UKCES

Technology and skills in the Digital Industries

Executive Summary
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The aim of the *Technology and Skills in the Digital Industries* evidence report is to provide new insights on the role of four emerging technologies: Cyber Security; Mobile technologies; Green IT and Cloud Computing, in driving high level skills needs of the wider Digital sector. This report combines data analysis, literature reviews and qualitative interviews with over twenty employers and experts to provide a comprehensive assessment on the nature of skills needs, job roles and career pathways for these technologies.

Sector overview

The Digital sector is at the heart of contributing to the economy, underpinning growth through the technology it develops and the services it provides. The Digital sector employs 3 per cent of the UK workforce and contributes nearly £69 billion Gross Value Added to the UK economy (7.4 per cent).

Per employee job, the sector is one of the most productive in the UK economy and employment has grown 5.5 per cent between 2009 and 2012, more than three times that recorded within the wider economy. The dominant characteristics of Digital sector employment are permanent, full time and male.

A total of 1.1 million people work as IT specialists in the UK, with those working outside the Digital sector most likely to be employed in Finance and Professional Services, Manufacturing or the Public Sector.

An analysis of the sector workforce shows over half of all workers to be employed in 'Professional' level occupations, well above the UK overall proportion. There is a particular concentration of higher level IT occupations in the Digital sector itself. Digital sector workers are also amongst the most highly qualified members of the UK workforce.

Skills shortage vacancies equate to 17 per cent of all vacancies in the sector, and are experienced by over 3,000 employers. Hard to fill and skill shortage vacancies are concentrated in Professional and Associate Professional and Technical occupations. The most common skills thought to be lacking are job specific, and advanced IT or software skills.

The impact of hard to fill vacancies includes difficulties introducing technological change and delays in developing new products and services. These issues are more keenly felt in the Digital sector than across other sectors. This evidence suggests that skills mismatches are affecting the ability of these high value firms to grow and develop as quickly as they might be able to, should they be able to source skills more easily.

Cyber Security

Cyber Security covers the protection of systems, networks and data. It is particularly driven by factors such as technology (new and legacy) and the increasing threat of security breaches; changes in business awareness and risk appetite; regulation and compliance (including legislation and industry standards).

Key factors driving Cyber Security growth in the UK also include: consumer expectations; reputation (damage to the business reputation is a greater concern than the risk of fines due to breaches/non-compliance); and Intellectual Property (IP) and asset protection.

Skills needs include a sound base of technical understanding, knowledge and competencies; understanding and awareness of security issues and industry standards; analytical skills, risk analysis and risk management.

Communication skills, relationship management, and customer facing presentation skills are also seen as critical to achieve active support for Cyber Security from other business leaders.

Estimates of growth potential go hand in hand with reports of significant recruitment and skills issues including an inability to source appropriate information security professionals in particular higher level specialists such as Security Architects and Security Analysts.

The most common pathway into Cyber Security roles is via internal recruitment and from general IT specialist roles which would suggest that whilst entry also includes apprenticeships (seen as a pathway into higher skilled roles) and graduates, businesses continue to seek skilled professionals to work in this area.

Training includes mandatory courses for compliance/audit but also to address the need for secure technology development and greater awareness of security across the business more widely.

There is a general sense that the market for Cyber Security will continue to grow. A proactive outlook where higher level skills will continue to be needed to provide the products and services required to deal with progressively more complex Cyber Security, increasing breaches and threats and the impact of new technologies.

Mobile technologies

Communications, devices and applications are integrating and converging enabling multiple uses and advanced collaboration. This requires constant innovation and new technology solutions. Businesses are using mobile technology solutions as part of a multi-channel approach to connect with clients and to improve employee productivity.

Mobility is primarily being driven from a consumer perspective and the pace of mobile use as a primary channel by consumers is faster than most businesses expected. An emerging theme is the growth of Bring Your Own Device (BYOD) where employees are driving change in the workplace.

There are significant challenges for IT specialists managing mobility, but mobile technologies bring new operational models to businesses providing opportunities for growth and more efficient working methods for employees.

Mobile technology skills are needed in many IT specialist job roles, whether in design and development, management or support. Highly skilled occupations in mobility include: IT Architects, Developers, User Experience Designers and Project Managers.

Agile techniques, technical pre-sales, sales, marketing, account management support and an extensive understanding of customers' industries are noted as key skills requirements alongside the need for a high degree of interaction between technical specialists, the user experience design team and the end client/customer.

Mobility is increasingly a thriving part of Digital sector products and services with massive potential for growth, and an area where significant recruitment and retention pressures are emerging, particularly in the recruitment of mobility specialists who need extensive technology experience together with specific mobile technology skills. Hard to find occupations were noted as IT Architects, Developers, User Experience Designers, Testers and Sales and Pre-sales staff.

Recruitment into mobility roles is often addressed by upskilling existing staff. Specific training is often provided by employers to increase the capability of their existing staff in mobile technologies but, because the market is relatively immature, experience is generally preferred over certifications in terms of recruitment.

The machine to machine 'connected device space' will potentially create a huge amount of information and will generate the need for highly valued analytical skills and for Big Data Specialists in particular, to exploit the data generated.

Securing mobile devices is becoming increasingly recognised and important for all organisations looking to integrate mobile technologies into their future business plans and will be, without question, a key skills challenge.

The increasing demand for skills in high level mobility roles is currently an issue, but in time it was felt that the skills will catch up, provided sufficient talent comes into the Digital sector.

Green IT

Green IT refers to sustainable IT through the invention, design and implementation, of infrastructure and services whilst minimising their environmental impact. It is a subset of sustainability.

Rising energy costs and environmental concerns were the original drivers behind Green IT but wider implementation may have paused, pending economic recovery. A key area for exploitation in implementing Green IT is virtualisation and the efficiencies allied to Cloud Computing (including energy optimisation) are also driving the uptake of Green IT.

Companies were emphatic that they have to demonstrate a responsible view of sustainability, either as a technology provider or a technology user company, and brand reputation in this area is a huge driver.

IT Architects and Solution Designers are key high level roles for Green IT. Staff working in this area tend to have extensive IT backgrounds, experience and capability before specialising in Green IT. There is general concern about the lack of volume of IT specialists who go on to specialise in Green IT. Certifications are less widely used with a solid technical background and experience being favoured, perhaps with a higher level degree.

Key skills requirements are around energy management expertise, data collection and analytics and integration. It was noted that research and development and high level mathematics skills are not readily available, highlighting the need for STEM skills. As found in other technologies investigated for this project, IT skills need to be complemented with sector or domain specific skills (e.g. in construction or logistics)

Business and commercial awareness, communication and presentation skills were found to be needed at a higher level to increase awareness of sustainability issues across the business as well as with customers.

Evidence from the literature review and interviews undertaken in this project suggests that there is potential for greater growth in Green IT in the future, and opportunities for the sector to offer more products and services as sustainability gradually pervades all parts of customers' businesses.

Growing the workforce to deliver this requires not only people with higher level technical skills, extensive experience and sector specialisms but also those that have a real interest/passion in this area.

Cloud Computing

Cloud Computing is a model for delivering internet based information and technology services in real time or, 'on-demand' and is particularly driven by: economic opportunity; cost reduction; technological change and consumerisation.

The current economic climate is seen to be a strong driver with Cloud Computing enabling companies to not only move into new markets, reduce costs and become more agile but also to provide growth through the enablement of new business models.

Mobile technologies provide new delivery platforms for the full benefits of Cloud Computing to be realised but employers report that security is a key challenge in implementing and managing cloud technologies. Cloud Computing is very much driven by a new generation of consumers and employees.

A wide range of technical skills are needed for Cloud Computing although security, networking, virtualisation skills and big data analytics are considered to be the key skills for Cloud.   However, IT specialists need broader business skill-sets, especially risk management and business stakeholder management, to bridge the divide between IT and wider business operations.

The growth in demand expected for cloud services has significant implications for the high level skills required by service providers – particularly as cloud systems become more complex, higher skills levels will increasingly be needed of IT specialists working in this area. However, employers report that generally competition for higher level IT skills means that they find it difficult to recruit into cloud roles, relying on contractors/consultants while they redeploy and upskill their existing staff.

Cloud Computing can be leveraged for growth across all sectors and is in itself a key factor in Mobility, Green IT and Cyber Security technologies. It is clearly a growing area for the Digital sector but for the uptake to continue, service providers will need to understand the consumer better and nurture innovation.

Future insights for higher level skills

The Digital sector is considered in its own right to be a major driver of the economy over the next ten years. Workforce growth in the Digital sector is slightly higher than across the economy as a whole, and future trends and forecasts all predict the continuation of the demand for high level skills in the sector.

The sector requires nearly 300,000 recruits at Professional, Manager and Associate Professional level to fulfil growth potential and replacement needs to 2020. The increasing demand for entrants to these occupations may lead to increasing competition between sectors for highly skilled recruits.

Priority themes across technologies emerge as cost reduction - technology enabling a reduced cost base; consumerisation - businesses and individuals driving uptake; and security - a common theme and increasing requirement across technologies.

The research showed that employers currently have to address labour market issues around the new technologies. A recurring finding across the technologies was the need for high level IT Architects, Big Data and Security specialists. The growing need for IT staff with the ability to analyse and interpret Big Data was widely reported. This data is becoming increasingly valuable to organisations as they seek to gain competitive advantage from the knowledge that can be unlocked from this new resource. Similarly, a common skills theme emerging from employers across all of the four technologies investigated was the need for specialist cyber security staff. The concern being expressed was that as technology connects more and more devices the risk of security breaches becomes more and more an issue.

The core of technical / computing skills remain but upskilling existing IT specialists with broader, deeper skills and more new specialisms is critical for continued growth and innovation in the new technology areas.

Business skills manifest themselves in the need for high level sales and technical pre-sales skills and techniques that are currently hard to source together with the need for IT specialists to communicate with their customers more proficiently and extensively.

There are already indications there is increasing competition for higher level skills across these new technologies, with recruitment difficulties in higher value roles and in occupations with specialist skill sets such as IT Architects, User Experience Designers, Analysts and Developers. Finding suitably skilled staff is recognised as a key challenge for employers in the sector to realise business growth and capitalise on the opportunities that these emerging technologies offer.

Employers were however realistic about the disruptive impact of emerging technologies and rather than being seen as an issue, it is thought, in a positive sense, to actually foster innovation and drive growth in the Digital sector and across the wider economy.

Employers raise serious concerns about the future supply of talented IT people that will be needed to fill the ever growing number of roles created by these emerging technologies. Sourcing the required numbers of suitably skilled staff to capitalise on the opportunities that these technologies offer is recognised as a key challenge for employers in the sector, which if not addressed will seriously compromise future business growth potential.

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