Technology Insights 2012

e-skills uk

United Kingdom
Northern Ireland
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>Wales

e-skills UK is the Sector Skills Council for Business and Information Technology; an employer–led organisation rated as 'outstanding' in the re-licensing of the Sector Skills Councils. e-skills UK's mission is to ensure the UK has the technology skills it needs to compete in the global economy, working on behalf of employers to develop the software, internet, computer gaming, IT services and business change expertise necessary to thrive.

Focused on making the biggest contribution to enterprise, jobs and growth across the economy, e-skills UK's three strategic objectives are to:

- inspire future talent,
- support IT professionals,
- increase digital capability.

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.

An e-skills UK publication

For further information please contact:

e-skills UK
1 Castle Lane
London
SW1E 6DR
Tel: 020 7963 8920
Fax: 020 7592 9138

info@e-skills.com

www.e-skills.com

The National Skills Academy for IT
1 Castle Lane
London
SW1E 6DR
Tel: 020 7963 0420

info@itskillsacademy.ac.uk

www.itskillsacademy.ac.uk

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Registered office: Victoria House, 39 Winchester Street, Basingstoke, Hampshire RG21 7EQ

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- e-skills UK Board members:

Rick Cooper	Director of Alcatel University	Alcatel Lucent
Ronan Miles (Chair)	Director of BT collaboration	BT
David Edwards	Assistant Director University services	Cardiff University
Greg Jones	CIO	DFTSSC
Richard Sheppard	Director	Draig Technology
Mike Greenway	Commercial Director	EADS
Non Rhys	Policy officer	FSB
Charlie Godfrey	Skills Academy Manager, HPC Wales	Fujitsu
Ian Clarke	Business Development Manager	General Dynamics
David Morgan	Marketing Director	HP Services
Jo Preece	Programme Director	HPC Wales
Steve Richard	Policy Director Wales	Logica
Paul Uden	Head of Skills & Economic Affairs	Microsoft
Cenydd Burden	Head of EMEA Client Services Delivery	Mitel
Christine Bamford	Head of OD	NLIAH
Gwyn Thomas	CIO	Welsh Government
Oliver Benzecry	Managing Director, UK & Ireland	Accenture
Clive Selly	CEO BT Innovate & Design	BT
Philip Oliver	CEO	Blitz Games
Christine Hodgson	Chairman	Capgemini
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Craig Wilson	Managing Director and VP, UK & Ireland	HP Enterprise Services
Stephen Leonard	Chief Executive UK, Ireland	IBM
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David Callaghan	Senior Vice President	Oracle
Gayna Hart	MD	Quicksilva
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Catherine Doran	CIO	Royal Mail
Rob Fraser	IT Director	Sainsbury's
Richard Thwaite	MD CIO, Global Asset Management IT	UBS
Peter Pederson	CTO	For other Industry SMEs

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Key Facts

This section summarises the key facts from this report.

The importance of IT & Telecoms to the Welsh economy

- The IT & Telecoms industry contributes in excess of £1.2 billion[1] or 5% of the Welsh total Gross Value Added (GVA).
- Optimisation of ICT[2] by businesses could generate an additional £1.5bn GVA to the Welsh economy over the next 5 to 7 years.
- It is estimated that the ICT driven GVA uplift of £1.5bn in the Welsh economy could translate into 18,000 new jobs, across many occupations and sectors, over the next 5 to 7 years.
- Looking at the UK as a whole an estimated 8.2 million UK adults remain off-line, with 481,000 of these in Wales.
- Those suffering 'Digital exclusion' will be unable to benefit from the wide and growing range of personal benefits accessing the web.
- The potential economic benefits that could result from getting everyone in the UK online as in excess of £22 billion.
- The Internet is also a catalyst for job creation - with 2.6 jobs created for each one lost to technology-related efficiencies.

IT & Telecoms: underpinning Welsh employment

- As the third largest UK nation, Wales accounts for around 4% of the UK population, workforce, business community and GVA.
- GVA per head in Wales is significantly lower than other nations and regions (at 74% of the UK average) as are wages (i.e. £450 per week or 90% of the UK figure).
- In Wales in 2011 over half (56%, or20,000) of IT & Telecoms professionals worked as either IT & Telecoms managers/strategists or as software professionals.
- Additional analysis of Welsh employment trends for IT & Telecoms professionals over the last ten years shows a significant increase of 67% in the number of ICT Managers/IT Strategists & Planners together with a 43% increase in Software Professionals, in the same period.
- Since 2001, the proportion of IT & Telecoms professionals aged 16 – 29 has dropped from 39% to 20% in 2011. Over the same time period, the proportion aged 40+ has increased by eighteen percentage points (from 30% in 2001 to 48% in 2011).
- The proportion of 'young people' (those aged 16-24) working as IT & Telecoms professionals (9%) in Wales is notably lower than that associated with other occupational groups (14%).
- Gender also remains a significant issue and, in 2011, just 21% of IT & Telecoms professionals were female.

[1] Based on SIC Codes 61 and 62

[2] ICT refers to Information & Communications Technologies and where it is specifically identified as ICT in third party sources this terminology has been kept. The preferred referencing used more generally throughout this report is IT & Telecoms

The changing environment

- Though labour issues were not generally a major concern for UK firms, the level of concern relating to the availability of skilled IT & Telecoms staff was twice the level amongst IT and Telecoms employers than that recorded by UK businesses as a whole.
- Despite continued concerns over the global/national economies, more than half of all UK companies surveyed were predicting an improvement in company finances, profitability, customer numbers, turnover and sales over the coming year.
- Cloud computing and mobile computing/applications whilst still used by a relatively small proportion of businesses as a whole (10% and 16% respectively) are expected to be growth areas, and more than half of users in both cases anticipate an increase in their utilisation over the coming year.
- The most immediate key issue for employers is security and data protection.

Demand and supply of IT & Telecoms labour and skills

- There were approximately 1,200 advertised vacancies for IT & Telecoms professionals in Wales during each quarter of 2011, the majority of which (81%) were for permanent posts.
- As within the UK as a whole, the majority of adverts for IT & Telecoms positions in Wales were in the areas of Development, Design or Support (51%, 20% and 16% respectively) and these groups have accounted for an increasing proportion of advertised vacancies over each of the past three years (growing from 74% in 2008 to 87% in 2011).
- For each of the vacancies advertised, a range of generic skills and competences are required together with a variety of job specific, technical skills - the most commonly requested in 2011 being (in order of demand volume): SQL, .NET, C#, Java, SQL Server, ASP, Visual Basic, HTML, JavaScript, and Oracle.
- Amongst recruiters of IT & Telecoms staff across the UK as a whole, IT & Telecoms related skills shortages tended to be associated with Programmers/Software Developers and Web Design/Development professionals.
- Employers report that the technical skills that were proving hardest to fill were .NET/ASP.NET, Dynamics, SharePoint, Visual Basic/Visual Studio, C#, PHP and VMWare.
- Employment of IT professionals within the IT industry in Wales to 2020 is forecast to grow at 1.37% per annum – over twice as fast as the average employment growth in Wales.
- Growth in the IT & Telecoms professional workforce is forecast to be mainly amongst the more senior level/high value roles i.e. ICT Managers, IT Strategy & Planning and Software Professional roles whilst the number of people employed in lower skilled roles will continue to contract or remain static.
- Through to 2020 Software Professionals in Wales show the highest forecast employment growth of all IT & Telecoms occupations at 1.6% per annum.
- Through to 2015 there is a need for 3,100 new entrants a year into IT & Telecoms professional job roles in Wales – the majority of which (42%) are forecast to come from people working in occupations other than IT or Telecoms with 600 (19%) coming from education.

IT & Telecoms skills and development

- On average, IT & Telecoms professionals working in Wales are educated to a higher level than other workers, with 56% holding an HE level qualification in 2011 compared with just 35% of those working in other occupations. Levels of educational attainment in both cases were lower than those recorded for the UK as a whole however, where 62% of IT & Telecoms staff and 37% of other workers were found to have an HE level award.
- Educational attainment is also higher amongst IT & Telecoms industry workers in Wales than is the case for those in other sectors with comparison figures of 55% and 36% respectively. By comparison though, IT & Telecoms sector workers in the UK were again found to be more highly educated with 59% holding an HE level award (38% of those working in other sectors).
- Results from the 2011 employer survey carried out by the National Academy for IT, show around one in five Welsh employers are aware of gaps in the skills of their employees (23%) and of these firms, over one third (37%) report there being gaps in the skills of their IT & Telecoms staff[3]. For the UK as a whole the incidence of skills gaps overall was much lower (11%) though the proportion that were IT & Telecoms related was similar (34%).
- Results for the UK show that where they are apparent, skills gaps amongst IT & Telecoms professionals are likely to be both of a technical and non-technical nature and will often arise with respect to: sales/related, interpersonal and business/related skills (i.e. non-technical) along with technical skills in ASP.NET, C and .NET, PHP and Linux.
- Again for the UK as a whole, these gaps tend to have a detrimental effect upon the business, as IT & Telecoms staff with gaps are typically thought to be performing only around half as well as they potentially could be.
- For IT & Telecoms staff working in 'professional' level positions the percentage receiving education/training is significantly below the level for other, non-IT & Telecoms workers employed at this level/grade (i.e. 23% vs. 41% respectively).

IT related education and qualifications

- Across the UK, a key issue affecting undergraduate provision has been the large decrease in numbers of applicants to IT related courses. In Wales, however, the number of applicants gradually increased from 2006 to 2009 but declined by 5% in 2010 and is yet to reach the 2002 high of 815. By comparison to the UK overall, the total number of applicants (UK domicile) to all HE courses in Wales has increased by 31% over the 2002-2010 period.
- Acceptances onto IT related Higher Education courses in Wales declined over the two year period 2002 to 2004 but, in line with applicant numbers, acceptances increased from the 2004 low of 600 to 790 in 2009 but decreased again to 705 in 2010.
- Across all IT related HE courses, 83% of acceptances are male and 17% are female.
- The number of IT & Telecoms qualifiers from Higher Education Institutes (HEIs) in Wales increased by 3% from 2008/09 to 2009/10 – five percentage points less than for the UK as a whole, which rose by 8%.
- Information Technology was the second most popular subject being undertaken by learners at Further Education (FE) Institutions in Wales in 2009/10.

[3] Caution low bases

- There were 67,925 learning activities and 24,750 attainments on Information and Communication Technology[4] courses at FE colleges in Wales during 2009/10.
- Since 2004, the decline in students in Wales taking A-Level Computing is more than that seen across the UK (a 64% and 53% decrease in numbers respectively).
- However the trend in Wales in the uptake of ICT A-Level is the reverse of that seen across the UK. Numbers in Wales taking ICT A-Level increased by 167% from 2004 to 2010 but decreased in 2011 by 2%, whilst across the UK numbers have fallen by 26% over the same time period (2004 to 2011).

The wider population's use of IT

- Across the UK over 1 in 10 (13%) of people aged 16 or over have never used a computer.
- Around one in five Welsh employers were aware of gaps in the skills of their employees (23%) whilst, within the UK at least, around 42% of firms with skills gaps were also thought to have gaps in the skills of their IT users.
- On average, just under one quarter (24%) of UK companies reporting gaps in the IT skills of their computer users were of the view that staff were underperforming as a consequence and on average users with gaps in their IT skills were thought to be working at 78% of their full potential.

Global ambition and e-skills UK's strategic objectives

- e-skills UK's vision is that the UK and its constituent nations are recognised as global leaders in delivering business value from technology.
- Strategic action to accelerate the development of the skills pool in line with this vision is essential for the future.
- Information Technology and Communications systems are at the heart of every organisation, they underpin the delivery of high quality, cost effective public services, and they are central to the fabric of our daily lives.
- Based on the analysis and skills priorities set out in this document, and taking account of the current environment, e-skills UK will work together with partner organisations to deliver on three key strategic objectives to ensure Wales is truly world class at delivering maximum value from technology both in business and in society more widely, namely to:

  1. Inspire future talent: To motivate talented students to pursue IT & Telecoms related careers and better prepare all young people for work in a technology-enabled world.

  2. Support IT & Telecoms professionals: To develop the IT & Telecoms professional skills pool as the best in the world for deriving business benefit from technology.

  3. Increase digital capability: To trigger increased investment in the IT capability of all individuals and businesses in every sector.

[4] By Sector Subject Area

1.0 Introduction

In the context of the current economic climate in Wales, high growth, high tech and innovative businesses are critical – they drive economic growth, productivity, global competitiveness and the creation of new jobs. In response to this, the Information and Communication Technologies sector has been highlighted by Welsh Government as an Economic Renewal Priority Sector, where targeted intervention could improve the global competitiveness of the Welsh economy.

By supporting high growth, innovative and technology companies and ensuring businesses have the right skills they need to grow Wales will be on the path to a new economic dynamism. The changing shape of the economy means that future growth will depend more and more on the technology sector, and so the technology skills needed for businesses to innovate will become increasingly important.

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Focused on making the biggest contribution to enterprise, jobs and growth across the economy, e-skills UK's three strategic objectives are to:

- Inspire future talent,
- Support IT professionals,
- Increase digital capability.

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.

Building on previous research over the last decade, e-skills UK has analysed the UK and nations IT & Telecoms workforce, technology trends, opportunities and challenges in order to deliver authoritative labour market intelligence which enables effective influence on policy, strategy and solution development. The resultant suite of publications, 'Technology Insights 2012' sets out the current reality, forecasts the future based on the best available intelligence, and assesses the implications for the IT & Telecoms sector.

'Technology Insights 2012: Wales' uses existing research knowledge supplemented with new primary research amongst over 200 employers in Wales and includes; a detailed analysis of the IT & Telecoms industry and workforce profiles in Wales; a summary of technology–related trends and their implications for future skills; employer views of business outlook for the next year, updated employment forecasts for the Welsh IT & Telecoms industry and workforce through to 2020, an analysis of the impact of IT & Telecoms across the wider Welsh economy; the state of current skills provision/training within the IT & Telecoms workforce and the status of ICT education in Wales in schools, FE and up to HE level.

This report will help to inform e-skills UK, Welsh government, education providers, employers of current and future issues facing the IT & Telecoms sector and the implications of emerging trends in a changing global environment.

2.0 The importance of IT & Telecoms to the Welsh economy

This section looks at the importance of IT & Telecoms to the economy in Wales.

2.1 IT & Telecoms and competitiveness

Wales is highly dependent on its IT & Telecoms workforce – it underpins the economy and is integral to information, business and consumer services, health and leisure and modern day social networking. Across all industries in Wales; it is the combination of its highly skilled IT & Telecoms professionals, technology-savvy business leaders and competent IT users that enable their organisation's effective participation in the global digital economy.

A growing sector that is significant to the economy and employment[5], the IT sector in Wales is also recognised as being pivotal in improving its global competitiveness[6] and whilst a direct comparison for Wales is not available, it is useful to reference the current global status/competitiveness of the UK as a whole.

Compared too many other nations the UK continues to rate highly with respect to IT investment and utilisation. However, its global ranking has generally declined in recent years and consistently remains below the level assigned to other leading nations, notably the US and the Nordic states in particular (i.e. Sweden, Denmark and Norway). Though the real 'game changers' organisations i.e. those IT firms such as Apple, Google, Facebook etc that attract the largest valuations, all have US roots, and have contributed to the US retaining its place at the top of the IT industry Competitiveness index[7] - although this could be about to change.

Firms in emerging markets are said to be realising the benefits of ICT investment quicker by learning from their advanced economy counterparts' mistakes and are investing aggressively in ICT. Subsequently, questions have been raised about the potential for the IT industry's centre of gravity shifting from West to East – not least because these firms in emerging markets are said to be twice as likely as those in advanced economies to increase ICT investments by 20% or more[8].

'While changing the way individuals live, interact, and work, ICT has also proven to be a key precondition for enhanced competitiveness and economic and societal modernisation, as well as an important instrument for bridging economic and social divides and reducing poverty'

World Economic Forum

2.2 IT & Telecoms productivity

Since the late 18th century Western society has been described as having experienced five distinct eras or revolutions[9]. Although all are said to have led to profound changes in the organisation of the economy; ICT - which is the fifth and most recent – stands out because of the velocity by which it has changed society.

The Welsh IT & Telecoms industry contributes in excess of £1.2 billion[10] or 5% towards Wales' total Gross Value Added (GVA). In addition, across Wales and the rest of the UK's nations, the previously un-assessed economic contribution of the Internet is now said to be worth an estimated £100 billion to the economy[11].

If Wales is to realise its goal of improving global competitiveness[12], further investment in ICT is critical. As an example of the potential impact

The IT & Telecoms industry GVA contributes in excess of £1.2 billion towards the economy of Wales

[5] UKCES, 'Skills for Jobs: The National Strategic Skills Audit for Wales 2011 Volume 1 Key findings', June 2011

[6] Welsh Assembly Government, 'Economic Renewal: a new direction', July 2010

[7] Economist Intelligence Unit 'Investment for the future, Benchmarking IT industry competitiveness 2011', 2011

[8] Oxford Economics, 'Capturing the ICT Dividend', October 2011

[9] World Economic Forum, 'The Global Information Technology Report 2010–2011', 2011

[10] Based on SIC 2003 Codes 72 and 64 – 2007 data

[11] The Boston Consulting Group, 'The Connected Kingdom: How the Internet Is Transforming the UK Economy', October 2010

[12] Welsh Assembly Government, 'Economic Renewal: a new direction', July 2010

investment in ICT can have, the following two paragraphs describe ICT's role in the improved productivity gains realised by the United States (US).

Reports[13] investigating the relationship between the effective application of IT and improved productivity found increased investment in ICT capital to have *'played a major role'* in the doubling of US productivity growth rates - commonly referred to as the *'productivity miracle'*.

Studies to understand the better productivity gains in the US compared to the UK and the comparative differences across Europe found that US multinational firms are on average 8.5% more productive than UK domestic owned firms, and that almost all of this difference is due to the higher productivity impact of their use of ICT[14]. Further research has concluded that over 80% of this productivity advantage is explained by better use of IT and that by 2020, if the Europe increased its ICT capital stock to the same level (relative to the size of the economy) as that of the US, GDP would increase by 5% on average – equivalent to €760 billion for Europe as a whole[15].

Notwithstanding the direct economic contribution of the sector, access to technologies such as the internet also creates social benefits for the three million people living in Wales. These include access to employment opportunities for unemployed adults, improved standards of living for older people and increased democratic engagement and access to information.

2.3 The importance of continued business investment in ICT

The IT & Telecoms sector, in its own right, clearly offers Wales continued economic opportunities, but perhaps of equal if not greater significance are the opportunities across the rest of the economy arising from businesses in all sectors of the economy maximising their use of ICT, broadband and internet access.

Estimates have been made of the potential GVA and employment impacts likely to result if all businesses, particularly small businesses, fully invest in and optimise advanced ICT. The impacts have been estimated for the UK, the nations, for the English regions and the UK city regions in each case using a bespoke ICT-impact model first developed by Adroit Economics Ltd for e-skills UK[16].

2.3.1 ICT-driven GVA uplift in Wales

The 2012 model estimates that optimisation of ICT by Welsh businesses could generate an additional £1.5bn GVA to the Welsh economy over the next 5 to 7 years.

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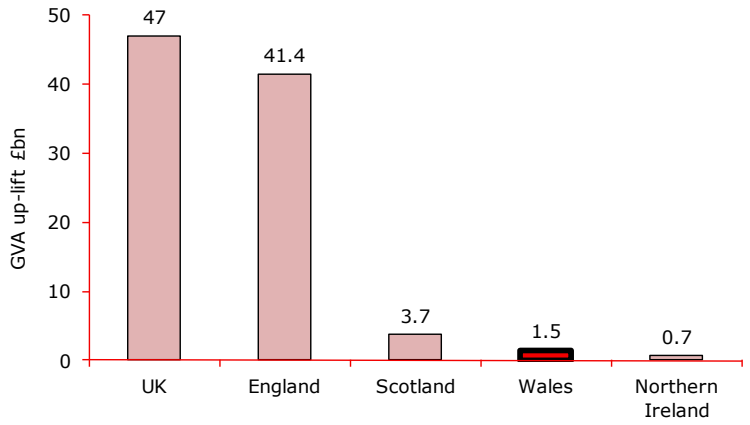
[13] London School of Economics, 'The Economic Impact of ICT', January 2010

[14] Office for National Statistics, 'IT investment, ICT Use and UK Firm Productivity' Rafaella Sadun, Shikeb Farooki, Giles Gale, Mark Lever, August 2005

[15] Oxford Economics, 'Capturing the ICT Dividend', October 2011

[16] The model was first developed for e-skills UK in 2006/7 and has since been updated in 2010 and now in 2011. The 2011 version of the model estimates potential ICT-driven GVA uplift for each industry sector (using the 2003 Standard Industrial Classification (SIC) system at 2-digit level). The 2011 model calculated potential ICT driven GVA uplift at the level of the UK's nations, the English regions, city regions, and for particular groups of industry sector. ICT GVA uplift is assumed to derive from two factors (i) continued productivity gains and (ii) increased enterprise and innovation. A percentage uplift figure is attributed for each factor and to each industry sector. GVA uplift is calculated by applying the total percentage uplift figure to current GVA for the industry sector (based on Experian's 2012 productivity forecasts)

Figure 1: GVA up-lift in Wales over the next 5–7 years



Source: Adroit Economics ICT impact model 2012, using Experian 2012 productivity forecasts

Optimisation of ICT by businesses could generate an additional £1.5bn GVA to the Welsh economy over the next 5 to 7 years

2.3.2 Translating the ICT driven GVA uplifts into equivalent jobs in Wales

Optimisation of advanced ICT by firms will also generate net additional jobs. There is some discussion however regarding the extent of this.

- Some would argue that increased productivity might result in reduced employment in some firms, static employment in other firms and employment growth in others, such that at the level of the economy, ICT driven productivity gains may not translate 100% into additional jobs.
- Others would argue that whilst in the short term, some firms may simply reduce employment, that in the longer term in a vibrant economy it is reasonable to expect advanced ICT to stimulate considerable new business starts and at the level of the economy for any surplus to be taken up by growth.

Recent evidence however strongly suggests that optimisation of ICT will generate significant additional jobs, driven in particular by the emergence of new ICT applications and services that will, in many respects, have a transformational impact on many businesses. In fact, recent studies report that optimisation of cloud computing and of 'big data'[17] alone will create over a quarter of a million jobs in the UK by 2015/17, namely:

- Spend on public and private cloud computing services will create 226,000 jobs in the UK by 2015, according to a study from analyst firm IDC[18] with SMEs adopting cloud computing faster than larger companies straddled with legacy systems.
- Harnessing 'big data' could contribute £216 billion to the UK economy and stimulate 58,000 new jobs between 2012 and 2017 according to a new study by The Centre for Economics and Business Research (Cebr) and SAS[19], a leader in business analytics software and services.

[17] As the amount of data continues to grow, compounded by the internet, social media, cloud computing and mobile devices, it poses both a challenge and an opportunity for businesses i.e. how to manage, analyse and make use of the ever-increasing amount of data being generated. As a result, organisations are turning to big data analytics solutions such as high-performance analytics to unlock the value of data and reveal previously unseen patterns, sentiments and customer related intelligence

[18] IDC, 'Cloud Computing's Role in Job Creation', 2012

[19] The Centre for Economics and Business Research (Cebr) and SAS, 'Data Equity: Unlocking the value of big data', April 2012

These and other fast emerging new IT applications and services are likely to generate significant additional jobs in Wales.

2.3.3 Equivalent jobs that could be generated in Wales

Calculating the exact number of additional jobs is difficult because many factors are at play. To reflect this, the Adroit Economics model uses several contrasting methods to provide a range of possible job outcomes. The range provides a useful cross-check.

The ICT driven GVA uplift of £1.5bn in the Welsh economy could translate into 18,000 new jobs, across many occupations and sectors, over the next 5 to 7 years

Taking the mid-range as the best guide of the likely number of additional jobs, it is estimated that the ICT driven GVA uplift of £1.5 in the Welsh economy could translate into 18,000 new jobs, across many occupations and sectors, over the next 5 to 7 years.

Table 1: GVA up-lift and estimate of equivalent jobs in Wales over the next 5-7 years

	GVA uplift £ billion	Estimate of equivalent jobs
England	41.4	427,000
Scotland	3.7	39,000
Wales	**1.5**	**18,000**
Northern Ireland	0.7	10,000
UK	**47**	**494,000**

Source: Adroit Economics ICT impact model 2012, using Experian 2012 productivity forecasts

2.3.4 Social and economic benefits of household use of ICT and of tackling digital exclusion in Wales

'The total potential economic benefit from getting everyone in the UK online is in excess of £22 billion'

PriceWaterhouse Coopers

In Wales and across the UK more generally it is not only businesses that benefit from use of ICT and access to the internet, citizens and their households also increasingly benefit. The most obvious benefits are entertainment and social benefits (e.g. IP-TV, gaming online, social networking etc) but there are also economic, educational health and wider quality of life benefits more generally.

Looking at the UK as a whole an estimated 8.2 million adults remain off-line (with 481,000 of these in Wales)[20] and are missing out on these benefits. The groups subject to the highest digital exclusion are the families with single parents, those aged 65 or over and the unemployed.

Those suffering 'Digital exclusion' will be unable to benefit from the wide and growing range of personal benefits accessing the web brings e.g. improved educational attainment, improved skill levels, improved job level and income, savings from online shopping and better access to public services including health services. Digital exclusion goes hand in hand with social exclusion - the former serves to exacerbate the latter.

A report by PriceWaterhouseCoopers[21] quantified the potential economic benefits that could result from getting everyone in the UK online as in excess of £22 billion.

2.3.5 ICT and significant public service cost savings

Adoption and increased usage of ICT by the public sector in Wales has and will continue to generate significant cost savings, improvements in existing services and innovative new services in certain areas e.g.

- One of the most significant cost savings derives from customers (businesses and households) accessing information and public

[20] ONS Q4 2011

[21] PriceWaterhouseCoopers 'The Economic Case for Digital Inclusion', 2009

services on line and undertaking an ever increasing range of transactions on line. This reduces transaction costs for the public sector whilst reducing time spent and numbers of physical journeys required by customers.

- The health service will also derive savings through reduced GP visits and the improved health enabled by better access to health information and advice online.

2.3.6 The economic importance of super fast broadband

'The Internet is also a catalyst for job creation ....with 2.6 jobs created for each one lost to technology-related efficiencies'

The McKinsey Global Institute (MGI)

Across global economies broadband and access to the internet has become an increasingly vital component of modern life. A recent study of 33 OECD countries by *Ericsson, Arthur D. Little and Chalmers University of Technology, October 2011,* concluded that 'quadrupling of broadband speeds coupled with a 10% increase in penetration would generate an additional 1.6% GVA over a two year period'.

This clearly suggests that faster broadband speeds are integral to the future optimisation and impact of advanced ICT in all countries. It follows that those countries that are able to deploy the best technologies soonest, will gain a competitive advantage.

Further, a recent report by The McKinsey Global Institute[22] stated that the internet is also a catalyst for job creation. Among 4,800 small and medium-size enterprises surveyed, the Internet created 2.6 jobs for each lost to technology-related efficiencies.

2.3.7 Ensuring the benefits of ICT are realised in Wales

This report strongly suggests that adoption and use of ICT continues to have a significant range of positive impacts across the economy for businesses, individuals and for the delivery of Government services.

These impacts are substantial and are of particular importance at this point in time, when priorities are to ensure business growth avoiding a stall in economic recovery, reducing the cost of public services and helping the excluded and disadvantaged to improve their health, aspirations and access to qualifications and work.

What then are the implications of this analysis for future Welsh policy? Is there a need for future ICT policy or will things take care of themselves?

The evidence suggests that there is a clear and present need for policy intervention identified in four main areas:

i. ICT business support - helping small businesses in Wales adopt and exploit more advanced ICT

ii. ICT skills – improving both professional and user skills, within the workforce and within communities

iii. Helping the digitally excluded to access the internet

iv. Ensuring all of Wales can access a new generation of superfast broadband.

Those countries that are able to deploy the best technologies soonest, will gain a competitive advantage

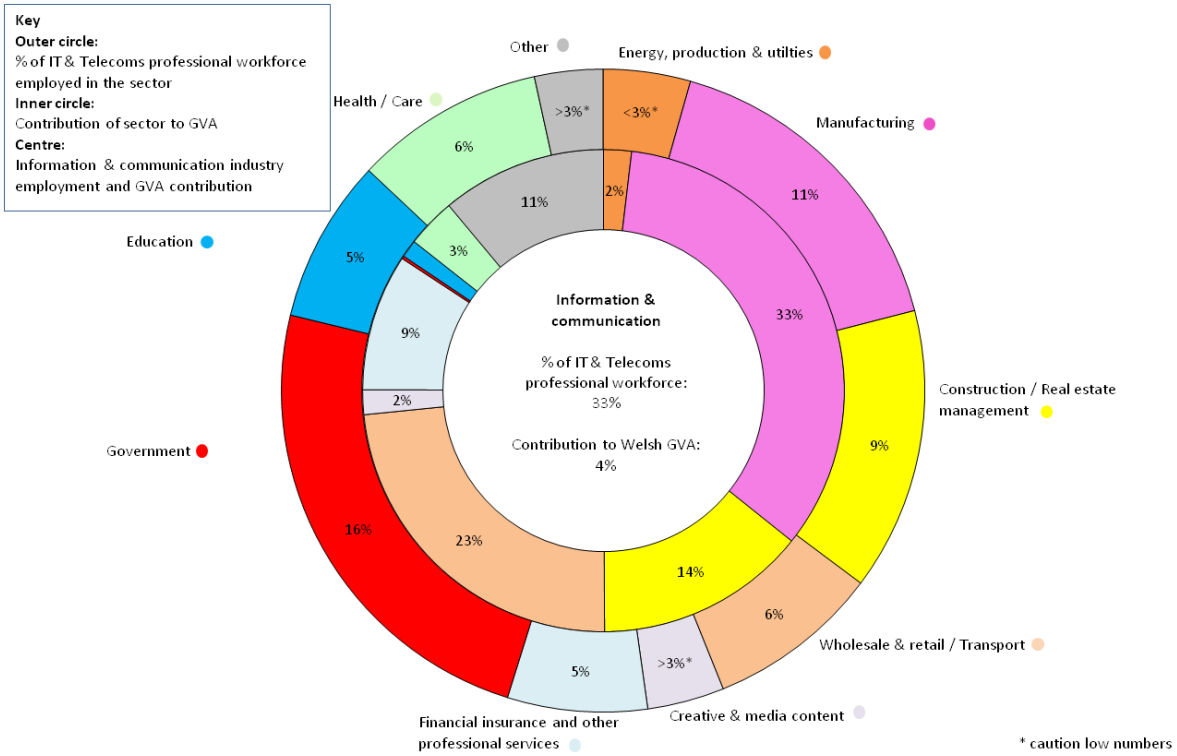
[22] The McKinsey Global Institute (MGI), 'Internet Matters: The Net's Sweeping Impact on growth, jobs and prosperity', May 2011

2.3.8 IT & Telecoms at the heart of the economy in Wales

Across all industries, it is the combination of highly skilled IT & Telecoms professionals, technology-savvy business leaders and competent IT users that enable an organisation's effective participation in the digital economy.

The following diagram shows the relationship between the proportions of the UK's IT & Telecoms professionals employed across various Welsh sectors, along with their respective GVA contributions, highlighting the role of IT & Telecoms at the heart of the Welsh economy.

Figure 2: The importance of IT & Telecoms to the Welsh economy



Source: e-skills UK analysis of data from the Office for National Statistics (ONS), 2011 data

'ICT has evolved into the general purpose technology of our time, given the critical spill overs to the other economic sectors and their role as industry wide enabling infrastructure'

World Economic Forum

It is clear that technology related skills are a major factor for economic and social success across many sectors in Wales, in particular, manufacturing, construction/real estate and within Welsh government.

In Wales IT is critical not only to the 44,000 people in the IT & Telecoms workforce, i.e. the experts who create, implement and operate the systems, services and communications backbone on which everyone relies; but also the 116,000 business managers who need to have a solid grasp of the strategic implications of technology and the skills to realise its potential together with the many Welsh employees who use IT in their daily work.

3.0 Technology's strategic importance in policy

This section summarises the skills and employment related policy environment in Wales with reference to national economic and skills strategies and other policy developments that impact the sector.

3.1 Skills and employment policy context in Wales

The Welsh *'Programme for Government'*[23] sets out the goals for growth and sustainable jobs and education alongside other priority policy areas. The government says it will improve support for the economy and business and Welsh skills for employment, including apprenticeships.

3.1.1 Economic strategies

Jobs and the economy are the overriding priorities for the Welsh Government, which has confirmed its support[24] for the Economic Renewal Programme. *'Economic Renewal: a new direction'*[25] sets out how the devolved government in Wales can help provide the best conditions for growth in the private sector using the five priorities of: investing in high-quality and sustainable infrastructure; making Wales a more attractive place to do business; broadening and deepening the skills base; encouraging innovation; and targeting the business support offered.

Within the programme, the Information and Communication Technologies sector is highlighted as an Economic Renewal Priority Sector where targeted intervention could help improve the global competitiveness of the Welsh economy. The report says: *"Information and Communications Technologies are a driving force in both economic development and wider societal change. In addition to being an important industry sector, the application of ICT drives productivity and competitiveness across the whole of the economy"*.

'In addition to being an important industry sector, the application of ICT drives productivity and competitiveness across the whole of the economy'

Welsh Assembly Government, Economic Renewal: a new direction, July 2010

3.1.2 Skills and education

In education the aim of Welsh Government is to help everyone reach their potential, reduce inequality, and improve economic and social well-being. Economic renewal sets out the importance of education and skills for economic growth and prosperity building on *'Skills that Work for Wales'*[26] and the HE strategy *'For our Future'*[27]. In terms of broadening and deepening the skills base the strategy is based around the following outcomes:

- Partnership with employers on workforce skills at all levels - through integrated business support, investing in leadership and management skills and basic skills in the workplace initiatives.
- Motivating young people, ready for employment - critically in basic skills and STEM subjects and through providing high quality and independent information about employment.
- Funding for priorities and policy commitments – including a clear fees policy, workplace skills development that aligns with economic renewal objectives.
- High quality apprenticeships offered by more employers, including shared apprenticeships and an apprenticeship matching service.
- Skills that open up rewarding routes into work including a more effective skills and employment service.
- A provider network that delivers choice, innovation and excellence.

[23] Welsh Government, 'Programme for Government', September 2011

[24] Welsh Labour Party, 'Welsh Labour Party Manifesto 2011: Standing up for Wales', 2011

[25] Welsh Assembly Government, 'Economic Renewal: a new direction', July 2010

[26] Welsh Assembly Government, 'Skills that Work for Wales: A Skills and Employment Strategy and Action Plan', July 2008

[27] Welsh Assembly Government, 'For Our Future - The 21st Century Higher Education Strategy and Plan for Wales', November 2009

- Higher education and higher level skills - new jobs and growth in existing and new companies arising from commercialisation of knowledge and research in Higher Education.

There is a core pledge to tackle youth unemployment by creating a young peoples' jobs and training fund and to extend apprenticeship opportunities for young people.

Changes to improve Further and Higher Education include: encouraging further mergers of FE colleges where these increase learning opportunities and enable closer FE-HE collaboration; reforming FE governance and establishing a new funding mechanism; establishing a single strategic planning and funding body for Higher Education and promoting mergers to improve the strength of universities.

3.1.3 Other policy developments

Other developments of relevance to the sector in Wales include:

- The Welsh ICT Infrastructure policies, to ensure businesses and individuals in Wales have access to the best broadband in Europe. This includes *'Delivering a Digital Wales'*[28] which promotes skills from basic digital literacy to specialist skills for the ICT industry, for all ages and level. There are recommendations on inclusivity, skills, the economy, public services and infrastructure.
- The publication of the *'National Strategic Skills Audit for Wales 2011'*[29] which, through a thorough assessment of jobs and skills in Wales, concludes that the IT sector is a growing sector that is significant to the economy and employment. Two priority action areas are highlighted indicating: a) the need to improve management capability in exploitation of technology in order to optimise business benefits and b) higher level security and data protection skills and an increasing need for customer and business-oriented skills as well as technical competencies for IT professionals.

3.1.4 e-skills UK strategic response

e-skills UK has a Strategic Plan for Wales (2009-2014) that, based on research input from employers, sets out a coherent suite of skills strategies that enable the economy to derive maximum benefit from the power of technology; transforming competitiveness and productivity through the creation of appropriate technology related skills.

e-skills UK is undertaking work to support three strategic objectives:

- 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 developing the IT professional skills pool as the best in the world for delivering business benefit from technology,
- Increase digital capability by triggering increased investment in the IT capability of all individuals and businesses in every sector.

Actions detailing how e-skills UK will deliver these objectives are set out in e-skills UK's Strategic Plan for Wales which identifies specific activities tailored to the context of Wales. The Strategic Plans for Wales and the associated actions will be further informed by the research presented in this *'Technology Insights 2012: Wales'* publication.

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[28] Welsh Assembly Government, 'Delivering a Digital Wales: The Welsh Assembly Government's Outline Framework for Action', December 2010

[29] UKCES, 'Skills for Jobs: The National Strategic Skills Audit for Wales 2011 Volume 1 Key findings', June 2011

4.0 IT & Telecoms: underpinning Wales' employment

Wales is the third largest UK nation and accounts for around 4% of the total population, workforce, business community and GVA. GVA per head in Wales is significantly lower than other nations and regions (at 74% of the UK average) as are wages (i.e. £450 per week or 90% of the UK figure).

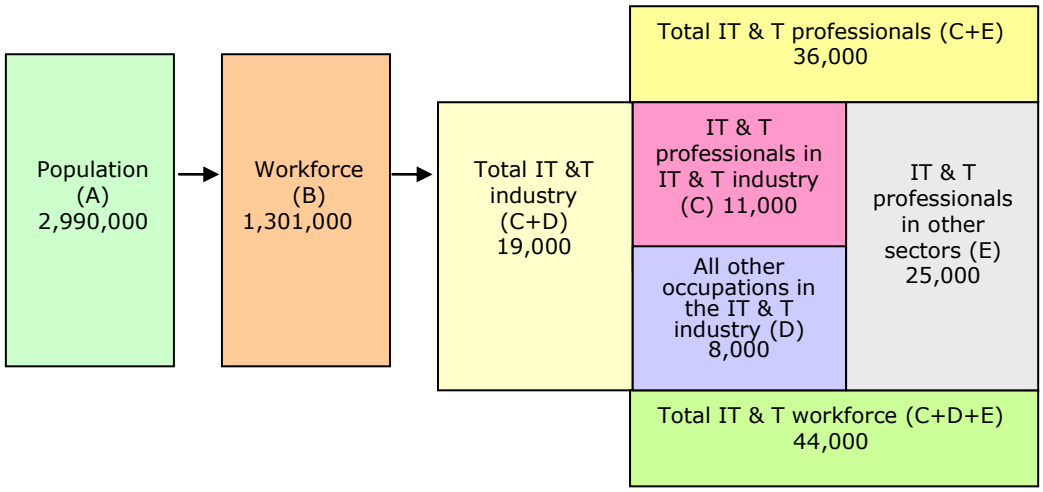
There are more than 3,500 workplaces in Wales' IT & Telecoms industry

There are more than 3,500 workplaces in the Welsh IT & Telecoms industry - 79% of which are IT and 21% Telecoms. 85% of these are services orientated. Though micro firms make up 94% of the number of IT & Telecoms workplaces in Wales, they employ just 34% of the sector workforce. By contrast, companies with 200 or more employees make up less than 1% of the number of workplaces but employ the largest proportion (34%) of the workforce.

In terms of its workforce, there are 44,000 people (or one in every thirty persons working in Wales) employed in IT & Telecoms – 19,000 (43%) of which work in the IT & Telecoms industry itself with a further 25,000 (56%) working as IT or Telecoms professionals in other industries.

The following diagram segments IT & Telecoms professionals and the IT & Telecoms industry. In addition it shows which of their respective sub groups combine to form the IT & Telecoms workforce.

Figure 3: IT & Telecoms workforce – high level segmentation



Source: e-skills UK analysis of the ONS Labour Force Survey, 2011 four quarterly average

Note: Figures may not add up due to rounding

Occupational profile

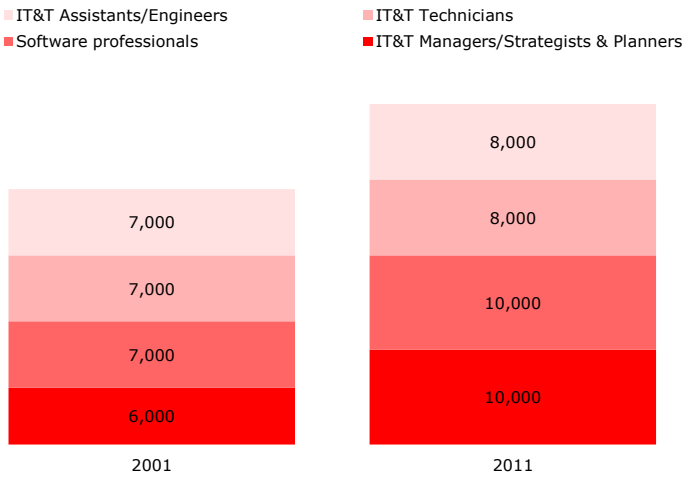
Figure 4 shows that in Wales in 2011 over half (56%/20,000) of IT & Telecoms professionals worked as either IT & Telecoms managers/strategists or as software professionals. Exploring these two groups in more detail identifies that two thirds of them work outside of the IT & Telecoms industry sector and are therefore employed across many different sectors across the whole economy in Wales. One in five also worked as IT & Telecoms Technicians (8,000/22%) with a similar number in Assistant/Engineer roles.

In Wales over half (56%) of IT & Telecoms professionals work as either managers/strategists or as software professionals, with two thirds of them working outside of the IT & Telecoms sector

Additional analysis of Welsh employment trends for IT & Telecoms professionals over the last ten years shows a significant increase of 67% in the number of ICT Managers/IT Strategists & Planners together with a 43% increase in Software Professionals, in the same period. Those in IT & Telecoms Assistant/Engineering and Technician roles have both increased marginally through to 2011.

Figure 4: Number of IT & Telecoms professionals by occupation in Wales 2001 to 2011

Over the last decade the number of software professionals in Wales has grown by around 43%



Source: UK analysis of data from the ONS Labour Force Survey, 2011 (four quarter average) together with 2011 forecasts from Experian

Age and gender

Almost half of IT & Telecoms professionals are now aged 40+ years old

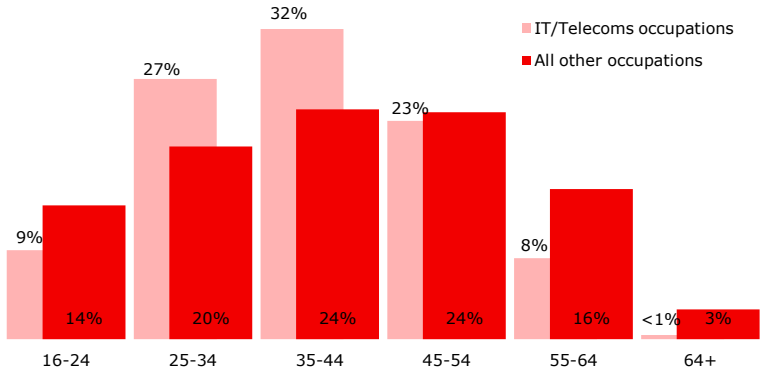
Though compared to all other sectors, the average age of an IT & Telecoms professional in Wales is in line with that seen across all other occupations (40 years old versus 42 years old respectively), the sector favouring experienced workers from other sectors over young recruits from the education system means the IT & Telecoms professionals age profile is increasing. Since 2001, the proportion aged 16 – 29 has dropped from 39% to 20% in 2011. Over the same time period, the proportion aged 40+ has increased by eighteen percentage points (from 30% in 2001 to 48% in 2011).

Looking at the age composition of the IT & Telecoms professional workforce in Wales in more detail reveals further evidence that the proportion of 'young people' (those aged 16-24) is low and declining. As illustrated within figure 5 (and as is the case for the UK as a whole), the proportion of 'young people' working as IT & Telecoms professionals in Wales is notably lower than that for workers in other occupations (i.e. 9% and 14% respectively).

Moreover, though historical trends are not currently available for Wales in isolation, it should also be recognised that, across the UK, the proportion of young people working in IT & Telecoms roles has been in decline for a number of years giving rise to concerns about the potential availability of entry grade positions for those considering a career in IT & Telecoms.

Figure 5: Age distribution of IT & Telecoms professionals/other workers in Wales

The proportion of young people working in Wales as IT & Telecoms professionals is just two-thirds that of other occupations



Source: e-skills UK analysis of data from the ONS Labour Force Survey, 2007-11 (average over the period)

This hypothesis is supported to some degree by an analysis of employment trends over the past decade which shows how growth in more senior IT & Telecoms positions (i.e. Managerial/Professional, as described in detail in the previous section) has coincided with a virtual stagnation in the number of lower level posts (i.e. Technicians/Engineers) – these being the most likely points of entry for young people seeking to commence a career in IT & Telecoms.

Though there has been little change in terms of proportion over the last ten years, gender also remains a significant issue and, in 2011, just 21% of IT & Telecoms professionals were female. By contrast, across all other occupations in Wales, females account for almost half (47%) of the workforce.

5.0 The changing environment

This section gives an overview of issues facing businesses in the UK and Wales together with a summary of key trends and associated skills implications.

When asked about their level of concern over various business influencers, employers surveyed in 2011 by the National Skills Academy for IT clearly highlighted the state of the global and national economies as being the most pressing issue for them. At the same time, labour related issues tended to be of comparatively little concern, primarily due to employers anticipating large numbers of redundancies and a general decline in demand for labour giving rise to an abundance of potential candidates and reduced competition in the marketplace.

Though labour issues were not generally a major concern for UK firms, the level of concern relating to the availability of skilled IT & Telecoms staff was twice the level amongst IT and Telecoms employers than that recorded by UK businesses as a whole.

Despite continued concerns over the global/national economies, more than half of all companies surveyed were predicting an improvement in company finances, profitability, customer numbers, turnover and sales over the coming year.

The focus of internal IT & Telecoms activities is likely to change significantly for many businesses over the coming year with one of the most noticeable trends being a likely reduction in the amount of internal resources dedicated towards helpdesk/support services. By contrast database activities and integration in particular were highlighted by the vast majority of businesses as areas in which more work will be undertaken by their own staff over the next 12 months.

Cloud computing and mobile computing/applications whilst still used by a relatively small proportion of businesses as a whole (10% and 16% respectively) are expected to be growth areas, and more than half of users in both cases anticipate an increase in their utilisation over the coming year.

Whilst the level of IT & Telecoms related spend is most often predicted to remain unchanged over the coming year, it is likely that increases will still occur areas such as IT & Telecoms staffing, hardware/software spending and general outsourcing activities.

Table 2: Anticipated changes in IT & Telecoms spending over the coming year

	Up	Down	Same	Balance
IT & Telecoms staffing	13%	0%	87%	13%
IT & Telecoms staff training	6%	1%	93%	5%
IT User skills training	4%	3%	94%	1%
IT & Telecoms hardware spend	28%	15%	56%	13%
IT & Telecoms software spend	29%	12%	59%	17%
IT & Telecoms services spend	12%	3%	85%	9%
Spend on outsourcing:				
General IT & Telecoms activities	15%	3%	82%	12%
Applications/development	3%	10%	87%	-7%
Help desk/support services	8%	7%	85%	1%
Database management/maintenance	6%	1%	93%	4%
Storage	5%	2%	94%	3%
Security	2%	0%	98%	2%
Process, project or programme management	5%	7%	88%	-2%

Source: National Skills Academy for IT - Employer survey, 2011

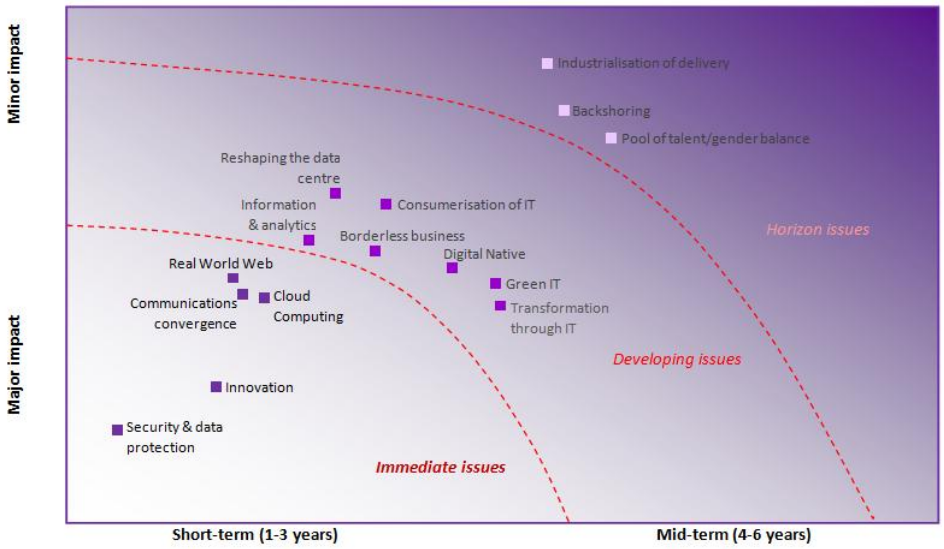
5.1 Emerging trends and associated skills needs

The most immediate key issue for employers is security and data protection

Figure 6 illustrates the relative impact of each key trend on business according to employers who 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. Based on these results the trends are categorised into one of three groups:

- Immediate issues: Those that many (typically more than half) employers say will have a major impact on business, and typically in the next one to three years. The immediate key issues for employers appear to be security and data protection, but innovation is also considered important, followed by cloud computing, convergence of communications & IT and the real world web,
- Developing issues: Those that will have a major impact on only a selection of businesses, or alternatively may have a more widespread impact, but in the medium term. '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 five years, but only those businesses with intensive computing needs will be directly affected,
- Horizon issues: 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 back-shoring, but it is not regarded as an immediate issue and smaller employers do not appear to be very concerned by it. In contract, industrialisation of IT delivery will only really impact on small employers in any great number, while the pool of talent and gender balance appears more of an issue for IT & Telecoms businesses than other employers of IT & Telecoms professionals.

Figure 6: Trends shaping IT & Telecoms skills changes



Source: Technology Insights 2011: Trends and UK Skills Implications, e-skills UK/Experian

5.2 Future skills issues

Many of the future trends that affect IT & Telecoms utilise similar technologies and or require similar skills and knowledge. There are five cross cutting themes in the demand for skills that emerge across the future trends survey and the relationship between skills and trends is shown in figure 7, below.

Figure 7: Future IT trends and the cross cutting skills issues

	Security skills	Business skills	Technology specific skills	Interpersonal skills	Analytical/research skills
Security and data protection	●		●		○
Innovation		●		○	○
Cloud computing	●	○	○	○	
Transformation through IT		●	●	○	
Real world web		○	●	○	
Convergence of IT & communications	●	○	●		
Borderless Business	●		○		
Digital Native		○	○	○	○
Reshaping the Data Centre	○	○	○	○	
Green IT			●		○
Information and analytics			●		●
Consumerisation of IT		○	○	○	
Back-shoring	○	○		○	
Pool of talent/gender balance		○	○	○	
Industrialisation of IT delivery		○	○	○	

● Priority skills requirement (>67% of respondents say will be required)

○ General skills requirement (<67% of respondents say will be required)

Source: IT & Telecoms Insights 2011: Trends and UK Skills Implications

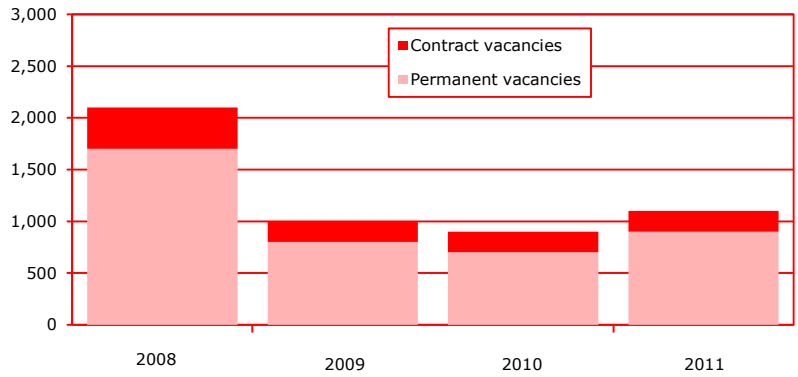
6.0 Demand and supply of IT & Telecoms labour and skills

This section explores IT & Telecoms workforce growth and replacement dynamics, recruitment needs by occupation, and recruitment sources. The general demand figures contained within section 6.1 are drawn from a bespoke analysis of vacancy data from Salary Services Ltd whilst observations regarding recruitment difficulties and skills shortages have been obtained from the National Skills Academy for IT[30].

6.1 Demand for IT & Telecoms professionals

There were approximately 1,200 advertised vacancies for IT & Telecoms professionals in Wales during each quarter of 2011, the majority of which (81%) were for permanent posts.

Figure 8: Change in demand for IT & Telecoms professionals 2008-2011[31]



Source: e-skills UK analysis of data from Salary Services Ltd

There were 1,200 IT & Telecoms vacancies in Wales per quarter on average during 2011, the majority of which were for in the areas of Development, Design or Support

As within the UK as a whole, the majority of adverts for IT & Telecoms positions in Wales were in the areas of Development, Design or Support (51%, 20% and 16% respectively) and these groups have accounted for an increasing proportion of advertised vacancies over each of the past three years (growing from 74% in 2008 to 87% in 2011).

For each of the vacancies advertised, a range of generic skills and competences are required together with a variety of job specific, technical skills - the most commonly requested in 2011 being (in order of demand volume): SQL, .NET, C#, Java, SQL Server, ASP, Visual Basic, HTML, JavaScript, and Oracle.

Amongst recruiters of IT & Telecoms staff across the UK as a whole, just under one in seven (14%) reported having difficulties filling the positions advertised during 2011, and of these, a similar proportion (15%) stated that they were experiencing IT & Telecoms related skills shortages (i.e. a lack of applicants with the required skills, qualifications or experience required).

Amongst recruiters of IT & Telecoms staff across the UK as a whole, IT & Telecoms related skills shortages tended to be associated with Programmers/ Software Developers and Web Design/Development professionals.

Problems relating to the recruitment of IT & Telecoms professionals were more common amongst larger firms and those operating within the IT & Telecoms sector where IT & Telecoms related skills shortages were also more often reported.

IT & Telecoms related skills shortages tended to be associated with vacancies at 'professional' level (i.e. as opposed to managerial, technician or engineer grade) and in particular: Programmers/Software Developers and Web Design/Development professionals.

The technical skills most often cited as being hard to find amongst applicants for skills shortage vacancies tended to be Microsoft related:

[30] 2011 Employer survey

[31] Four quarter average

The technical skills that were proving hardest to fill were - .NET/ASP.NET, Dynamics, SharePoint, Visual Basic/Visual Studio, C#, PHP and VMWare

.NET/ASP.NET, Dynamics, SharePoint, Visual Basic/Visual Studio and C# together with PHP and VMWare[32].

The vast majority (94%) of Welsh employers[33] were of the view that there will be no change in the degree of ease/difficulty associated with filling IT & Telecoms vacancies over the coming 12 months.

Though this view was common to the majority of firms in the UK, those predicting that it would be harder to recruit IT & Telecoms staff were most likely to see problems arising when recruiting for Programming and/or Software Development positions.

6.2 IT & Telecoms workforce growth dynamics

Work during 2011 with the forecasting experts Experian identified that the growth of the IT professional workforce in Wales is predicted to continue strongly to 2020. Table 3 below shows that whilst employment in the overall Welsh workforce is forecast to increase at 0.67% per annum to 2020, the IT professional workforce within the IT industry is forecast to grow at 1.37% per annum, over twice as fast as the average employment growth in Wales.

Table 3: Forecast annual average employment growth rates per annum in Wales 2011-2020

	Growth per annum (%)
IT professionals	1.21%
IT professionals within the IT industry	1.37%
IT professionals in all other sectors	1.10%
The IT industry	-0.15%
All other occupations within the IT industry	-8.31%
Telecoms professionals	-0.17%
The Telecoms industry	1.82%
Wales workforce: all sectors	0.67%

Source: e-skills UK analysis of Experian employment forecasts 2011

Employment of IT professionals within the IT industry in Wales to 2020 is forecast to grow at 1.37% per annum – over twice as fast as the Welsh average

Whilst growth within the IT industry overall has slowed significantly from previous forecasts, brought about predominately by a reduction across IT organisations of non IT staff, (showing an average forecast decline of 8.31% per annum to 2020), employment growth is predicted to pick up in the Telecoms industry with a forecast growth rate per annum of 1.82% improving upon a modest previous forecast of 0.13% per annum.

Growth in the IT & Telecoms professional workforce is expected to be mainly amongst the more senior level / high value roles i.e. ICT Managers, IT Strategy & Planning and Software Professional roles whilst the number of people employed in lower skilled roles will continue to contract or remain static as shown in Table 4 below.

[32] Treat with caution - small number of responses

[33] Employers already with IT & Telecoms staff

Table 4: IT & Telecoms professionals in Wales by occupation 2011-2020

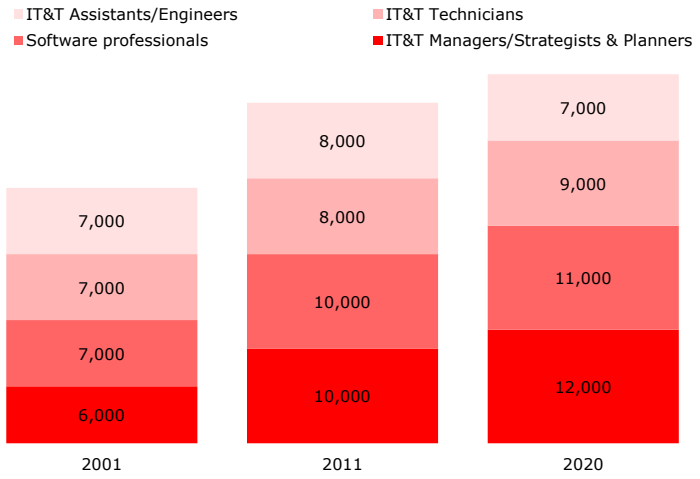
	Employment					
	2011		2020		Average annual growth	Growth 2011-2020
	n	%	n	%	%	n
ICT Managers/IT Strategy & Planning Professionals	10,000	28%	12,000	31%		2,000
Software professionals	10,000	28%	11,000	29%	1.6%	1,000
IT Operations Technicians/ IT User Support Technicians	8,000	23%	9,000	22%		1,000
Database assistants/ Telecoms Engineers/ Line Repairers and Cable Jointers/ Computer Engineers	8,000	21%	7,000	19%		-1,000
Total	**36,000**		**39,000**			**3,000**

Source: e-skills UK analysis of data from the ONS Labour Force Survey, 2011 (four quarter average) together with 2011 forecasts from Experian.

Software professionals are forecast to have the highest growth rate of all IT & Telecoms occupations at 1.6% per annum

Figure 9, below, combines the actual changes in the occupational profile of the Welsh IT & Telecoms professional workforce from 2001 to 2011 (from chapter 4) with the forecasts by occupation through to 2020. Software professionals are forecast to have the highest growth rate of all IT & Telecoms occupations at 1.6% per annum.

Figure 9: Number of IT & Telecoms professionals by occupation in Wales 2001, 2011 and forecast to 2020



Source: e-skills UK analysis of data from the ONS Labour Force Survey, 2011 (four quarter average) together with 2011 forecasts from Experian

It is also useful to understand which sectors of the Welsh economy are forecast to employ the largest proportion of IT & Telecoms professionals by 2020. Table 5, below, shows the top twenty sectors employing the highest numbers of IT & Telecoms staff.

Table 5: Forecast employment of Welsh IT & Telecoms professionals by sector (as a proportion of the total) in 2020

Sector	% of IT & Telecoms professionals in 2020 (% of total)
Computer/related	20.06%
Other Business Activities	11.18%
Post & Telecommunications	8.58%
Public Administration & Defence; Compulsory Social Security	8.07%
Education	6.30%
Financial Intermediation, (excl Insurance & pension funding)	5.77%
Construction	5.07%
Health & Social Work	4.93%
Retail Trade, Except of Motor Vehicles & Motorcycles, Repair of Personal & Household Goods	4.43%
Recreational, Cultural & Sporting Activities	2.86%
Financial Intermediation (auxiliary activities)	2.28%
Wholesale Trade & Commission Trade, Except Motor Vehicles & Motorcycles	1.98%
Manufacture of Machinery & Equipment Not Elsewhere Specified	1.51%
Transport Activities of Travel Agents (supporting & auxiliary)	1.31%
Manufacture of Basic Metals	1.24%
Manufacture of Other Transport Equipment	1.16%
Manufacture of Chemicals & Chemical Products	0.92%
Hotels & Restaurants	0.89%
Publishing, Printing & Reproduction of Recorded Media	0.85%
Manufacture of Radio, Television & Communications Equipment & Apparatus	0.83%

Source: e-skills UK analysis of Experian employment forecasts, 2011

Computer/related activities (the majority of the Welsh IT industry) will continue to account for the largest proportion of IT & Telecoms professionals working in 2020 whilst 'Other business activities' (which includes the likes of legal, accounting and business and management consultancy) has a significantly higher proportion of IT & Telecoms staff than most other sectors. Post and Telecoms and Public Administration together account for nearly 17% of the Welsh IT & Telecoms professional workforce followed by Education and Financial Intermediation forecast at 6.30% and 5.77% respectively.

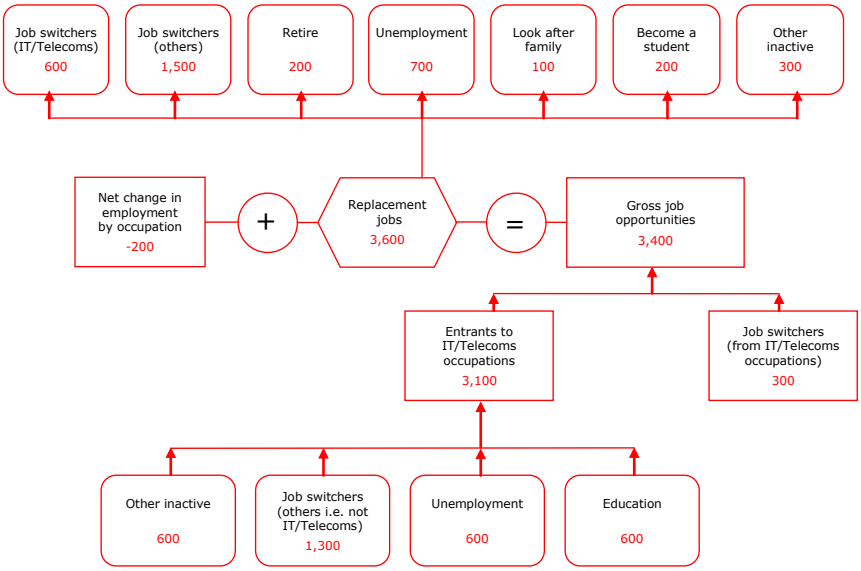
6.3 Recruitment needs

Figure 10 shows there are 3,400 gross job opportunities expected each year up to 2015 across all IT & Telecoms occupations. Given that there is a small decrease forecast in the IT & Telecoms professional workforce[34] replacement is the significant part of these opportunities with 3,600 jobs expected to become available due to one of the replacement factors[35].

[34] 2010 to 2015 data

[35] Job switcher numbers only reflect the position at the end of a year compared with that at the start and do not take account of job movements within the IT & Telecoms professional workforce taking place throughout the year

Figure 10: Anticipated annual gross job opportunities for IT & Telecoms professionals to 2015 in Wales



Source: Experian/e-skills UK analysis of gross job opportunities, 2011

Through to 2015 there is a need for 3,100 new entrants a year into IT & Telecoms professional job roles. Based on current data, the makeup of this intake is expected to be as follows:

- 1,300 people a year coming from occupations other than IT or Telecoms (i.e. experienced workers who can be re-trained as IT & Telecoms professionals),
- 600 people a year coming from education (predominantly graduate level and higher),
- 1,200 people a year coming from other sources (e.g. re-entering the workforce after a career break, early retirement or unemployment).

3,100 new entrants a years are required to fill IT & Telecoms professional job roles in Wales

7.0 IT & Telecoms skills and development

This section looks at the level of skills held by IT & Telecoms professionals working in Wales[36], the likely degree to which they match with those needed by employers and the steps taken by individuals/employers to address mismatches and ensure future balance between the skills held by/needed of IT & Telecoms staff. The analysis is based primarily upon the findings of a recent survey of employers carried out on behalf of the National Skills Academy for IT (2011) alongside a bespoke analysis of data from the Office for National Statistics (ONS) quarterly Labour Force Survey[37].

On average, IT & Telecoms professionals working in Wales are educated to a higher level than other workers, with 56% holding an HE level qualification in 2011 compared with just 35% of those working in other occupations. Levels of educational attainment in both cases were lower than those recorded for the UK as a whole however, where 62% of IT & Telecoms staff and 37% of other workers were found to have an HE level award.

Educational attainment is also higher amongst IT & Telecoms industry workers in Wales than is the case for those in other sectors with comparison figures of 55% and 36% respectively. By comparison though, IT & Telecoms sector workers in the UK were again found to be more highly educated with 59% holding an HE level award (38% of those working in other sectors).

Around one in five Welsh employers are aware of gaps in the skills of their employees (23%)

Though Wales specific data are not available it appears that IT & Telecoms professionals and IT & Telecoms industry staff working at 'professional' grades (i.e. SOC level 2[38]) have a much lower level of educational attainment than their counterparts at this level in non IT & Telecoms roles and/or sectors in the UK.

Results from the 2011 employer survey carried out by the National Academy for IT , show around one in five Welsh employers are aware of gaps in the skills of their employees (23%) and of these firms, over one third (37%) report there being gaps in the skills of their IT & Telecoms staff[39]. For the UK as a whole the incidence of skills gaps overall was much lower (11%) though the proportion that were IT & Telecoms related was similar (34%).

Results for the UK show that where they are apparent, skills gaps amongst IT & Telecoms professionals are likely to be both of a technical and non-technical nature and will often arise with respect to: sales/related, interpersonal and business/related skills (i.e. non-technical) along with Microsoft (particularly ASP.NET, C and .NET), PHP and Linux (technical).

Across the UK technical skills gaps amongst IT & Telecoms professionals are likely to be in ASP.NET, C, .NET, PHP and Linux

Again for the UK as a whole, these gaps tend to have a detrimental effect upon the business, as IT & Telecoms staff with gaps are typically thought to be performing only around half as well as they potentially could be.

Despite the potential impacts of IT skills gaps on business activities, gaps were thought to have been in existence for 6 months or longer in around half of the cases reported (47%) even though they were often thought avoidable (in 48% of cases) – particularly via the implementation of more training.

Most recent estimates[40] suggest around 48% of IT & Telecoms professionals working in the UK will receive some form of job-related education/training each year compared with 51% of workers in other occupations. Around 25% received education/training each quarter during 2011 and the proportion receiving education/training was the same for those working in Wales at that time.

IT &Telecoms staff with gaps are typically thought to be performing only around half as well as they potentially could be

IT & Telecoms Engineers appear most likely to receive job-related education/training with around 31% doing so each quarter. Conversely,

[36] As data for Wales is of limited availability, UK figures are often used as a proxy and text within this section should be considered as UK wide unless otherwise specified

[37] Using four quarter annual averages

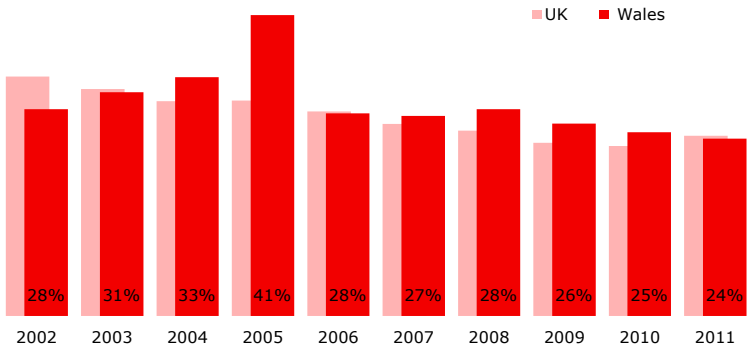
[38] See Annex A

[39] Caution low bases

[40] 2010

development activity is lowest amongst IT & Telecoms Assistants (with a comparison figure of just 14%).

Figure 11: Percentage of all IT & Telecoms professionals receiving job related education/training each quarter



Source: e-skills UK analysis of data from the ONS Labour Force Survey (four quarter averages)

For IT &Telecoms staff working in 'professional' level positions the percentage receiving education/training is significantly below the level for other, non-IT & Telecoms workers employed at this level/grade (i.e. 23% vs. 41% respectively)

For those working in 'professional' level positions (IT & Telecoms Strategy, Planning and Development) the percentage receiving education/training was similar to the overall average for all IT & Telecoms staff though it was significantly below the level for other, non-IT & Telecoms workers employed at this level/grade (i.e. 23% vs. 41% respectively).

Of the IT & Telecoms professionals in Wales that do not receive education/ training each quarter, one in five (20%) are still thought to have received an offer of education/training from their employer[41].

[41] Caution low bases

8 IT related education and qualifications

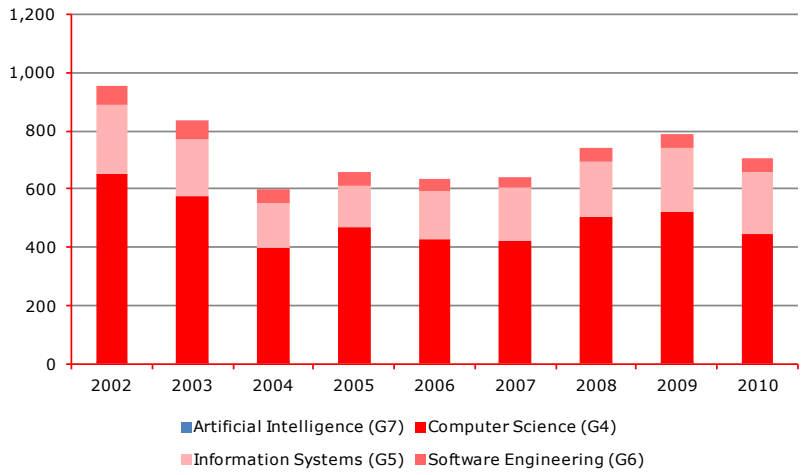
Higher Education

IT related Higher Education remains an important source of talent for the sector's labour force requirements. Across the UK, a key issue affecting undergraduate provision has been the large decrease in numbers of applicants to IT related courses. In Wales, however, the number of applicants gradually increased from 2006 to 2009 but declined by 5% in 2010 and is yet to reach the 2002 high of 815. By comparison, the total number of applicants (UK domicile) to all HE courses in Wales has increased by 31% over the 2002-2010 period.

Following a two year increase in applicant numbers to IT related HE courses in Wales, numbers declined by 5% in 2010

Acceptances onto IT related Higher Education courses in Wales declined over the two year period 2002 to 2004 but, in line with applicant numbers, acceptances increased from the 2004 low of 600 to 790 in 2009 but decreased again to 705 in 2010. Across all IT related HE courses, 83% of acceptances are male and 17% are female.

Figure 12: Acceptances onto IT related HE courses in Wales, 2002-2010, UK domicile



Across all IT related HE courses in Wales, just 17% of acceptances are female

Source: e-skills UK analysis of data from UCAS

The number of IT related and Telecoms qualifiers from Higher Education Institutes (HEIs) in Wales decreased by 5% from 2008/09 to 2009/10 – three percentage points more than for IT related and Telecoms qualifiers in the UK as a whole, which decreased by 2%.

Further Education

Information Technology, which encompasses both IT user and IT professional related learning, was the second most popular subject being undertaken by learners at Further Education (FE) Institutions[42] in Wales in 2009/10.

Information Technology was the second most popular subject being undertaken by learners at Further Education Institutions in Wales in 2009/10

Table 6: Most popular subjects* undertaken by learners at FE institutions in Wales, 2009/10

	Percentage of all learners
Care/Personal Development (including Basic Skills)	26%
Information Technology	13%
Cultural Studies/Languages/Literature	10%
Health/Care/Medicine/Health & Safety	7%
Media/Communication/Publishing	7%
Science/Mathematics	7%
Business/Management/Office Studies	5%

Source: Further Education, Work-based Learning and Community Learning in Wales Statistics, 2009/10

* Proportion of the total, excluding unspecified subjects

There were 67,925 learning activities and 24,750 attainments on Information and Communication Technology[43] courses at FE colleges in Wales during 2009/10 and of the 13,085 Local Authority Community Learning activities on IT & Telecoms related courses in Wales in 2009/10, 68% were female.

Of all learning programmes for Foundation Modern Apprenticeships and Modern Apprenticeships undertaken in Wales in 2009/10, just under one in twenty (4%) were IT & Telecoms professional and IT user related (1,400 in total). 10% of these were IT & Telecoms professional learning programmes (135) and 90% were IT user learning programmes (1,265).

[42] Within the LLWR data provided by WAG, the term learning providers constitutes the Further Education (FE) Colleges in Wales and training providers engaging in Work Based Learning (WBL) and Adult and Community Learning (ACL)

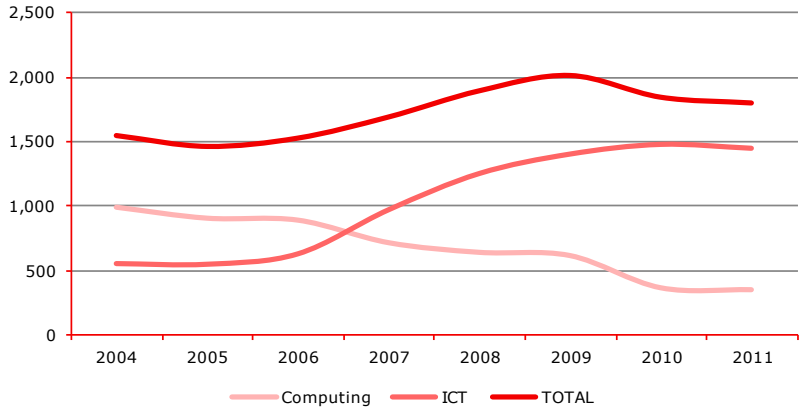
[43] By Sector Subject Area

Schools and Colleges

Since 2004, the decline in students in Wales taking A-Level Computing is more than that seen across the UK (a 64% and 53% decrease in numbers respectively), however the trend in Wales in the uptake of ICT A-Level is the reverse of that seen across the UK. Numbers in Wales taking ICT A-Level increased by 167% from 2004 to 2010 but decreased in 2011 by 2%, whilst across the UK numbers have fallen by 26% over the same time period (2004 to 2011).

Since 2004 the decline in students in Wales taking A-Level Computing is more than that seen across the UK but the uptake of ICT A-Level has increased and is the reverse of that across the UK

Figure 13: Number of students taking A-Level Computing and ICT courses in Wales, 2004-2011



Source: e-skills UK analysis of data from the Joint Council for Qualifications, 2004-2011

There are a number of IT related GCSE courses including a GCSE in ICT, a GCSE double award in Applied ICT, and a short course GCSE in ICT. Historically, numbers taking GCSE IT related courses in Wales have been in decline although the total IT related GCSEs sat as a percentage of all GCSEs sat has remained static at 4% over the past five years.

Whilst A-Level ICT shows a positive increase of female participation from 2003 to 2011, A-Level Computing shows a decline of 4 percentage points in Wales over the same period

Gender

The table below shows a varied picture in relation to gender balance across all levels of education. It is interesting to note that whilst A-Level ICT shows a positive increase of female participation from 2003 to 2011, A-Level Computing shows a decline of 4 percentage points in Wales over the same period.

Table 7: Gender balance on IT related courses and in IT & Telecoms professions

	Qualification	% of females 2003	% of females 2011	Variance
Wales	ICT (Full Course) GCSE	44%	45%	1%
UK	ICT (Full Course) GCSE	40%	45%	5%
Wales	A-level Computing	18%	14%	-4%
UK	A-level Computing	14%	8%	-6%
Wales	A-level ICT	31%	45%	14%
UK	A-level ICT	33%	39%	6%
Wales	Applicants to Computing discipline degree courses	13%	16%*	3%
UK	Applicants to Computing discipline degree courses	16%	13%*	-3%
Wales	IT & Telecoms professional occupations	22%	21%	-1%
UK	IT & Telecoms professional occupations	19%	18%	-2%

Source: e-skills UK analysis of data from UCAS, Department for Education, Joint Council for Qualifications and the ONS Labour Force Survey

Note: * 2010 data

9.0 The wider population's use of IT

This section provides an indication of the general levels of IT usage in Wales and the level of IT skills held by the workforce using information covering the UK as a proxy measure. A variety of sources are referenced to in this section including the Office for National Statistics (ONS) *Internet Access - Households and Individuals survey (2011)*[44], the Department for Business, Innovation and Skills (BIS) *Skills for Life Survey (2011)*[45] and the 2011 employer survey commissioned by the National Skills Academy for IT.

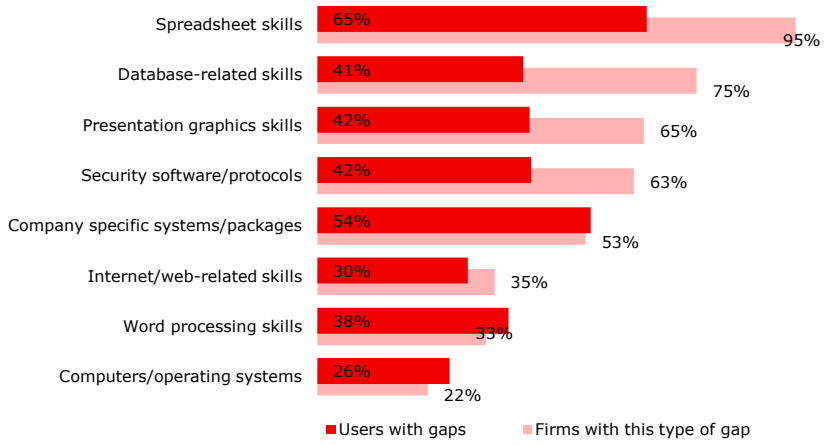
Latest UK estimates from ONS suggest that around 87% of people aged 16 or over have used a computer at some time in their lives and that many have used them to undertake a wide range of activities including computer programming.

Across the UK over one in ten (13%) of people aged 16 or over have never used a computer

IT users are likely to have developed their e-mail related skills to a higher level than other IT skills such as word-processing/spread sheets which are most often held at just NVQ entry level 3 or below (compared with NVQ level 2 for emailing/related)[46].

Results from the 2011 employer survey carried out by the National Academy for IT for, show around one in five Welsh employers were aware of gaps in the skills of their employees (23%) whilst, within the UK at least, around 42% of firms with skills gaps were also thought to have gaps in the skills of their IT users.

Figure 14: Incidence of computer users with gaps in their IT skills, by nature of skills gaps



Source: National Skills Academy for IT - Employer survey, 2011

Around one in five Welsh employers were aware of gaps in the skills of their employees whilst, within the UK at least, around 42% of firms with skills gaps were also thought to have gaps in the skills of their IT users

Gaps were most often thought to exist in the spreadsheet skills held by computer users and virtually all firms (95%) with IT user skills gaps identified a mismatch in this area. Moreover, amongst computer users employed within these firms, almost two thirds (65%) were thought to have skills gaps of this nature.

On average, just under one quarter (24%) of UK companies reporting gaps in the IT skills of their computer users were of the view that staff were

[44] Figures relate to Great Britain only as opposed to the UK as a whole

[45] Figures relate to England only as opposed to the UK as a whole

[46] Individuals were asked to perform a range of common, practical IT tasks (in a test environment and their skills rated accordingly. Adults with IT Entry Level 3 skills are able to interact with and use an IT system to meet required needs, as well as present information in ways that are fit for purpose and audience. Level 2 is equivalent to GCSE grades A*-C and adults with this level of IT skills are able to demonstrate different methods for organising and presenting a variety of information, taking into account fitness for purpose and audience

underperforming as a consequence and on average users with gaps in their IT skills were thought to be working at 78% of their full potential.

On average users with gaps in their IT user skills were thought to be working at 78% of their full potential

Despite the potential impacts of IT user skills gaps on business activities, gaps were thought to have been in existence for 6 months or longer in around half of the cases reported (47%) even though they were often thought avoidable (in 48% of cases) – particularly via the implementation of more training.

There is little data available on the incidence/nature of IT user skills training provided by UK firms though the ONS *'Internet Access survey of Households and Individuals, 2011'* does show that; amongst adults who had ever used the internet at least some 44% have never undertaken a computer training course[47], around one third (32%) had only undertaken a course over three years ago and just one quarter (25%) had taken a course during the past three years.

For those that had never undertaken any IT training this was most likely due to the belief that they already had sufficient skills, though in a small number of cases, barriers such as cost and the availability of courses were also cited as being a reason.

In general, these IT user skills (i.e. for those living in Great Britain) are most likely to have been self-taught and/or learnt from friends/colleagues.

[47] Of 3 hours or more

10.0 Current and future skills priorities

This section summarises the current and future skills issues and priorities for the IT & Telecoms professional workforce and IT users in Wales identified within the earlier sections of this report. Where Wales specific data is available it is identified and reported otherwise UK data is used.

10.1 IT & Telecoms professionals

10.1.1 Current skills priorities

Advertised demand

On average, there were 1,200 advertised vacancies for IT & Telecoms professionals in Wales during each quarter of 2011– the equivalent of around one in 30 actual positions (i.e. there were estimated to be 36,000 IT & Telecoms professionals employed throughout the year).

The majority of adverts for IT & Telecoms positions placed during 2011 in Wales were in the areas of Development, Design or Support (51%, 20% and 16% respectively) and these groups have accounted for an increasing proportion of advertised vacancies over each of the past three years (growing from 74% in 2008 to 87% in 2011).

The technical skills most often sought by employers were: SQL, .NET, C#, Java, SQL Server, ASP, Visual Basic, HTML, JavaScript, and Oracle.

Occupational profile

In Wales in 2011 over half of IT & Telecoms professionals worked as either IT & Telecoms managers/strategists or as software professionals. Exploring these two groups in more detail identifies that two thirds of them work outside of the IT & Telecoms industry sector and are therefore employed across many different sectors across the whole economy in Wales. One in five also worked as IT & Telecoms Technicians with a similar number in Assistant/Engineer roles.

Additional analysis of Welsh employment trends for IT & Telecoms professionals over the last ten years shows a significant increase of 67% in the number of ICT Managers/IT Strategists & Planners together with a 43% increase in Software Professionals, in the same period. Those in IT & Telecoms Assistant/Engineering and Technician roles have both increased marginally through to 2011.

Recruitment and skills shortages

Amongst UK employers seeking to recruit IT & Telecoms staff during 2011, just under one in seven (14%) reported having difficulties filling the positions advertised. Of these, a similar proportion (15%) stated that they were experiencing IT & Telecoms related skills shortages. The issue of IT & Telecoms related recruitment difficulties was still more acute within the UK IT & Telecoms sector however where just under one half of firms with IT & Telecoms positions reported having difficulty finding applicants to fill them.

IT & Telecoms related skills shortages were most frequently associated with 'Professional' level openings (i.e. as opposed to Managerial, Technician, Assistant or Engineer grade posts) with around four in five (79%) of businesses experiencing IT & Telecoms related skills shortages stating that they were occurring in this area.

In particular, skills shortages were cited by recruiters seeking to fill positions for Programmers/Software Developers and Web Design/Development Professionals.

The job-related technical skills most commonly cited by employers as being hard to find amongst applicants for IT & Telecoms positions were: .NET, ASP.NET, Dynamics, SharePoint, Visual Basic/Visual Studio, C# with PHP and VMWare.

Skills matching in the workplace

Around one in five Welsh employers are aware of gaps in the skills of their employees (23%) and of these firms, over one third (37%) report there being gaps in the skills of their IT & Telecoms staff[48]. For the UK as a whole the incidence of skills gaps overall was much lower (11%) though the proportion that were IT & Telecoms related was similar (34%).

Results for the UK show that where they are apparent, skills gaps amongst IT & Telecoms professionals are likely to be both of a technical and non-technical nature and will often arise with respect to: sales/related, interpersonal and business/related skills (i.e. non-technical) along with Microsoft (particularly ASP.NET, C and .NET), PHP and Linux (technical).

Again for the UK as a whole, these gaps tend to have a detrimental effect upon the business, as IT & Telecoms staff with gaps are typically thought to be performing only around half as well as they potentially could be.

10.1.2 Future skills

The next 12 months

Results for the UK show that a large proportion of firms anticipate an increase in their use of cloud computing and mobile computing/applications over the coming year and many predict an implementation of business process management, virtualisation, business analytics and mobile computing/applications.

More specifically, in the near future it is thought that IT & Telecoms related recruitment difficulties are likely to be most apparent for firms seeking to fill positions for Programmers and Software Development Professionals or Web Design and Development staff.

Employment forecasts to 2020

Whilst employment in the overall Welsh workforce is forecast to increase at 0.67% per annum to 2020, the IT professional workforce within the IT industry is forecast to grow at 1.37% per annum, over twice as fast as the average employment growth in Wales

Historic growth trends within the Welsh IT & Telecoms employment are set to continue, with the strongest growth predicted to arise in high skill areas/occupations, particularly Software Professionals, ICT Managers and IT Strategy & Planning staff.

The number of people working as Software Professionals in Wales is forecast to continue growing and this group of workers will account for nearly a third of all IT & Telecoms professionals in Wales by 2020. By contrast, there will be a decline in the number of people working as IT/Telecoms Engineers over the same period.

Emerging trends and associated skills needs

Specific technologies with important skills implications are: Cloud Computing; Green IT; Social and Mobile Computing; 'Big data'/Analytics, Smart Computing and Security and Data Protection.

Security and data protection is an issue across many new technologies and IT & Telecoms professionals need the skills to develop integrated security solutions which will fix the vulnerabilities of underlying architecture and infrastructures.

Cloud computing will require project and integrated solutions management skills as well as architecture, infrastructure, networking, security and quality assurance testing skills.

[48] Caution low bases

For businesses to take advantage of the use of information and analytics for competitive advantage they need staff with advanced skills in data modelling, simulation and analytics.

With mobile technologies the skills challenges will be around developing new security models for managing and securing devices and services and managing risk.

10.2 Use of IT by the wider population[49]

10.2.1 Current skills priorities

Latest estimates from the Office for National Statistics suggest that approximately 87% of people aged 16 or over have used a computer at some time in their lives and though detailed information about the level of IT user skills held is not currently available, for two of the most commonly used applications – word processing and spreadsheets - it is estimated that only one quarter or less of people in the UK are at NVQ level 2 or above.

For employers, this level of IT user skills often appears to be insufficient as two in five (42%) firms with skills gaps within their workforce, identify IT user skills as one of the areas in which these gaps exist.

IT user skills gaps appear most prevalent amongst those operating in the public sector and are seen to increase with firm size from just 8% of micro firms to 14% of small firms, 20% of medium sized firms and 25% of large employers. Gaps are most often thought to exist in the spreadsheet skills of computer users and virtually all firms (95%) with IT user skills gaps identify a mismatch in this area. Moreover, amongst the computer users employed within these firms, almost two thirds (65%) are thought to have skills gaps of this nature.

After spreadsheet skills, gaps are most often observed in the ability of staff to use company specific systems/packages (54% of firms reporting).

On average, just under one quarter (24%) of companies reporting gaps in the IT skills of their computer users are of the view that staff underperform as a consequence - i.e. on average users with gaps in their IT skills were thought to be working at 78% of their full potential.

10.2.2 Future skills priorities

Making the most of technology is arguably the single most important action that can be taken to improve productivity within the Welsh economy. To achieve this all individuals need increasingly sophisticated IT user skills which can be used not only to secure/retain employment but also to enable and enrich their daily lives.

In the workplace, the key to this generic IT up-skilling will lie in particular with the 116,000 Welsh managers and leaders who will need to grasp the strategic implications of technology and have the skills to realise its potential.

However, outside of the workplace not all are engaged with new technology and it is estimated that approximately 8.2 million UK adults (481,000 of these in Wales) are still off-line and hence excluded from the benefits that IT/technology can bring about. More specifically, the groups most likely to be 'digitally excluded' are the families with single parents, those aged 65 or over and the unemployed.

Digital exclusion is seen as going hand in hand with social exclusion - the former serving to exacerbate the latter and hence bringing the digitally excluded online and enabling them to attain pre-requisite skills for life in a technology driven world is a key priority. Only then can this community

[49] Due to data availability issues the majority of information generally within this section relates to the UK

avoid being left out of the wide and growing range of personal benefits accessing the web brings e.g. improved educational attainment, improved skill levels, improved job level and income, savings from online shopping, and better access to public services and health services.

11.0 Global ambition and e-skills UK's strategic objectives

This section sets out a vision for Wales' role in the digital economy and recommended actions to support that vision.

11.1 Vision

The UK has one of the most competitive technology industries in the world, a highly respected technology skills pool, and a particular expertise in the application of technology to deliver business benefit. e-skills UK's vision is that the UK and its constituent nations are recognised as global leaders in delivering business value from technology.

11.2 Rationale for change

Strategic action to accelerate the development of the skills pool in line with this vision is essential for the future. Information Technology and Communications systems are at the heart of every organisation, they underpin the delivery of high quality, cost effective public services, and they are central to the fabric of our daily lives.

11.3 The challenges

IT & Telecoms is at the heart of the modern economy, supporting the value add of practically all organisations in every sector. It is fundamentally affecting companies in all sectors and making the most of technology is arguably the single most important step that can be taken to improve productivity across the economy.

- For businesses across all sectors there are significant opportunities to be had by investing in and optimising ICT. To exploit the transformational potential of technology requires a new level of business innovation,
- All individuals increasingly need sophisticated skills in the use of IT for social and economic purposes,
- Managers and leaders need to grasp the strategic implications of technology and have the skills to realise its potential,
- Workforce growth combined with restructuring and skills shifts mean attracting high quality recruits into the IT & Telecoms workforce is critical to competitiveness and developing those in the workforce, as well as new entrants is vital to sustain continued growth. Security and data protection remain crucially important,
- The choices of young people are not supporting the growth of the sector: gender imbalance is prevalent across IT related courses; there are concerns about the curriculum in schools; and students and their advisors often have an extremely poor understanding of IT related careers with young people commonly holding negative perceptions as a result.

Making the most of technology is arguably the single most important step that can be taken to improve productivity across the economy

A coherent, strategic approach to skills is fundamental to enabling the economy to derive maximum benefit from the power of technology; transforming competitiveness and productivity through the creation of appropriate technology related skills. With this, Wales can be a global leader in technology. Without it, the country will become a second rate player in a high technology world.

In Wales the need for broader, deeper and continually changing skills affects not only the 44,000 people in the IT & Telecoms workforce, but also the 116,000 business managers and leaders who need to understand how to realise the potential of ICT, together with over a million workers requiring skills in the use of IT.

11.4 Recommended strategies

Employers remain committed to addressing skills pipeline issues, such as the curriculum in schools and universities, and the gender divide. There is also increasing interest in collaborative action to make it easier to recruit and train new entrants to the sector and to improve the mobility and development of the existing workforce. Alongside this, the continuing

challenges of the economic environment places particular emphasis on products and services that reduce cost or increase return on investment.

Based on the analysis and skills priorities set out in this document, and taking account of the current environment, e-skills UK will work together with partner organisations to deliver on three key strategic objectives to ensure Wales is truly world class at delivering maximum value from technology both in business and in society more widely:

1. Inspire future talent

To motivate talented students to pursue IT & Telecoms related careers and better prepare all young people for work in a technology-enabled world.

We will galvanise employer investment in young people so that:

- An increasing proportion secure employment in the growing IT & Telecoms workforce, via industry-valued full time degrees, part-time degrees and apprenticeships;
- New mainstream qualifications are established, which appeal to students and are valued for their rigour and relevance by the most demanding universities and employers;
- A generation of young people – especially women - are inspired to pursue IT-related education and technology-rich careers.

2. Support IT & Telecoms professionals

Develop the IT & Telecoms professional skills pool as the best in the world for deriving business benefit from technology.

We will galvanise the investment of employers and individuals in IT & Telecoms professional skills so that:

- The sector is maximising its potential for employment and economic growth by attracting and developing talent;
- New recruits are undertaking the training they need to become more productive more quickly, including through increased uptake of Apprenticeships and part-time degrees and increased use of IT Professional Standards;
- More IT & Telecoms professionals are up-skilling in order to maximise their business contribution and career potential.

3. Increase digital capability

Trigger increased investment in the IT capability of all individuals and businesses in every sector.

We will galvanise the collaborative action of employers and government so that:

- Individuals seeking employment can understand and access training to achieve a clear minimum standard of digital literacy;
- Employers in every sector have a better understanding of how to deliver business value from IT.

To enable all of the above, we will:

- Maintain the quality and vitality of our employer leadership and wider employer engagement;
- Underpin all of our work with world-class labour market intelligence;
- Ensure there is a coherent qualifications strategy for the sector which is driven by the needs of employers and learners;
- Bring together effective partnerships to improve the impact and value for money of action on skills.

Annex A: IT & Telecoms professional occupations

e-skills UK has been licensed to address skills issues relating to all IT & Telecoms professionals working in the UK irrespective of the industry sector in which they are employed. More specifically, this means workers identified by the following Standard Occupational Classification (SOC) codes:

SOC (2000)	Summary	Related Job Titles
1136 INFORMATION AND COMMUNICATION TECHNOLOGY MANAGERS	Plan, organise, direct and co-ordinate the work necessary to operate and provide information communication technology services, to maintain and develop associated network facilities and to provide software and hardware support.	• Computer Manager • Computer Operations Manager • Data Processing Manager • IT Manager • Systems Manager • Telecom Manager
2131 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.	• Computer Consultant • Software Consultant
2132 SOFTWARE PROFESSIONALS	Responsible for all aspects of the design, application, development and operation of software systems.	• Analyst Programmer • Computer Programmer • Software Engineer • Systems Analyst • Systems Designer • Games Developer • Web Designer/ Developer
3131 IT OPERATIONS TECHNICIANS	Responsible for the day-to-day running of computer systems and networks including the preparation of backup systems, and the performance of regular checks to ensure the smooth functioning of such systems.	• Database Manager • IT Technician • Network Technician • Systems Administrator • Web Master
3132 IT USER SUPPORT TECHNICIANS	Responsible for providing technical support, advice and guidance for customers or IT users within an organisation, either directly or by telephone, email or other network interaction.	• Help desk Operator • Helpline Operator (computing) • IT Helpline Support Officer • Support Technician (computing) • Systems Support Officer
4136 DATABASE ASSISTANTS AND CLERKS	Create, maintain, preserve and update information held in electronic databases, computer files, voice-mailboxes and email systems.	• Computer Clerk • Data entry Clerk • Data Processor • VDU Operator

Cont...

5242 TELECOMMUNICATIONS ENGINEERS	Install, maintain and repair public and private telephone systems.	• Technical Officer (telecommunications) • Telecommunications Engineer • Telephone Engineer • Telephone Installation Engineer • Telephone Technician
5243 LINE REPAIRERS AND CABLE JOINTERS	Install, maintain, test and repair overhead, underground, surface and submarine electricity and telecommunications cables.	• Cable Jointer • Telegraph Linesman • Telephone Linesman • Telephone Wireman
5245 COMPUTER ENGINEERS, INSTALLATION AND MAINTENANCE	Install, maintain and repair personal computers, mainframe and other computer hardware.	• Computer Engineer • Computer Maintenance Engineer • Computer Service Engineer • Computer Service Technician

For simplicity, and to avoid issues of data suppression, in certain sections of the report, occupational codes have been summarised in the following manner to aid the reader.

SOC level	**SOC Major Group**	**IT & Telecoms grouping**	**IT & Telecoms occupations**	**IT & Telecoms SOC codes**
1	Managers and Senior Officials	IT & Telecoms Management	• ICT Managers	• 1136
2	Professional occupations	ICT Professionals	• IT Strategy & Planning Professionals • Software Professionals	• 2131 • 2132
3	Associate Professional and Technical	IT & Telecoms Technicians	• IT Operations Technicians • IT User Support Technicians	• 3131 • 3132
4	Administrative and Secretarial	IT & Telecoms Assistants	• Database Assistants & Clerks	• 4136
5	Skilled Trades Occupations	IT & Telecoms Engineers	• Telecommunication Engineers • Line Repairers & Cable Jointers • Computer Engineers	• 5242 • 5243 • 5245
6	Personal Service Occupations			
7	Sales/Customer Service Occupations			
8	Process, Plant and Machine Operatives			
9	Elementary Occupations			

Annex B: IT & Telecoms industrial classifications

In the same way that specific SOC codes are employed to identify the core occupational focus of our activities (or 'footprint') Standard Industrial Classification (SIC) codes are used to define the industrial sectors for which e–skills UK are licensed by Government. These codes are as follows:

SIC 2003	
22.33	Reproduction of computer media
64.2	Telecommunications
72	Computer & related activities
72.1	Hardware consultancy
72.2	Software consultancy & supply
72.21	Publishing of software
72.22	Other software consultancy & supply
72.3	Data processing
72.4	Database activities
72.5	Maintenance & repair of office, accounting & computing machinery
72.6	Other computer related activities

SIC 2007	
18.20/3	Reproduction of computer media
58.2	Software publishing
58.21	Publishing of computer games
58.29	Other software publishing
61	Telecommunications
61.1	Wired telecommunications activities
61.2	Wireless telecommunications activities
61.3	Satellite telecommunications activities
61.9	Other telecommunications activities
62	Computer programming, consultancy & related activities
62.01	Computer programming activities
62.01/1	Ready-made interactive leisure & entertainment software development
62.01/2	Business & domestic software development
62.02	Computer consultancy activities
62.03	Computer facilities management activities
62.09	Other information technology activities
63.1	Data processing, hosting & related activities; web portal
63.11	Data processing, hosting & related activities
63.12	Web portals
95.1	Repair of computers & communications equipment
95.11	Repair of computer & peripheral equipment
95.12	Repair of communication equipment

Other relevant SIC codes

e-skills UK has an interest in the elements of management and consultancy concerned with technology and business change:

70.22/9	Management consultancy activities (other than financial management)

e-skills UK also has a shared interest in technology manufacturing, a sector for which SEMTA has been designated as the lead SSC with responsibility for skills and related issues:

26.2 Manufacture of computers and peripheral equipment		
	26.20 Manufacture of computers and peripheral equipment	
26.3 Manufacture of communication equipment		
	26.30 Manufacture of communication equipment	
		26.30/1 Manufacture of telegraph and telephone apparatus and equipment
		26.30/9 Manufacture of communication equipment (other than telegraph and telephone apparatus and equipment)
	27.31 Manufacture of fibre optic cables	

Other codes of relevance include wholesale and retail sale of ICT equipment for which Skills for Logistics and Skillsmart have been designated as the lead SSCs with responsibility for skills and related issues:

46.5 Wholesale of information and communication equipment	
	46.51 Wholesale of computers, computer peripheral equipment and software
	46.52 Wholesale of electronic and telecommunications equipment and parts

47.4 Retail sale of information and communication equipment in specialised stores		
	47.41 Retail sale of computers, peripheral units and software in specialised stores	
	47.42 Retail sale of telecommunications equipment in specialised stores	
		47.42/1 Retail sale of mobile telephones in specialised stores
		47.42/9 Retail sale of telecommunications equipment (other than mobile telephones) not elsewhere classified in specialised stores

To avoid issues of data suppression and for comparison purposes, industry codes have sometimes been combined to form the following broad groups:

IT Services (SIC codes: 58.21, 58.29, 62.01, 62.01/1, 62.01/2, 62.02, 62.03, 62.09, 63.11, 63.12 and 95.11)

IT Manufacturing (SIC codes: 18.20/3 and 26.20)

IT Wholesale/Retail (SIC codes: 46.51 and 47.41)

Telecoms Services (SIC codes: 61.10, 61.20, 61.30, 61.90 and 95.12)

Telecoms Manufacturing (SIC codes: 26.30/1, 26.30/9 and 27.31)

Telecoms Wholesale/Retail (SIC codes: 46.52, 47.42/1 and 47.42/9)

Annex C: Glossary

ASHE	Annual Survey of Hours and Earnings
BIS	UK Department for Business Innovation and Skills
CPHC	Council of Professors and Heads of Computing
DfE	Department for Education
DLHE	Destination of Leavers from Higher Education
FE	Further Education
GCSE	General Certificate of Secondary Education
GDP	Gross Domestic Product
GVA	Gross Value Added
HE	Higher Education
HEI	Higher Education Institution
HESA	Higher Education Statistics Agency
HND	Higher National Diploma
ICT	Information and Communications Technology
IDBR	Inter Departmental Business Register
JACS	Joint Academic Coding System
JCQ	Joint Council for Qualifications
LEP	Local Enterprise Partnership
LFS	Labour Force Survey
NVQ	National Vocational Qualification
ONS	Office for National Statistics
PROCOM	The IT Professional Competency Model
SIC	Standard Industrial Classification
SME	Small or Medium Sized Enterprise
SOC	Standard Occupational Classification
SSC	Sector Skills Council
SQA	Scottish Qualifications Authority
UCAS	Universities and Colleges Admissions Service

Annex D: Supporting data

Demand and supply of IT & Telecoms labour and skills (section 6)

Table 8: Forecast growth rates per annum, and relative size, of IT & Telecoms professionals by sector in Wales 2011 to 2020.

Sector	Growth per annum 2011 to 2020	% of IT & T professional workforce in 2011
Manufacture of Machinery & Equipment Not Elsewhere Specified	5.43%	1.11%
Financial Intermediation (auxiliary activities)	4.83%	1.75%
Manufacture of Motor Vehicles, Trailers & Semi-Trailers	4.45%	0.48%
Manufacture of Fabricated Metal Products, Except Machinery & Equipment	3.98%	0.56%
Financial Intermediation, (excl Insurance & Pension Funding)	3.40%	4.86%
Agriculture, Hunting & Related Service Activities	3.29%	0.20%
Transport Activities of Travel Agents (supporting & auxiliary)	3.02%	1.14%
Recreational, Cultural & Sporting Activities	2.83%	2.50%
Health & Social Work	2.81%	4.33%
Post & Telecommunications	2.77%	7.55%
Retail Trade, Except of Motor Vehicles & Motorcycles, Repair of Personal & Household Goods	2.60%	3.94%
Activities of Membership Organisations Not Elsewhere Classified	2.18%	0.44%
Manufacture of Basic Metals	1.95%	1.16%
Publishing, Printing & Reproduction of Recorded Media	1.92%	0.79%
Sewage & Refuse Disposal, Sanitation & Similar Activities	1.87%	0.47%
Wholesale Trade & Commission Trade, Except Motor Vehicles & Motorcycles	1.79%	1.87%
Education	1.52%	6.09%
Research & Development	1.51%	0.65%
Manufacture of Other Transport Equipment	1.42%	1.13%
Other Business Activities	1.29%	11.01%
Computer/related activities	0.91%	20.38%

Source: e-skills UK analysis of Experian employment forecasts 2011

Table 9: IT & Telecoms professionals – recruitment sources for new entrants in Wales

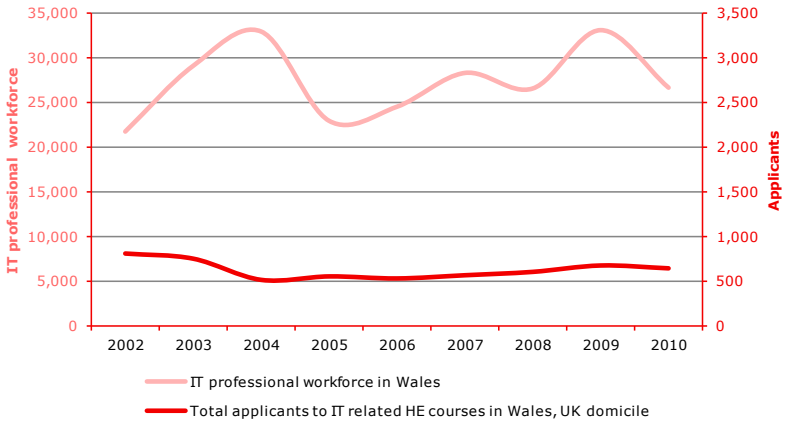
Recruitment source	Number (average pa to 2015)	Share
Those already in work (in occupations other than IT or Telecoms)	1,300	42%
Individuals joining from education	600	19%
Other sources	1,200	39%
Total	**3,100**	**100%**

Source: Experian/e-skills UK employment forecasts, 2011

IT related education and qualifications (section 8)

Higher Education

Figure 15: Comparison between the number of IT professionals and applicants to IT related HE courses in Wales, 2002-2010, UK domicile



Source: e-skills UK analysis of data from the ONS Labour Force Survey (four quarter averages) and UCAS

Table 10: Qualifiers in Wales in IT & Telecoms related HE courses, UK domicile

Higher Education Institute	2006/07		2007/08		2008/09		2009/10	
	n	% of total in Wales	n	% of total in Wales	n	% of total in Wales	n	% of total in Wales
Aberystwyth University	90	9%	75	8%	95	10%	95	10%
Bangor University	10	1%	35	4%	40	4%	20	2%
Cardiff University	85	9%	110	12%	130	13%	130	14%
University of Wales Institute, Cardiff	50	5%	60	6%	55	6%	65	7%
University of Glamorgan	280	30%	280	31%	350	36%	310	34%
Glyndŵr University	80	8%	80	9%	60	6%	65	7%
The University of Wales, Newport	115	12%	85	9%	75	8%	60	6%
Swansea Metropolitan University	120	13%	115	13%	110	11%	110	12%
Swansea University	75	8%	65	7%	45	5%	50	5%
Trinity University College	15	2%	15	1%	5	1%	5	0%
The University of Wales, Lampeter	10	1%	0	0%	5	1%	10	1%
Total	**930**	**100%**	**920**	**100%**	**975**	**100%**	**920**	**100%**

Source: e-skills UK analysis of data from HESA

Note: Figures may not add up due to rounding

Table 11: Level of degree qualification, UK domicile

Level of qualification	Wales		UK	
	IT	Telecoms	IT	Telecoms
Postgraduate	14%	9%	15%	25%
First degree	60%	82%	60%	58%
Other (e.g. Foundation Degree)	26%	9%	24%	17%
Total	100%	100%	100%	100%

Source: e-skills UK analysis of data from HESA, 2009/10

Note: Figures may not add up due to rounding

Table 12: Destination of respondents entering IT & Telecoms occupations by region of employment and institution, 2009/10, all domicile

		Region of Institution											
		North East	North West	Yorkshire & Humber	East Midlands	West Midlands	East of England	London	South East	South West	Northern Ireland	Scotland	Wales
Region of Employment	England	94%	91%	95%	95%	94%	91%	89%	91%	89%	6%	21%	36%
	North East	54%		1%		1%			1%				
	North West	5%	61%	9%	3%	3%	2%	1%	2%	1%		1%	4%
	Yorkshire& Humber	9%	4%	48%	3%	1%			3%	1%	1%	1%	1%
	East Midlands	3%	3%	8%	39%	4%	2%	1%	2%	1%		1%	1%
	West Midlands	1%	2%	4%	8%	43%	1%	1%	3%	3%		2%	6%
	East of England	2%	3%	3%	8%	5%	46%	4%	7%	3%		2%	2%
	London	11%	8%	12%	17%	15%	27%	66%	23%	15%	2%	8%	7%
	South East	4%	6%	7%	12%	9%	11%	12%	41%	17%	1%	3%	8%
	South West	3%	2%	2%	4%	4%	1%	1%	6%	49%		1%	7%
	Northern Ireland	1%	1%						1%		85%	1%	
	Scotland	1%		1%	1%	1%			2%	4%		70%	
	Wales		2%	1%	1%	1%			1%	1%			58%
	Overseas	4%	5%	4%	2%	4%	9%	10%	4%	5%	9%	8%	5%

Key

	Largest proportion
	2nd largest proportion
	3rd largest proportion

Source: e-skills UK analysis of data from HESA, 2009/10

Note: Figures may not add up due to rounding

Further Education in Wales

Table 13: Numbers of learning programmes for Foundation Modern Apprenticeships and Modern apprenticeships, 2009/10

	Foundation Modern Apprenticeship	Modern Apprenticeship	Total
IT & Telecoms Professional	95	40	135
IT User	110	360	1,265
Total IT & Telecoms	**205**	**400**	**1,400**
Total for all sectors	21,575	16,665	40,390

Source: e-skills UK analysis of data from the Lifelong Learning Wales Record post-16 database, 2009/10

Note: Figures may not add up due to rounding

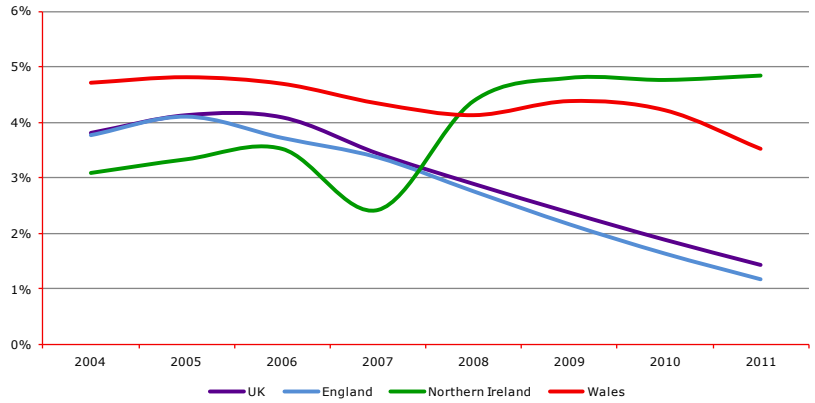
Schools and colleges in Wales

Table 14: Uptake of ICT GCSEs in Wales, 2004-2011

Year	Full course ICT GCSE	Short course ICT GCSE	Applied ICT GCSE	Total
2004	11,555	3,905	920	16,380
2005	11,120	4,320	1,060	16,500
2006	11,295	4,265	885	16,445
2007	10,875	4,170	455	15,505
2008	10,015	4,120	450	14,585
2009	10,290	4,425	455	15,170
2010	9,340	4,705	345	14,390
2011	6,905	4,380	205	11,490

Source: e-skills UK analysis of data from the Joint Council for Qualifications, 2004-2011

Figure 16: All IT related GCSEs as a percentage of total GCSEs sat, 2004-2011



Source: e-skills UK analysis of data from the Joint Council for Qualifications, 2004-2011

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e-skills UK, the Sector Skills Council responsible for: Business and Information Technology, including Software, Internet & Web, Computer Games, IT Services, Telecommunications and Business Change.

e-skills UK is the Sector skills Council for Business and Information Technology, rated 'outstanding' in the relicensing of Sector Skills Councils in 2010. We work on behalf of employers to ensure the UK has the technology skills it needs to succeed in a global digital economy.

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For further information please contact:

e-skills UK
1 Castle Lane
London
SW1E 6DR
UK

Tel: 020 7963 8920

info@e-skills.com

www.e-skills.com