selected, a household[29] is kept in the sample for a total of five consecutive quarters.

Interviewers can take answers to questions by proxy if a respondent is unavailable. This is usually from another related adult who is a member of the same household. About a third of LFS responses are collected by proxy. Information on individuals aged 16 – 19 most likely to be obtained by proxy.

Full user guidance can be accessed here: http://www.ons.gov.uk/ons/guide-method/user-guidance/labour-market-statistics/index.html

### Preparation of LFS data for this report

The UK Commission provided report authors with a core set of tables based on LFS data for mandatory inclusion within Sector Skills Assessment reports. The data within these tables was prepared by two contractors: Cambridge Econometrics (CE) and Warwick Institute for Employer Research (IER).

Data was prepared in three stages:

[29] Note, it is the address that is selected and not necessarily the particular people who live there.

- The original survey data was gathered and coded by IER to the categories and classifications required for the SSA tables. This was then sent to CE
- CE used the data prepared by IER and derived the indicators and aggregated the data to the dimensions required for the tables
- The UK Commission checked tables and distributed to report authors

Annual data presented within this report is based on an average of four consecutive quarters of data. Data prior to 2009 is based on SIC2003 and data for 2009 and 2010 is based on SIC2007 codes.

**Reporting of LFS data**

In line with ONS convention, annual LFS data presented within this report has been suppressed if individual cell sizes fall below 6,000. This is because cell sizes of fewer than 6,000 are deemed to be low quality estimates.

Analysis of employment uses all four categories of employments status within the LFS: employee, self-employed, government scheme & unpaid family worker.

Please note, some tables present a total for *All sectors* while others present a total for *Whole economy.* The values for these totals are different because the *Whole economy* total includes the 'Not within scope' category (i.e. sectors that don't fall within an SSA sector), whereas *All sectors* is the total for just the 15 SSA sectors.

## UK Commission's Employer Skills Survey 2011

The UK Commission's Employer Skills Survey 2011 (UK Commission's ESS 11) was the first large-scale economy-wide employer skills survey to be conducted across the whole of the UK. The survey was managed by the UK Commission for Employment and Skills and was conducted by three contractors: IFF Research, BMG Research and Ipsos Mori (Davies et al, 2012). The project steering group included representatives from all four nation governments, the Alliance of Sector Skills Councils, the Department for Work and Pensions and the Skills Funding Agency.

Fieldwork was carried out from March to July 2011. Two waves of interviews were conducted. The main survey involved telephone interviews with approximately 87,600 employers and a follow-up survey focusing on investment in training was undertaken with over 11,000 respondents. The data presented within this report draws only on information gathered from the main survey.

The table below provides information on the number of employers interviewed by sector and nation for the main survey.

| SSA sector | England | Scotland | Wales | NI | UK |
|---|---|---|---|---|---|
| Agriculture, forestry and fishing | 1,270 | 99 | 133 | 45 | 1,547 |
| Energy production and utilities | 1,306 | 106 | 133 | 69 | 1,614 |
| Manufacturing | 6,774 | 182 | 470 | 350 | 7,776 |
| Construction | 7,538 | 300 | 660 | 463 | 8,961 |
| Wholesale and retail trade | 13,919 | 333 | 1,129 | 769 | 16,150 |
| Transportation and storage | 4,078 | 152 | 300 | 205 | 4,735 |
| Accommodation, food and tourism activities | 9,630 | 324 | 909 | 455 | 11,318 |
| Information and communication | 2,262 | 56 | 111 | 81 | 2,510 |
| Creative media and entertainment | 3,301 | 99 | 227 | 135 | 3,762 |
| Financial, insurance & other professional services | 4,525 | 146 | 391 | 281 | 5,343 |
| Real estate and facilities management | 3,113 | 85 | 133 | 93 | 3,424 |
| Government | 2,078 | 163 | 188 | 176 | 2,605 |
| Education | 4,597 | 164 | 391 | 287 | 5,439 |
| Health | 2,912 | 107 | 242 | 137 | 3,398 |
| Care | 4,028 | 101 | 338 | 296 | 4,763 |
| Not within scope | 3,722 | 86 | 257 | 162 | 4,227 |
| Total | 75,053 | 2,503 | 6,012 | 4,004 | 87,572 |

UK Commission's ESS 11 is a quota survey. Quotas were set on a size by sector within nation / English region basis. In Northern Ireland and Wales, where more interviews were carried out than the required minimum to get national representation, they were predominately distributed in proportion to the population.

In order to include the maximum number of questions without extending the overall length of the interview, the sample was randomly split in half for some sections, and one set of employers were asked one module of questions, and the other half of the sample different questions.

The survey is a local unit (establishment) survey. This means that for large multi-site organisations several branches/ locations may have been interviewed. The establishment level sampling reflects that the survey asks employers about issues that need to be answered by people with day-to-day contact with employees rather than head office.

Respondents are those who have the best overview of HR and training within the establishment. This will tend to be HR or training managers in large establishments and owner/managers or senior managers within small establishments.

The valid population of establishments being used in UK Commission's ESS 11 is all establishments with the exception of sole traders (this means that establishments with one employee and no working proprietors (for e.g. flower stall at a station, where there is one person working but they don't own it themselves) are included). In addition, establishments with multiple working proprietors but no employees are also included.

Sampling error for the survey results overall and for different sub-groups by which analysis is presented in the report is shown in the table below. Sectoral figures are presented for the 14 SIC 2007 sections which were used for the survey sampling approach.

Figures have been based on a survey result of 50 per cent (the 'worst' case in terms of statistical reliability), and have used a 95 per cent confidence level. Where the table indicates that a survey result based on all respondents has a sampling error of +/- 0.32 per cent, this should be interpreted as follows: 'for a question asked of all respondents where the survey result is 50 per cent, we are 95 per cent confident that the true figure lies within the range 49.68 per cent to 50.32 per cent'.

As a note, the calculation of sampling error has taken into account the finite population correction factor to account for cases where we are measuring a significant portion of the population universe (i.e. even if two sample sizes are the same, the sampling error will be lower if in one case a far higher proportion of the population was covered).

These confidence intervals are based on the assumption of a normal distribution of responses.

**Sampling error (at the confidence 95 per cent level) associated with findings of 50 per cent**

| | Population | Number of interviews | (Maximum) Sampling Error |
|---|---|---|---|
| **Overall** | **2,299,921** | **87,572** | **+/-0.32** |
| **By country** | | | |
| England | 1,960,298 | 75,053 | +/-0.35 |
| Northern Ireland | 65,559 | 4,004 | +/-1.5 |
| Scotland | 175,114 | 2,503 | +/-1.94 |
| Wales | 98,950 | 6,012 | +/-1.22 |
| **By size of establishment** | | | |
| 1-4 | 1,466,397 | 18,955 | +/-0.99 |
| 5-24 | 648,446 | 47,770 | +/-0.61 |
| 25-99 | 147,319 | 15,951 | +/-1.03 |
| 100-249 | 25,945 | 3,270 | +/-2.27 |
| 250+ | 11,814 | 1,626 | +/-3.12 |
| **By sector** | | | |
| Agriculture | 98,458 | 939 | +/-3.18 |
| Mining & Quarrying | 2,222 | 188 | +/-6.84 |
| Manufacturing | 128,255 | 7,704 | +/-1.08 |
| Electricity, Gas and Water | 10,583 | 1,426 | +/-3.35 |
| Construction | 241,429 | 6,654 | +/-1.18 |
| Wholesale and Retail | 441,365 | 15,340 | +/-0.78 |
| Hotels & Restaurants | 167,215 | 8,471 | +/-1.04 |
| Transport and Communications | 210,801 | 7,885 | +/-1.08 |
| Financial Services | 52,381 | 1,881 | +/-2.22 |
| Business Services | 551,612 | 14,488 | +/-0.80 |
| Public Administration | 26,058 | 1,617 | +/-2.36 |
| Education | 65,499 | 5,439 | +/-1.27 |
| Health and Social Work | 140,269 | 8,161 | +/-1.05 |
| Community, Social and Personal Services | 163,774 | 7,379 | +/-1.11 |

Looking specifically at sampling error for SSA sectors at national level, Agriculture in Scotland provides an illustrative example. 99 interviews were completed for this sub-group. Applying the assumptions outlined above, this gives a maximum sampling error of around +/- 10 percentage points. This demonstrates the indicative nature of the detailed survey estimates for smaller sectors.

Within the report, data based on unweighted bases of less than 25 have therefore been suppressed for quality reasons. In addition, data based on unweighted bases of between 25 and 50 have been marked as indicative. More stringent thresholds have been applied in Scotland because of the lower total number of interviews that were conducted. Estimates based on unweighted bases of fewer than 50 have been suppressed, whilst estimates based on bases of 50-99 are marked as indicative in the relevant tables.

Finally, occupations within the survey are defined by 2010 Standard Occupational Classification codes and sectors are defined by 2007 Standard Industrial Classification codes.

Please visit the UK Commission's Employer Surveys website for further information including the full survey report and questionnaire. https://ness.ukces.org.uk/default.aspx

### Working Futures 2010 - 2020

Working Futures 2010-2020 is the latest in a series of detailed projections of UK employment, productivity, labour supply and skills. The projections have been prepared by the Institute for Employment Research (IER) and Cambridge Econometrics (CE) on behalf of the UK Commission for Employment and Skills (UKCES).

The projections are calculated from a number of different data sources, including the Annual Business Inquiry, the Business Register and Employment Survey, and the Labour Force Survey. The results provide a picture of employment prospects up to 2020 by industry, occupation, qualification level, gender and employment status for the UK as a whole, the four nations, and English regions.

As with all projections and forecasts, the results presented in Working Futures should be regarded as indicative of likely trends and orders of magnitude given a continuation of past patterns of behaviour and performance, rather than precise forecasts of the future.

At a time of great uncertainty about the short to medium term prospects for the economy, it is important to stress the value of Working Futures in aiding understanding of likely prospects for employment in the longer term (i.e. in 2020). Readers should therefore focus on the relative position of sectors, and occupations in 2020 and treat the projected values as broad indicators of scale rather than exact predictions.

Further methodological details can be found on the UK Commission's website - http://www.ukces.org.uk/publications/working-futures-technical-report

### Other secondary quantitative data sources

Other secondary quantitative data sources were used in the production of this report, primarily to fill data gaps and provide sector specific quantitative data. The main sources used and methodologies are outlined below.

### Methodological information for other labour market information sources

### UKCES Employer Perspectives Survey 2010

The Employer Perspectives Survey 2010 was conducted by telephone with 14,390 UK employers. Interviews were conducted by IFF Research between June and August 2010 for the UK Commission for Employment and Skills to explore employers' engagement and satisfaction with Government support for recruitment and workforce development. Interviews were conducted at an establishment rather than organisation level. Telephone contact details for the employers sampled were largely sourced from the Experian Business Database, supplemented by Office of National Statistics (ONS) Inter-Departmental Business Register (IDBR) database.

The sample ensured; national quotas were large enough to allow analysis at the national level and that the profile of the establishments surveyed was proportionate to the total business population but also allowed for robust analysis of sectoral sub-groups. Quotas were then set on the size of establishments. Final data were weighted and grossed up to reflect the total business population of establishments. A total of 316 interviews with establishments in the Information and communication technologies sector were undertaken giving a weighted number of employers of 33,345.

| Nation | Number of employers interviewed |
|---|---|
| England | 225 |
| Scotland | 30 |
| Wales | 42 |
| Northern Ireland | 19 |
| **UK** | **316** |

Data for the sector in this report has been weighted by the 'sector' weight provided in the UKCES perspectives dataset and presented only for the UK. Calculations with unweighted base sizes under 25 have not been reported. Calculations with unweighted base sizes of 26-50 are accompanied by a caveat that they are indicative only. The survey questionnaire and full report can be found at:

http://www.ukces.org.uk/assets/bispartners/ukces/docs/publications/employer-perspectives-survey-2010.pdf

### Annual Business Survey

The Annual Business Survey (formerly the Annual Business Inquiry) is undertaken by the Office for National Statistics. The survey covers approximately two thirds of the UK economy with the main exclusions being Agriculture, Financial Intermediation, Public Administration and Defence.

Data collected through the survey is used to produce estimates of Gross Value Added (GVA) at basic prices. Other measures presented include number of enterprises, turnover, employment, capital expenditure and total stocks and work in progress. Data used in this SSA report is from the ABS 2009 provisional results release of November 2011 and is based on the data for the 2 digit Standard Industrial Classifications that make up the Information and communication technologies sector.

More information on the Annual Business Survey and data tables can be accessed from:

http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-249421

### Balance of Payments

The Office for National Statistics Balance of Payments is a key economic measure used to show transactions by the UK with the rest of the world. The data used in this SSA report is based on the measures of exports of services, imports of services and the balance on trade in services for the 'Communications' and 'Information and Computer' industries for 2010. The statistical bulletin from which the data is drawn was released in March 2011 and can be found at:

http://www.ons.gov.uk/ons/rel/bop/balance-of-payments/q4-and-annual/balance-of-payments.pdf

## Inter-Departmental Business Register

The Office for National Statistics data on UK Business: Activity, size and location has been used in this report to illustrate the different nature of the sector in Northern Ireland by looking at the number of local units at 4 digit SIC. The dataset used contains are numbers of enterprises and local units produced from a snapshot of the Inter Departmental Business Register (IDBR) taken on 28 March 2011. The IDBR contains information on VAT traders and PAYE employers in a statistical register. The full release can be found at: http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-227577

## Coverage of literature review

A full literature review was undertaken to find relevant and recent literature pertaining to the topics covered in the Sector Skills Assessment. Reports reviewed include:

- **General skills, employment and economic reports** including skills survey reports, employment forecasts, compilations of employment and skills data and commentary, policy documentation and the strategic skills audits. These reports are mainly from government and skills bodies across the nations including the UK Commission for Employment and Skills;
- Those pertaining to **specific subject areas** even if they are not sector specific, for example on innovation, High Performance Working, skills utilisation, gender inequality, the value of skills, migration, workforce characteristics;
- **Sector specific reports**, commentary and mainstream and trade press articles on drivers of demand; future drivers and predictions, the value of qualifications, including those prepared by the Sector Skills Council, trade bodies, and sector experts;
- **International and national reports** on skills and employment surveys, drivers and specific reports for the Information and communication technologies sector.

A full bibliography is included. Details of key sector specific reports readers may be less familiar with are included below.

## IT & Telecoms Insights: Trends and UK skills implications 2011.

This e-skills UK/Experian report is based on desk research to identify key trends within the sector combined with a primary survey of employers, to explore the associated implications for recruitment and skills development of IT & Telecoms professionals. The initial desk research reviewed the 11 trends highlighted in *IT & Telecoms Insights 2008: Trends and UK Skills Implications* (e-skills UK / Gartner, 2008), assessing their continuing / current relevance and updating / augmenting them where appropriate. In the second phase, Experian and Market Solutions surveyed over 200 employers of IT & Telecoms professionals to gauge their views on the impact and implications of each trend.

The respondents in medium and large employers were Senior management or those responsible to strategy and IT directors. In small businesses, the respondent was the Managing Director, the owner, or senior member of staff responsible for IT.

Respondents were asked how significant the impact of each trend would be on their business, and if there was an impact, what the broad timescale would be. Companies were also asked about their industry and size (in employment terms), to explore whether opinions varied between different businesses.

| | Number of respondents |
|---|---|
| 10-49 employees | 50 |
| 50-249 employees | 101 |
| 250+ employees | 50 |
| Total | 201 |

It should be noted that this piece of work covers the e-skills UK licensed footprint and included both IT and Telecoms companies (101) and employers in other sectors of the economy (100 respondents) who employ staff working in IT and Telecoms occupations.

Responses were used unweighted to produce the report which explores 15 key trends and the implications for skills demand. The report can be found at:

https://www.e-skills.com/Documents/Research/Tech-Insights-2011/Technology-Insights-2011-Trends-and-UK-Skills-Implications.pdf

## Eye of the storm, key findings from the 2012 global state of information security survey

This report summarises the findings from the 2012 Global State of Information Security survey which was undertaken by PwC, CIO Magazine and CSO Magazine. The survey was conducted between February and April 2011 with the readership of the magazines and PwC clients.

The results reflect the worldwide responses of 9,600 senior business leaders including: CEOs, CFOs, CISOs, CIOs, CSOs and VPs and directors of IT and information security. The report authors state that the margin of error in the results is less than 1 per cent.

The location of respondents was:

| Geographic location | Proportion of respondents |
|---|---|
| North America | 29% |
| Europe | 26% |
| South America | 21% |
| Asia | 20% |
| Middle East and South Africa | 3% |

The full report can be found at: http://www.pwc.com/nz/en/global-state-of-information-security-survey

### SSL/JobAdswatch IT Salary and Appointments survey

The SSL/JobAdswatch IT salary and appointments survey incorporates a comprehensive pay and demand survey combined with a powerful recruitment research system. This system provides management with the ability to see in detail what jobs are currently being advertised based on a combination of job title, region and industry type, together with full reporting of what companies and agencies have been advertising such jobs and in which media.

Now in its 24th year of publication the survey is one of the most established sources of IT job information available. The survey covers over fifty job titles, with region, industry and software skill variations. It is produced quarterly in January, April, July and August of each year. http://www.jobadswatch.co.uk/subscriber/salarysurvey/commentary

### State of the Sector: President's report 2011

This annual report from the trade association for the UK's technology industry, Intellect, provides valuable insight into the performance of the industry and indicates future drivers for the sector. The report draws upon the experience of member companies which number more than 780 and range from SMEs to multi-nationals.

Each chapter of the report is authored by a specialist in the field, either an Intellect member of staff or industry expert, and is supplemented with short case studies and member comments. The latest report can be found at:

http://www.intellectuk.org/publications/intellect-annual-reviews

### Capturing the ICT Dividend

"Capturing the ICT Dividend: Using technology to drive productivity and growth in the EU", is a white paper produced by Oxford Economics (a global forecasting and research consultancy) in collaboration with AT&T (a leading Telecommunications company). The white paper seeks to establish the impact of ICT (Information and Communication Technology) in terms of improved productivity and competitiveness in Europe. Data and econometric analysis of ICT investment and productivity were used alongside a review of existing research and qualitative research interviews with leading businesses, policy-makers and analysts. The white paper can be accessed at:

http://www.fi3p.eu/assets/pdf/Oxford_economics_capturing_the_ict_dividend_0911.pdf

### Investment for the future – benchmarking IT industry competitiveness.

This report from the Economist Intelligence Unit (EIU) was produced with the support of the Business Software Alliance, and build on a series of reports on IT industry competitiveness published since 2007. EIU benchmarks 66 countries every two years on a series of indicators across the six areas of: healthy business environment; a first-rate IT infrastructure; dynamic human capital; robust research and development; a strong legal environment; and public support for industry development.

The main sources of data for each indicator are outlined in the Appendix to the report. The sources include quantitative data and qualitative assessment by the EIU. Quantitative sources range from data from national data sources, UNESCO, World Bank and OECD analysis to that from specialist IT industry analysts IDC and ITU. In addition to updating each indicator, in depth interviews were held with nine IT executives and independent experts who shared their insights. The full report can be accessed at:

http://globalindex11.bsa.org/upload/key-finding/keyfindings.pdf

### Information Technology Predictions and Trends.

Gartner is one of the leading Information technology research and advisory companies and operates a network of 1,200 industry analysts to produce a wide range of industry research and market analysis. 'Predictions' are based on a wealth of data and interaction with clients in 80 countries and cover 73 market, topic and industry areas.

http://www.gartner.com/technology/research/predicts/

## IT Professional Standards

The IT Professional Standards are a common, sector-wide terminology for describing IT professional disciplines, developed by e-skills UK, employers in the private and public sector, professional bodies and other partners. They provide the framework for more detailed specification by discipline (including transferable skills) and level, building on the National Occupational Standards (NOS) and linking to the Skills Framework for the Information Age (SFIA). The Standards can be accessed at:

http://www.itskillsacademy.ac.uk/standards/it-professional-standards/

## 2011 UK attractiveness survey

Ernst & Young's report on the attractiveness of the UK to foreign direct investors uses the Ernst & Young European Investment Monitor and a representative panel of 274 international decision makers to rate the perceived attractiveness of the UK. A further sample of 310 respondents in specific sectors (financial services, cleantech, technology and real-estate) is used to gain wider insight. The report can be found at:

http://www.ey.com/Publication/vwLUAssets/2011_UK_Attractiveness_Survey/$FILE/2011_UK_Attractiveness_Survey.pdf

# Appendix B: Additional information on qualification levels and equivalent qualifications

| | England | Scotland | Wales | Northern Ireland |
|---|---|---|---|---|
| Level 4 + | Post-graduate degree, Masters or Doctoral Degrees or equivalent<br>Bachelor's degree, Graduate Diplomas, Graduate Certificates<br><br>Foundation Degrees,<br>Diplomas of Higher Education (DipHE),<br>Higher National Diplomas (HND)<br>Higher National Certificates (HNC),<br>Certificates of Higher Education (CertHE)<br><br>NVQ level 5, NVQ level 4 | Post-graduate degree, Masters or Doctoral Degrees or equivalent<br>Bachelor's degree, Graduate Diplomas, Graduate Certificates<br><br>Foundation Degrees,<br>Diplomas of Higher Education (DipHE),<br>Higher National Diplomas (HND)<br>Higher National Certificates (HNC),<br>Certificates of Higher Education (CertHE)<br><br>SVQ level 5, SVQ level 4<br>Scottish Baccalaureate, Advanced Highers | Post-graduate degree, Masters or Doctoral Degrees or equivalent<br>Bachelor's degree, Graduate Diplomas, Graduate Certificates<br><br>Foundation Degrees,<br>Diplomas of Higher Education (DipHE),<br>Higher National Diplomas (HND)<br>Higher National Certificates (HNC),<br>Certificates of Higher Education (CertHE)<br><br>NVQ level 5 ,NVQ level 4<br>Higher Apprenticeship Framework | Post-graduate degree, Masters or Doctoral Degrees or equivalent<br>Bachelor's degree, Graduate Diplomas, Graduate Certificates<br><br>Foundation Degrees,<br>Diplomas of Higher Education (DipHE),<br>Higher National Diplomas (HND)<br>Higher National Certificates (HNC),<br>Certificates of Higher Education (CertHE)<br><br>NVQ level 5 ,NVQ level 4 |
| Level 3 | NVQ Level 3,<br>GCE AS and A Level,<br>Advanced Diplomas | Highers, SVQ Level 3,<br>National Progression Awards,<br>National Certificates | NVQ Level 3,<br>GCE AS and A Level,<br>Welsh Baccalaureate Advanced | NVQ Level 3,<br>GCE AS and A Level, |
| Level 2 | NVQ Level 2,<br>GCSEs at grade A*–C,<br>Higher Diplomas<br>NVQ level 2, GCSE grades A-C | Intermediate 2<br>Credit Standard Grade<br>SVQ Level 2<br>National Progression Awards<br>National Certificates | NVQ Level 2,<br>GCSEs grade A*–C<br>Welsh Baccalaureate Intermediate,<br>Foundation Apprenticeship Framework | NVQ Level 2,<br>GCSEs at grade A*–C,<br>Essential Skills Qualifications |
| Level 1 and below | NVQ Level 1,<br>GCSEs at grade D–G,<br>Foundation Diplomas<br>Functional skills 1 and entry level<br>Entry Level Certificates (1–3), | SVQ level 1, Intermediate 1, General Standard Grade and Access certificates (3, 2 and 1) | NVQ Level 1,<br>GCSEs at grade D–G,<br>Welsh Baccalaureate Foundation,<br>Essential Skills Wales | NVQ Level 1,<br>GCSEs at grade D–G,<br>Essential Skills Qualifications |

*Source : Adapted from QAA, Scottish Credit and Qualifications Framework Partnership, CEA, Ofqual, CQFW Welsh Assembly Government and The National Qualifications Authority of Ireland (2011) 'Qualifications can cross boundaries A rough guide to comparing qualifications in the UK and Ireland'*
http://www.qaa.ac.uk/Publications/InformationAndGuidance/Documents/Quals_cross_boundaries.pdf (Accessed 10 January 2012)

# Appendix C: Priority Action Matrix

| Skill / occupational priority | Degree of certainty – definite, likely, possible, unknown | Magnitude – large, medium, small (current and future) | Lead time – short / medium / long | Criticality to a) the sector and b) the economy through GVA and/or Job Volume | Nations /Sub-sector differences |
|---|---|---|---|---|---|
| **Cross occupational skills needs** | | | | | |
| Recruitment for forecast growth in the sector and future skills needs will be difficult to meet.<br><br>(See section 8.2.1) | **Definite**<br>Significant future demand is forecast particularly in high skill, high value areas. of Managerial, Professional and Associate Professional and Technical occupations.<br><br>• The workforce is aging<br>• current recruitment practices are restricted to parts of the talent pool,<br>• there is a gender imbalance<br>• current education output is being questioned<br>• there is a general negative perception of occupations in the sector. | **Large**<br>Total sector growth and replacement demand of 371,000.<br><br>Demand will be particularly in high skills, higher level occupations such as professional, managerial and Associate Professional and Technical. | **Medium – Long term** solutions are required as there is no 'quick fix. | **Critical** to both the sector and the economy as a whole.<br><br>Vital for growth in the sector and competitive position in a global market.<br><br>Risk to economic growth and employment if the recruitment pool is not available in volume or quality (skills shortages) and resulting skills gaps.<br><br>Consequences in the long term could include<br>• continuing and accelerated aging of the workforce<br>• diminishing recruitment pool<br>• reliance on recruitment 'outside' of the sector<br>• global sourcing of labour, migration and off-shoring. | Potentially more of an issue in countries that are forecast to have more significant growth, for example Northern Ireland.<br><br>There is sector growth in Wales, this is not forecast to be in professional occupations.<br><br>In Scotland growth is from 2015 giving some leeway on lead time. |
| Security and data protection skills<br><br>(See section 8.2.1) | **Definite**<br>Security and data protection is the most immediate and greatest impact of the current and future drivers recognised by employers. | **Likely to be large**<br>Security skills needs cut across the whole sector workforce<br>There are also specialist areas that may be relatively small in number | **Immediate and ongoing**<br>The nature of technology and cyber crime is ever evolving.<br><br>Higher level skills | **Critical**<br>The sector provides technology prevention and detection solutions and services to businesses across the economy and the public sector. | |

| Skill / occupational priority | Degree of certainty – definite, likely, possible, unknown | Magnitude – large, medium, small (current and future) | Lead time – short / medium / long | Criticality to a) the sector and b) the economy through GVA and/or Job Volume | Nations /Sub-sector differences |
|---|---|---|---|---|---|
| | | but demand is growing. | required in specialists are more likely to take longer to develop. | The cost of cyber-crime is rising, new threats constantly emerging. | |

| Skill / occupational priority | Degree of certainty – definite, likely, possible, unknown | Magnitude – large, medium, small (current and future) | Lead time – short / medium / long | Criticality to a) the sector and b) the economy through GVA and/or Job Volume | Nations /Sub-sector differences |
|---|---|---|---|---|---|
| **Cross occupational skills needs (continued)** | | | | | |
| Business skills<br><br>(See Section 8.3.1) | **Definite**<br>Business skills are a main areas of skills gaps<br><br>• Gaps reported include: Planning and organisation skills<br>• Problem solving skills<br>• Written communication skills (England and NI).<br>Also skills lacking in programme, project and supplier management.<br><br>In terms of skills shortage vacancies, business skills are most lacking in terms of planning and organisation skills and problem solving skills. | **Medium to Large**<br>Business skills being three of the top five skills gap areas reported and two of the top five skills lacking in SSVs in the sector.<br><br>Seen as an increasing area of need. | **Medium to long term**<br>Requires some re-adjustment of educational supply to integrate and develop business skills. | **Very important**<br><br>Required to maximise productivity and business benefit and efficiency from the core technical and technology skills that are required in the sector.<br><br>Complements the technical skills through a broader understanding of business objectives. | Wales highlight strategic management as the second largest area of skills gap.<br><br>Team working is highlighted in Northern Ireland as the top skills gap area. |

| Skill / occupational priority | Degree of certainty – definite, likely, possible, unknown | Magnitude – large, medium, small (current and future) | Lead time – short / medium / long | Criticality to a) the sector and b) the economy through GVA and/or Job Volume | Nations /Sub-sector differences |
|---|---|---|---|---|---|
| Interpersonal skills including customer service for client facing occupations whether first line or business development<br><br>(See Section 8.3.1) | **Likely/Possible**<br>Customer handling is the fifth largest skills gap area in the sector across the UK.<br><br>Leadership skills are also highlighted as a gap by employers. | **Medium**<br>Interpersonal skills are a skills need across most of the occupational areas in the sector, issues with interpersonal skills are more likely to be found in the traditionally technical occupations. | **Medium to long term**<br>Requires some re-adjustment of educational supply to integrate and develop interpersonal skills. | **Important**<br>Key skills for business to business and business to consumer markets.<br><br>Important for service delivery. | Customer handling is a gap area for the sector in England, Scotland and Wales but not in the top 5 in Northern Ireland.<br><br>Team working skills in the sector in Northern Ireland is the largest skills gap area. |

| Skill / occupational priority | Degree of certainty – definite, likely, possible, unknown | Magnitude – large, medium, small (current and future) | Lead time – short / medium / long | Criticality to a) the sector and b) the economy through GVA and/or Job Volume | Nations /Sub-sector differences |
|---|---|---|---|---|---|
| **Cross occupational skills needs (continued)** | | | | | |
| Self employment skills<br><br>(See Section 8.4.1) | **Possible**<br>The extent of skills issues for the self-employed specifically is not known.<br><br>However the nature of the skills needed is likely to be broader than for employees as the self-employed also need the skills to run a business (business skills, staff management, and soft skills) as well as undertake a technology related role. | **Large**<br>124,000 or 16% of the workforce but up to 43% in the Repair sub-sector.<br><br>The proportion of self-employed has grown 40% since 2002. | **Short/medium**<br>Across all sectors, the self-employed are less likely to participate in work related training or education. | **Important.** Innovation in the sector (a key strength) is reliant on entrepreneurs and small business start ups.<br><br>The self-employed and related skills are important in keeping people in employment and contributing to the economy. | Higher proportion of Self-employed in the workforce in Wales and Scotland and therefore this priority could be of greater importance there.<br><br>All parts of the sector are affected but particularly Repair of computers and other goods sub-sector where 43 per cent of the workforce is self-employed. |

| Skill / occupational priority | Degree of certainty – definite, likely, possible, unknown | Magnitude – large, medium, small (current and future) | Lead time – short / medium / long | Criticality to a) the sector and b) the economy through GVA and/or Job Volume | Nations /Sub-sector differences |
|---|---|---|---|---|---|
| **Managers** | | | | | |
| Non-technical management skills and technical management skills<br><br>(See Section 8.3.2) | **Likely**<br>Management skills gaps are not currently that big at 4,947 (three per cent of managers have skills gaps, equivalent to the UK whole sector average).<br><br>An average level of qualification with 40% having Level 4+<br><br>However, training is low and management training (regardless of occupation) is less common than elsewhere across the economy indicating a potential future problem. | **Large**<br>There are 212,000 managers in the sector, the second largest occupational role.<br><br>Growing occupational area to date and in the future. | **Medium to long term**<br>A potential future problem if lack of training leads to greater skills issues. | **Potentially important**<br>If skills gaps increase due to the lack of training and upskilling there could be an impact on sector productivity. | In Wales strategic management is the most common skills gap in the sector. |

| Skill / occupational priority | Degree of certainty – definite, likely, possible, unknown | Magnitude – large, medium, small (current and future) | Lead time – short / medium / long | Criticality to a) the sector and b) the economy through GVA and/or Job Volume | Nations /Sub-sector differences |
|---|---|---|---|---|---|
| **Professional** | | | | | |
| Skills gaps – technical<br><br>(See Section 8.2.2) | **Definite**<br>Gaps in the sector workforce affect one in ten employers and 6 % of the workforce.<br><br>Where employees are recruited without the right skills this impacts/ increases the incidence of skills gaps - 44% of employers saying skills gaps are due to employees being new to the role.<br><br>Job specific skills are the third largest skills gap area in the sector in the UK | **Large**<br>Gaps in the sector workforce affect one in ten employers and a larger proportion of the workforce (6% or 34,775) than average.<br><br>Professionals are the largest occupational group in the sector (267,000) and software professionals are the largest occupation (141,000).<br><br>The largest volume of skills gaps in the sector are in professionals (9,414 or 7 per cent of all profs). | **Short - medium**<br>There are current “fixes” but fairly low levels of training and barriers include cost (18% of employers in the sector who do not train seeing cost of training as a barrier).<br><br>Training in new technologies is the 2nd most common type of training provided in the sector (after "job specific" which could be technology related in this case). | **Critical**<br>Technical skills for professionals are core skills for the sector. Addressing skills gaps would increase productivity.<br><br>Skills gaps are adversely affecting businesses in the sector and<br>• increasing workload for other staff (70% of employers reporting this as a consequence of skills gaps - potentially affecting productivity, morale, retention...),<br>• operating costs (45%)<br>• difficulties meeting quality standards (40%)<br>• loss of business orders (30%)<br>• delays in developing new products and services (39%)<br>• Outsourcing work (23%). | Gaps in the workforce highest in England.<br><br>In Scotland and Wales, technical and practical skills are also cited as in the top five areas of skills gaps. |

| Skill / occupational priority | Degree of certainty – definite, likely, possible, unknown | Magnitude – large, medium, small (current and future) | Lead time – short / medium / long | Criticality to a) the sector and b) the economy through GVA and/or Job Volume | Nations /Sub-sector differences |
|---|---|---|---|---|---|
| **Professional (continued)** | | | | | |
| Skills shortages – technical including advanced IT or software skills and the current 'in demand' skills of SQL, C, C#, .NET and SQLServer<br><br>(See Section 8.2.2) | **Definite**<br>Current skills shortages (25% of professional vacancies are SSVs). Job specific skills, and specifically advanced IT and software are the most common skills lacking.<br><br>Software developer and systems engineer in "visual effects and 2D/3D computer animation for film, television and video games" are on the MAC skills shortage list. | **Large**<br>Vacancies for Professional are the second largest number of vacancies. 2,002 skills shortage vacancies for professionals currently – every one in 4 professional vacancy is an SSV.<br><br>Largest occupational group in the sector (267,000 or 35% of the workforce) and growth of 33,000 to 2020 and replacement demand of 125,000 meaning a total demand of 157,000 to 2020.<br><br>Potentially 39,250 of these 'vacancies' would be SSVs to 2020 if the current SSV ratio continued i.e. was not "fixed". | **Short/Medium**<br>The most immediate response by employers is to use new recruitment methods.<br><br>Developing conversion courses and education and training at Level 4 and ensuring a better flow of skills in to the sector, and recruitment from alternative sources would help to mitigate issues with skills supply in the medium to long term. | **Critical.**<br>Technical skills for professionals in the sector are core skills required for growth, productivity and increasing higher value added activities.<br><br>The main impacts on the sector are an increase in workload for existing staff and issues with developing new products and loss of business to competitors.<br><br>Employer demand that is not met risks wage inflation (in an already high paying sector) and the need for inward migration to meet short term needs (either through the RLMT or Skills shortage list) with consequent economic and social impacts. | SSVs in the sector in Scotland are 28 per cent of all vacancies which is higher than the rest of the UK.<br><br>Although in NI a lower proportion of all vacancies are SSVs (13% v 17%), NI companies are more likely to have retention issues (7% employers v 4%) suggesting staff are more likely to move to another job/employer with the possible impact of wage inflation and less stable labour market.<br><br>All parts of the sector are affected but in particular Games development (which is part of SIC 62) |

| Skill / occupational priority | Degree of certainty – definite, likely, possible, unknown | Magnitude – large, medium, small (current and future) | Lead time – short / medium / long | Criticality to a) the sector and b) the economy through GVA and/or Job Volume | Nations /Sub-sector differences |
|---|---|---|---|---|---|
| **Professional (continued)** | | | | | |
| Skills gaps – non technical.<br>• Planning and organisation skills<br>• problem solving<br>• written communication skills<br>• customer handling skills<br>• Project management, Programme and supplier management<br>• Leadership<br><br>(See Section 8.3.3) | **Definite**<br>Interpersonal and business skills are more likely to have been needed in IT strategy & Planning professionals (who are likely to be client/customer/supplier facing) than in software professionals but increasingly more professional occupations need interpersonal skills to understand customer requirements in order to provide technical solutions. Additionally, interpersonal, business and management skills are needed to work effectively in teams. | **Medium**<br>Gaps in the sector workforce affect one in ten employers and a larger proportion of the workforce (6% or 34,775) than average.<br><br>Professionals are the largest occupational group in the sector (267,000) and software professionals are the largest occupation (141,000), IT Strategy & planning (89,000).<br><br>The largest volume of skills gaps in the sector are in professionals (9,414 or 7 per cent of all profs) – and non-technical skills make up four out of five of the top skills gap areas. | **Medium** | **Important**<br>In reality, non-technical skills gaps are further down the priority scale for employers although for individuals working in key occupations such as IT Strategy and Planning occupations these skills will be more critical to undertaking their job and delivering a quality service to customers. | |

| Skill / occupational priority | Degree of certainty – definite, likely, possible, unknown | Magnitude – large, medium, small (current and future) | Lead time – short / medium / long | Criticality to a) the sector and b) the economy through GVA and/or Job Volume | Nations /Sub-sector differences |
|---|---|---|---|---|---|
| **Associate professional and Technical** | | | | | |
| Technical skills shortages including advanced IT or software skills<br><br>(See Section 8.3.4) | **Definite**<br>This occupational group shows the second highest number of SSVs in the sector (1,626 SSVs or 22% of current vacancies for Associate Professionals are SSVs).<br><br>Skills lacking in SSVs are predominantly job specific, and specifically advanced IT or software. | **Medium**<br>There are1,626 skills shortage vacancies currently – nearly every one in 4 Associate Professional vacancy is an SSV.<br><br>Currently the third largest occupational group in the sector (107,000) and growth of 10,000 for this occupational group to 2020 and replacement demand of 53,000 meaning a total demand of 64,000.<br><br>Potentially 14,080 of the 'vacancies' would be SSVs to 2020 if the current SSV ratio continued i.e. was not "fixed". | **Short/Medium**<br>The most immediate response by employers is to use new recruitment methods.<br><br>In the medium term developing conversion courses and ensuring a better flow of skills in to the sector, and recruitment from alternative sources would help to "fix" medium to long term supply. | **Very important**<br>The impact is similar to professional skills shortages. Again technical skills are core to this occupational group and are critical to service delivery.<br><br>Shortages result in an increase in workload for existing staff (with possible consequences in terms of productivity GVA per head which is one of the highest across all sectors, morale etc.), in developing new products and loss of business to competitors.<br><br>Risk of wage inflation and inward migration to meet short term needs<br><br>However, job volumes (current and future) are lower in Associate Professional and technical group than for professionals with a consequent decrease in the level of criticality. | SSVs in the sector in Scotland are 28 per cent of all vacancies which is higher than the rest of the UK. Although in NI a lower proportion of all vacancies are SSVs (13% v 17%),<br><br>NI companies are more likely to have retention issues (7% of employers compared to 4% in the sector UK wide) suggesting staff are more likely to move to another job/employer with the possible impact of wage inflation and less stable labour market. |

| Skill / occupational priority | Degree of certainty – definite, likely, possible, unknown | Magnitude – large, medium, small (current and future) | Lead time – short / medium / long | Criticality to a) the sector and b) the economy through GVA and/or Job Volume | Nations /Sub-sector differences |
|---|---|---|---|---|---|
| **Skilled trade** | | | | | |
| Technical skills shortages including advanced IT or software skills<br><br>(See Section 8.4.2) | **Definite**<br>Whilst the number of vacancies in the sector is quite small, (1,416) half of vacancies in this occupational group are skills shortages which is the highest rate of all occupational groups in the sector.<br><br>Skills lacking are job specific, and specifically advanced IT or software. | **Small**<br>There are just 715 skills shortage vacancies currently although one in two vacancies is an SSV.<br><br>Skilled trades are a smaller occupational group (80,000) and are forecast to decline (net change of minus 9,000 to 2020).<br><br>With replacement demand however, there is a need for 18,000 workplace jobs to be filled to 2020. This might mean 9,000 of the 'vacancies' would be SSVs to 2020 if the current SSV ratio continued i.e. was not "fixed". | **Short/Medium**<br>Employers are responding to shortages by using new recruitment methods.<br><br>In the medium term ensuring a better flow of skills in to the occupation, and recruitment from alternative sources would help to "fix" medium to long term supply. | **Important**<br>Whilst the number of vacancies is significantly less than Professionals and Associate Professionals, and the group is one of the smaller occupational groups, this SSV/Vacancy ratio reflects recruitment problems in this area.<br><br>The main impacts are an increase in workload for existing staff, delays in developing new products and loss of business to competitors. Employer demand that is not met risks wage inflation.<br><br>Technical skills are critical to service delivery but current and future job volumes are much lower than in Associate Professional and Professional groups with a consequent decrease in criticality. | SSVs in the sector in Scotland are 28 per cent of all vacancies which is higher than the rest of the UK.<br><br>Although in NI a lower proportion of all vacancies are SSVs (13% v 17%), NI companies are more likely to have retention issues (7% employers v 4%) suggesting staff are more likely to move to another job/employer with the possible impact of wage inflation and less stable labour market. |

| Skill / occupational priority | Degree of certainty – definite, likely, possible, unknown | Magnitude – large, medium, small (current and future) | Lead time – short / medium / long | Criticality to a) the sector and b) the economy through GVA and/or Job Volume | Nations /Sub-sector differences |
|---|---|---|---|---|---|
| **Sales and Customer Services** | | | | | |
| Volume of Sales and Customer Service occupations vacancies and extent of skills gaps<br><br>(See Section 8.4.3) | **Definite**<br>Sales occupations are the largest volume of current vacancies, 9,515 or 32% of all current vacancies.<br><br>Few are HTF (3% of the vacancies) or SSVs (2%) so, despite the volume of vacancies to be filled, the likelihood of recruitment issues is much lower.<br><br>These occupations experience the second largest volume of skills gaps (5,722 or 7% of sales and customer staff).<br><br>Customer handling skills are also the fifth most reported skills gap area in the sector. | **Medium**<br>There are 32,000 people working in this occupational group in the sector but no growth is forecast.<br><br>However, there is replacement demand of 17,000 to 2020. | **Short**<br>There are current solutions to skills gaps but fairly low levels of training (44% of sales staff trained in the sector compared to 55% across the economy)<br><br>Barriers to training include cost (18% of employers who do not train in the sector saying this compared to 10% across the economy seeing cost of training as a barrier). | **Important**<br>Skills gaps adversely affect businesses in the sector, increasing workload for other staff (potentially affecting productivity, morale and retention) operating costs and difficulties meeting quality standards.<br><br>Other consequences of skills gaps to the sector are loss of business orders. | |

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