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Lifelong digital skills development, current picture and future challenges

Future of Skills & Lifelong Learning

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Lifelong digital skills development, current picture and future challenges

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June 2016

(minor updates July 2017)

This review has been commissioned as part of the UK government's Foresight Future of Skills and Lifelong Learning project. The views expressed do not represent policy of any government or organisation.

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Executive Summary

Research Question

In the context of accelerating technological change, what conditions are required to ensure the supply of digital skills keeps up with demand?

Impact of Technological Change

Technological change has advanced at a rapid rate, doubling computer power every 18-24 months (Moore's Law) for over 20 years. Now, there is more than enough computing power currently to automate large numbers of existing jobs. Predictions for the UK suggest that 35%-47% of jobs could be displaced over the next 10-20 years, with both unskilled and higher skilled roles at risk. However, if we look back over the last 20 years, technological change has created more new jobs than it has displaced.

The issue of job losses can be addressed by developing support mechanisms for reskilling and upskilling staff, and providing lifelong learning support through continuing professional development (CPD) to maintain currency with technology change, through competency-based training initiatives.

Definition of Digital Skills

We focus on a classification of three levels of digital skills: Basic Digital Literacy Skills, essential for everyone in the population to be able to use current online systems; Digital Skills for the General Workforce, which are the skills necessary to use the software and systems (provided by ICT Professionals) effectively for the needs of a business; Digital Skills for ICT Professions, this covers a vast area of software and systems design, development and configuration, as well as the invention of new tools and techniques. All three levels are under-represented in the UK working population and there is a need for new initiatives to address the shortfalls, particularly at the ICT Professional level where current shortages are predicted to get worse.

Current Pipeline of Supply and Demand

Predictions currently state that there will be a shortfall of 500,000 ICT Professionals across Europe by 2020, with the UK as one of the major losers. Additionally, it is predicted that there will be a need for a further 50,000 additional high-tech Leaders per year until 2025. There are also significant shortfalls worldwide in a number of specialist areas, especially cyber security. The current pipeline is inadequate to meet this need. With insufficient graduates in the UK each year to fill available roles in the ICT Profession, many staff are recruited with other less relevant degree qualifications or lower qualifications. This builds a lack of core knowledge into the industry, leading to project failures and a lack of innovation. Additionally, there are extremely significant diversity issues: only 14%-17% of the ICT Professionals in the UK are female; and black and minority ethnic (BME) graduates experience far higher unemployment levels than their similarly qualified white colleagues.

Addressing diversity issues successfully could have a significant impact on the current pipeline of ICT Professionals.

Changing the Pipeline

To address shortcomings in the skills and knowledge of personnel, there is a need to upskill the ICT industry. Establishing certification for project and contract sign-off, based on mapping skills and competences to qualification frameworks, as well as CPD, could offer a way forward. Increasing the numbers of ICT graduates is not enough to address shortfalls, although higher apprenticeships and conversion Masters will help. This presents an opportunity to “unbundle” higher education, offering micro and nano courses in specialist areas, with small numbers of academic credits.

Opportunities for students to be funded on a credit accumulation basis could open up the marketplace to this kind of unbundled model, offered by a variety of providers.

Future Vision and Policy

The provision of higher education that is reactive to the demands of the labour market and that is offered in a variety of forms and meets the lifelong learning needs of a highly skilled ICT professional community will help address the above issues.

To achieve this, there are a range of possible options, such as unbundling higher education, financial support for lifelong learning, addressing diversity issues, support for flexible working and flexible learning, and local entrepreneurship could be supported by policy initiatives.

Introduction

This paper aims to answer the question: “In the context of accelerating technological change, what conditions are required to ensure the supply of digital skills keeps up with demand?”

To answer this question, we begin by first exploring how technology is likely to impact society in the future. The paper then defines the term digital skills as used here, and outlines the current and predicted workforce shortages, noting workforce diversity issues. It concludes with an outline of how the pipeline needs to change and the potential areas for policy review.

1. Technological change and its impact

A 2013 O2 report, 'The Future Digital Skills Needs of the UK Economy', estimated that 745,000 additional workers with digital skills would be needed to meet rising demand from employers between 2013 and 2017 (Telefonica and O2, 2014). This did not address predictions regarding the future impact of automation on the workforce, however. A study by Oxford University (Frey and Osbourne 2013) predicts 47% of the workforce are at risk from automation in the USA and notes that "While computerisation has been historically confined to routine tasks involving explicit rule-based activities ....algorithms for big data are now rapidly entering domains reliant upon pattern recognition and can readily substitute for labour in a wide range of non-routine cognitive tasks".

A Deloitte report (2014) suggests 35% of jobs are at risk of automation in the next 10-20 years. Both reports identify occupations at risk, including both unskilled and highly skilled jobs e.g. materials engineers and scientists. We can already see a number of recent examples where automation has displaced a large proportion of jobs. For example, in 2016, Apple replaced 60,000 workers in China by robots. Although similar cases and many expert predictions point towards the rapidly approaching automation of many jobs (Marketwatch 2015, NPR 2015), history tells us that technology can often create more jobs that it destroys (Business Insider UK 2015), or at least that the creation and replacement of jobs by automation is at a steady state (Deloitte 2015). A recent report by McKinsey (MGI 2017) assessed the automation potential of over 2000 work activities (not whole occupations) in more than 800 countries analysing the "sensory perception, cognitive capabilities, natural language processing, social and emotional capabilities, and physical capabilities" of robots, and concluded that "Only a small percentage of occupations can be fully automated by adapting current technologies, but some work activities of almost all occupations could be automated", concluding that about 50% of work activities (about $15 trillion) could be automated using current technology. A recent OECD report (Arntz et al. 2016), which analysed 21 countries, estimates that only 9% of jobs (not activities) are automatable at this time. The speed of adoption is affected by a number of factors such as regulation, reaction of users, economic benefit, labour market dynamics and technical feasibility, but is predicted to boost global productivity and increase GDP. The pace of job creation as a result of automation is unclear (Brynjolfsson & McAfee 2012, MIT 2013) but, given that automation will largely affect lower skilled jobs, in the near future, it is important that the UK focuses on the continual upskilling and reskilling of its workforce to ensure that people can navigate a changing job market. The UK otherwise risks increasing the divide between rich and poor, and the employed / unemployed. This is ever more important given the "technical revolution which is reinventing the way people behave, companies innovate, economies operate, and governments regulate, faster than many of us can comprehend" (Exchange Wire Editorial, 2015). This pace of change, known as Moore's Law, is now slowing having hit fundamental physical limits.

The Leitch Review envisages a society where the development of world-class skills provides prosperity for all (Leitch 2006). However, much of the academic research in this area has focused either on the development of digital skills to support specific activities, such as using public services (van Deursen & van Dijk 2009), or on how to address the "digital divide" being created by this technological change (Ferro 2009), rather than on the development of these world-class skills. It is also worth noting that the technological change we are describing opens the door for many more poorly developed countries, to bypass the development cycles

experienced by the developed world, and move directly into competition as “knowledge economies” (Kefela 2010).

2. What do we mean by Digital Skills?

There are numerous definitions of the term digital skills, as outlined in the recent ECORYS UK (2016) report which cited 15 different definitions by a range of national and international organisations. Drawing together these definitions, the report provided the following three major classifications of digital skills, which will be used in this report going forward (Figure 1):

- Basic Digital Literacy Skills (Empowering individuals): skills needed by every citizen to become 'digitally literate'. These are the skills needed to carry out basic functions such as using digital applications to communicate and carry out basic internet searches. Cyber security sits under this category.

- Digital Skills for the General Workforce (Upskilling for the Digital Economy): these encompass the skills described in category 1, plus skills needed in a workplace and those that are generally linked to the use of applications developed by ICT specialists. As discussed in the Development Economics report (2013), equipping the workforce with such skills helps 'encourage deeper and faster usage of digital technologies by UK businesses and other organisations. While the digital skills needed by the workforce are likely to differ across sectors, there will be some minimum requirements linked to processing information that will be applicable across all sectors.

- Digital Skills for ICT Professions (Digitally innovative and creative individuals, organisations and businesses): these include the skills described in categories 1 and 2, plus skills needed to work across the diverse IT sector. They include digital skills linked to the development of new digital technologies, and new products and services. Such skills are needed if the UK is to compare favourably with other nations in relation to ICT investment and utilisation.

  It is important, however, to open up the definition of ICT in this classification since it deals with everything from basic programming skills through to high-level technological invention. However for the purposes of this report, we will use the above definition when referring to ICT professionals.

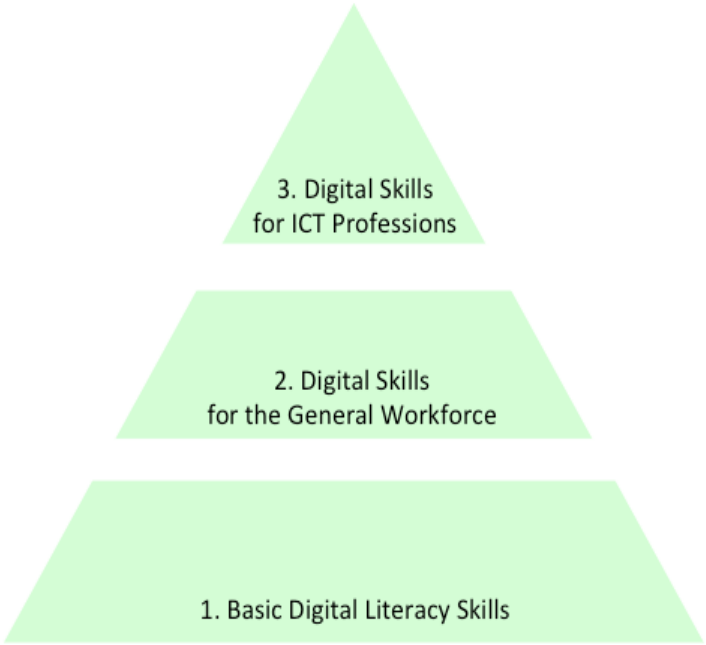

Figure 1 - Digital Skills requirements for UK population

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3. The Current Pipeline of Supply and Demand

In terms of the supply of digital skills for ICT professions as defined above, in Europe, "the latest estimate of the gap between demand and supply is 500,000 in 2020, down from an estimate of 756,000 released in December 2015. The reduction of the gap comes at least in part from an increased number of IT educated professionals coming out of Higher Education (HE) and Vocational Training (VET)" (DG 2017). Although the gap has reduced, it is still problematic for companies to find qualified staff, as supported by the Tech Partnership (2015) Employer Insights skill survey which reports that "Of those firms seeking to recruit tech specialists in the previous year, 42% stated that some or all of these positions had been hard-to-fill, with it taking up to 91 days to fulfil certain tech specialist roles (Figure 2). Among these companies, some 85% stated that digital skills shortages (a lack of candidates with the required skills, qualifications or experience) had been the cause of some or all of these recruitment difficulties". Additionally Europe will "be required "to generate around 50,000 additional high-tech leaders per year in the years up to 2025, or a total of around 450,000 until 2025" (DG 2017). A high – tech leader, also called an e-Leader (DG 2017) can be defined as: "a person capable of driving successful innovation and capitalising on advances in information and communication technologies" (EU 2015). This fits within a more general view of upcoming shortages of skills, in particular digital skills, within the workforce (Dychtwald et al 2013).

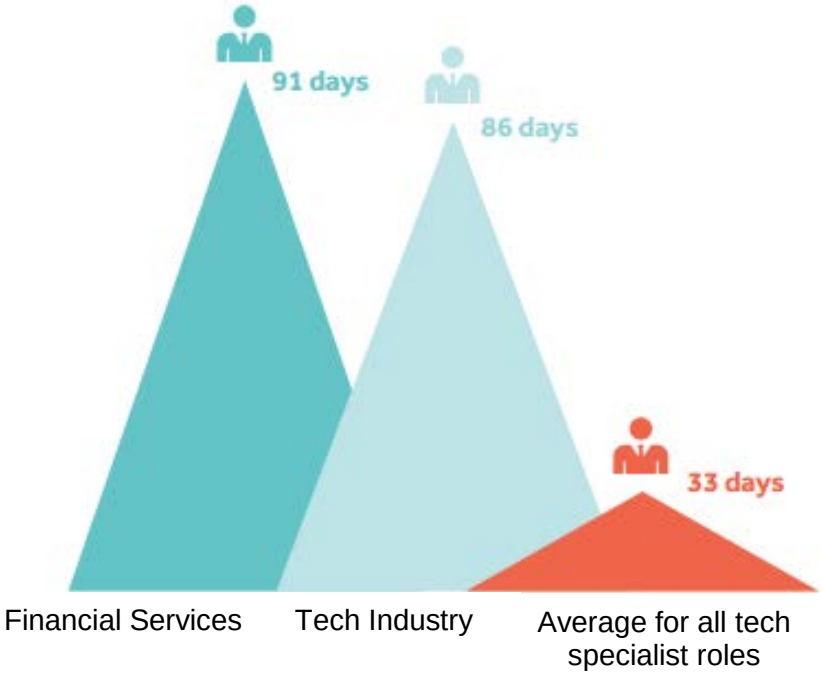

Figure 2 - Estimated Time to Fill Hard-to-Recruit Tech Specialist Positions. Figure taken from Tech Partnership 2015a with permission from Tech Partnership © 2015.

This issue is widely recognised in Europe and has stimulated many initiatives e.g. the e-skills for jobs campaign (EC 2016) and the Grand Coalition for Jobs (EC 2013) designed to enhance ICT skills across the board including filling ICT vacancies. A range of initiatives aimed at helping school pupils to learn to code have sprung up all over Europe, including the UK, over the past few years, e.g. The Code Club (2012), in addition to changes to the national curriculum to replace ICT (learning to use computers) with Computer Science, introduced in 2014 (DfE 2013). It should, however, be noted that whilst these initiatives will raise the digital skills of the general population over time, it is unclear to what extent they will assist in filling ICT vacancies.

The shortage of ICT skills has also impacted the teaching of computer science skills at schools, causing the supply / upskilling of computer science teachers to become a major issue in the UK. This has led to a DfE funded initiative to promote and support computer science teaching (CAS 2016). The self-teaching of ICT skills has also raised some concerns. For example, an international survey of 56,033 coders conducted by online forum, Stack Overflow (2016), found that 69.1% were at least partly self-taught, potentially leading to the production of poor quality software with consequences for testing, maintenance and bug fixing (Harrison 2004, Floyd 1979, Malvik 2015).

Many people who enter the ICT industry do not have formal training and the supply of computing graduates to industry has not been able to address this digital skills shortage. After the dot.com bubble burst in early 2000s, applications to study computing at university dropped nationally by over half. Numbers are slowly increasing but many universities downsized their provision during this period. Universities are now producing about 15.5 thousand graduates per year (HESA 2016), which is down from around 37.5 thousand graduates in 2004/5 (CPHC 2008). Among this cohort there are issues associated with the underrepresentation of women and poor employment prospects for black and minority ethnic (BME) students (CPHC 2016).

The issues surrounding inequality of opportunity for BME students have been the subject of considerable research and discussion through the latter decades of the twentieth century, and the expansion of higher education provision in Computing and IT at the turn of the century increased the “widening access” provision and saw significant increases in the BME student population in these subjects. However, an Open Educational Resources study in 2002 highlighted that, while opportunities for BME students had improved (although there remained issues with selecting universities), pay and employment differentials for BME and women graduates remained a significant issue (Blackaby et al 2002). The research also indicated that these differentials increased through an individual’s career, so inequality at the time of recruitment will result in further and greater inequalities of opportunity, progression and remuneration in later years. Research also focused on reasons for such employment differentials, with the use of social networks to find recruits being highlighted as a strong cause (Gray et al 2007). Further research highlighted that the perception of discrimination, held by BME graduates, and the significant level of recruitment through social networking, impacted both the areas and types of business that BME graduates would apply to, leading to significant regional variations in employment issues (Booth et al 2007, Kirton 2009). Current research evidence suggests there has been little to no improvement over the past decade and suggests a worsening situation, with recent research by the Trade Union Congress, highlighting that “black, Asian and minority ethnics (BAME) graduates are 2.5 times more likely to be jobless than their white peers” (Allen 2016, TUC 2016). In fact, current research suggests that discrimination in recruitment focuses on a number of factors that apply to BME graduates, while factors such as race and ethnicity are obvious this also refers to other factors such as, inter alia, location of home address, institution of study, club and society engagement, and unskilled employment history. Assuming these factors are made explicitly available to recruiters, as is normally the case, this makes it much less likely that BME graduates would be treated equally with other graduates, on their capabilities (Zwysen Longhi 2016).

As mentioned earlier, another area for concern is the continuing decline of women studying ICT at university and in the workforce (in all areas and at all levels).

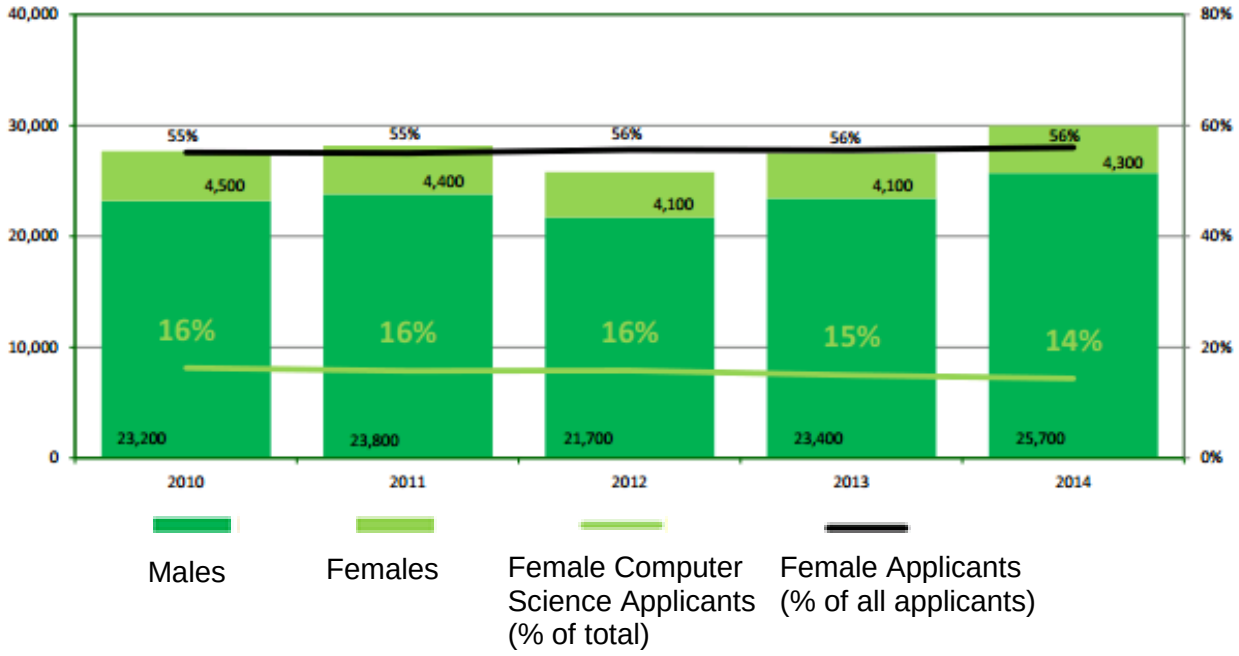

Figure 3 - Unique Applicants to IT/other HE Courses by Gender 2010-2014. Taken from Tech Partnership 2015b with permission from The Tech Partnership and BCS, The Chartered Institute for IT © 2015. *Note: Analysis of UCAS data undertaken by The Tech Partnership.*

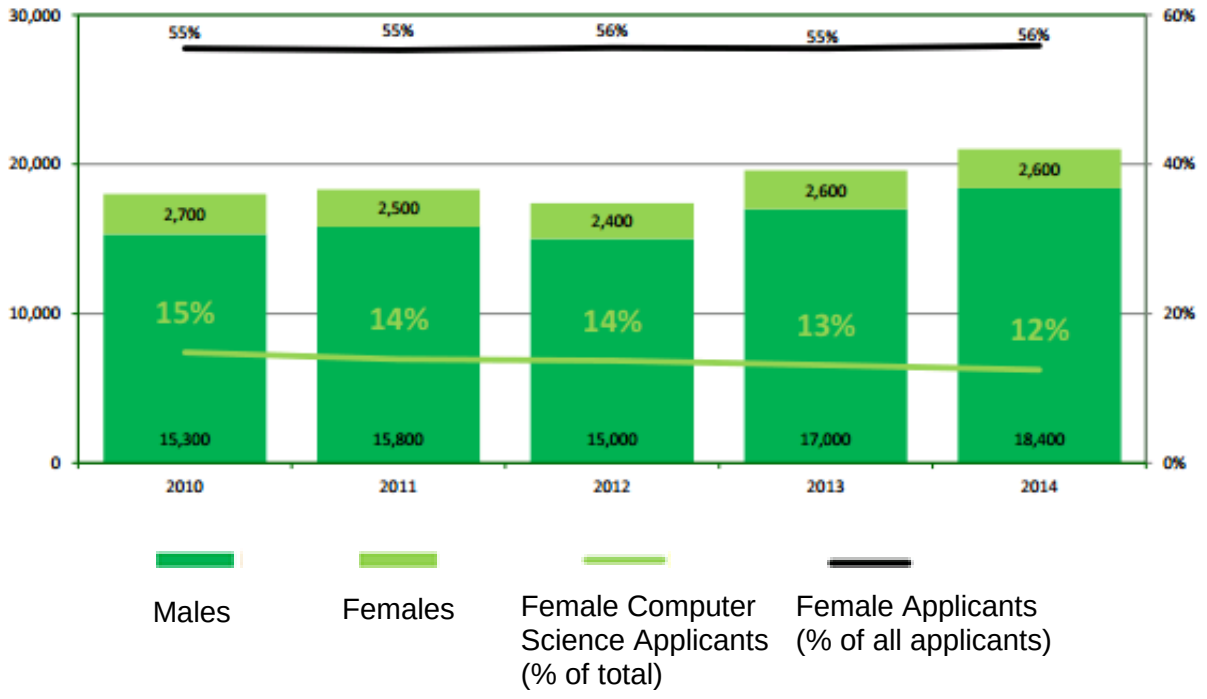

Figure 4 - Acceptances to IT/other HE Courses by Gender 2010-2014. Taken from Tech Partnership 2015b with permission from The Tech Partnership and BCS, The Chartered Institute for IT © 2015. *Note: Analysis of UCAS data undertaken by The Tech Partnership.*

Addressing the gender inequality issue in the ICT profession is an important step towards solving the digital skills deficit. From a company perspective, there are many advantages, but also many challenges and barriers which need to be overcome in order to cultivate a gender balanced workforce, for example:

- The percentage of women working in technology in the UK is typically quoted at around 14-17% (Mortimer Spinks 2015, Tech Partnership 2015b) (Figure 3 and 4). McKinsey & Company (2015a) research makes it clear that "companies with more diverse workforces perform better financially". Gender-diverse companies are likely to experience a 15% improvement in performance, and ethnically-diverse companies, up to a 35% improvement. Research (IBT 2014) shows that diversity is a significant issue in the large tech companies such as Google, HP, LinkedIn, Yahoo and Intel. To quote Baroness Jan Royall "in order to have a healthy society, we need to have organisations that reflect the society in which we live" (Royall 2016).

- McKinsey & Company's (2015b) research on women in the US workplace concluded that "Based on employee pipeline data from 118 companies in 2015 and 60 companies in 2012, two broad themes emerge: women are still underrepresented, and they face real barriers to advancement". There isn't a similar study for the UK, however, common challenges facing developed countries are often debated for example Deloitte's report (2016) and it is therefore highly likely that women face similar barriers in the UK workforce. The report goes on to say "Transparency and training are vital. If employees see that there are real, measurable gender inequities in their organization, they will be more likely to participate in solutions. Companies should implement training to help employees learn how to identify and counteract gender bias. This is particularly critical for managers, who shape the day-to-day work experience of most employees."

- Women face a number of barriers to careers in IT throughout their lives e.g. societal stereotypes, male dominated, male workplace cultures, unconscious bias from parents, careers advisors, work colleagues etc., poor image, use of language e.g. in job adverts, societal perceptions of careers etc. which can deter them from entering the workforce or drive them to leave it (Lewis 2015).

Whilst the number of women in the ICT industry continues to slowly decline, many strategies have been shown to make a difference such as:

- diversity reflective / representative role models;
- lifelong mentoring from an early age;
- hands-on STEM activities both within and outside traditional educational environments;
- collaborative learning and working environments;
- supportive networks;
- clear pathways to digital careers for women in wider professions such as marketing and finance;
- flexible working and essential care support (elderly care as well as childcare) etc.

However despite many initiatives in the UK each year by groups such as WISE (1984), and STELLAR (2015) which aim to share best practice at the senior level, success has so far been limited.

Figure 5 – Start ups that are "unbundling" the Hotel Industry. Figure taken from © 2017 CB Insights.[1]

[1] Unbundling the Hotel: The 62 Startups Marriott and Hilton Should Be Watching: www.cbinsights.com/blog/unbundling-the-hotel/

4. Changing the Pipeline

The promotion of basic digital literacy skills is being addressed by a number of existing initiatives such as Computing at Schools (CAS 2016) and Digital Eagles (Barclays 2016). The issue of Digital Skills for the General Workforce requires further support, however, particularly in reskilling workers made redundant through automation or other changes in working practices, and upskilling existing workers so that they are capable of working within increasingly technology-rich environments. This issue requires long-term investment and a change in the conceptual model of learning among the general public, moving towards a view of lifelong learning and updating and improving one's skillset across the life course (NCS 2016).

The main issue here, however, is promoting the number of highly skilled personnel coming into the ICT profession. There is currently a growing shortfall of these skilled personnel and, as a result, the UK is being overtaken by other countries as a digital and knowledge economy (BBC 2009, OECD 2015). The pipeline producing staff for these professions is not limited to the existing HE model. There have been a number of routes developed through on-the-job training, specialist conversion short-course training providers, apprenticeships and, of course, self-tuition, which have proven successful in enabling people to find employment in the industry. A significant survey of over 56,000 IT staff working in coding, across 173 countries, carried out by Stack Overflow (2016) found that over 69% identified themselves as at least partly self-taught. In the same survey only 43% of these key developer staff had a degree in Computer Science or a related discipline. There is also significant pedagogical and technical research into the ideas of future learning spaces (Punie & Ala-Mutka 2007). Unfortunately, there have also been numerous ICT system development failures that may be attributed to a lack of knowledge and expertise by individuals and organisations in the technologies necessary to support such developments (Computer World 2008). If the UK is to minimise the occurrence of these failures we need to ensure the highest possible level of skills and knowledge within the workforce and the organisations responsible for developing advanced systems and inventing new technologies. There is therefore a need to develop better models for certifying knowledge and skills, and maintaining their currency, and for relating the capability of an organisational workforce to project specifications and contract negotiations, thereby professionalising, and potentially licensing, the industry (BCS 2006). There are existing skills and competency frameworks, such as the Skills Framework for the Information Age (SFIA 2016) and the European e-Competence Framework (e-CF 2016), and establishing effective mappings between these and the UK Qualifications Frameworks (EQF 2016, RQF 2016, SCQF 2016) would offer a route to achieve this. There are a large number of companies offering Continuing Professional Development programmes, some certified by professional bodies such as BCS (The chartered Institute for IT, previously known as the British Computer Society) (2016). These focus on the development and growth of competence relative to roles in industry, professional and personal competence within role, and development of advanced or specialist skills. Associating statements of professional competence, such as Chartered Status, with engagement with CPD, provides a mechanism to ensure the currency and competence of the workforce – providing that those statements of professional competence carry weight in job selection, promotion and/or contract sign-off.

Recognising that we need to grow the workforce much faster than can be achieved by simply increasing undergraduate numbers, the current development of degree-level higher apprenticeships also offers a route forward, as does the reintroduction of conversion Masters degrees for those who already have a degree in a non-ICT subject. However, this is also an

opportunity to support the so-called “unbundling” of Higher Education (Craig 2015, University Ventures 2012), in keeping with the current government’s model of opening up the HE marketplace, and to investigate the delivery of micro and nano courses and degrees, offering small numbers of academic credits that can be accumulated over time towards qualification awards, and which also offer specialist education and training in advanced knowledge and skills areas (Udacity 2015, Harvard 2015). Figure 5 shows an example of unbundling in the hotel industry, with a large number of specialist start-ups taking on functions that are bundled as part of the hotel offering.

The delivery of such courses through online systems and eLearning is possible, based on expertise and skills already present in the UK education system, but the existing funding model presents a significant barrier to mass take-up of such opportunities. The current funding model for students is based on 3-4 year long undergraduate programmes, postgraduate programmes over 1-2 years, and some rather inflexible part-time models (SFE 2016). Making funding available to all eligible students on the basis of credit accumulation, with a maximum number of credits being supported within a lifelong learning window, and repayment associated with elapsed time since credit achievement, would offer the opportunity for far greater flexibility in the provision and take-up of higher education. A variety of existing credit transfer and accumulation schemes already exist worldwide (Junor & Usher 2008). In fact, the same model could also be used to support the reskilling and upskilling of personnel made redundant by automation or other changes in working practices, to enable them to achieve appropriate levels of Digital Skills for the General Workforce. A number of schemes for retraining redundant workers and unemployed youth have been developed over the years, with recent redevelopment in Ireland as part of a national structural reform policy initiative a good example (Pina 2011), and this is now driving competence-based training initiatives across the world (Panth & Coali-Rodriguez 2017).

5. Future Vision and Policy

There is strong evidence that there will be a significant change in the workforce over the next 10-20 years. As such, there is a need to plan carefully and develop policies to address issues that arise as these changes take place. We have discussed the need to develop mechanisms to reskill and upskill those who are made redundant through automation or other changes in working practice, and to maintain a lifelong learning approach through Continuing Professional Development (CPD). However, if the UK is to remain globally competitive there is a need to ensure a supply of highly skilled personnel working in the ICT Professions, and that those working in the ICT industry operate to professional standards.

Therefore, it is important to promote conditions that will ensure an appropriate supply of highly skilled personnel that can satisfy demand. This will require a fast reacting higher education sector, able to offer flexible provision in a variety of forms from a variety of providers. Initiatives by public sector, ICT industry, private sector and community organisations will be required to achieve this. Such initiatives could potentially be supported and promoted by policy direction from government. Examples include:

Lifelong Education Provision

- Offering more flexible education models, so-called “unbundling” of higher education (Craig 2015, University Ventures 2012). The current model of student loan provision, based on a fixed period of 3-4 year long programmes is constraining. Providing support for credit accumulation models, micro-credits and nano-courses (Udacity 2015, Harvard 2015), upskilling and reskilling would open up a wider marketplace. This is particularly important in addressing the digital skills shortages, since existing structural and funding models are not flexible enough to allow the migration of personnel from other disciplines, including those made redundant. Credit accumulation would allow the development of a knowledge and skills base over a more flexible time period, according to need, while also accumulating practical experience in the workplace. Such approaches are now being referred to as ‘competence-based training initiatives’ (Mulder 2017).
- Encourage growth of online learning provision across HE sector, with associated changes in Program Design and Teaching and Learning models (Teachonline 2016).

Lifelong Education Funding

- Providing financial support for lifelong learning through tax breaks for both corporates and individuals in high demand subject areas, as has already been successfully undertaken for vocational education in a number of EU countries (CEDEFOP 2009).
- Encouraging employers to use Apprenticeship levy funds to offer re-training opportunities for adult women who would like to work in technology.
- Allowing employers to draw down funding from the Levy contributions for activities designed to engage, recruit and support under-represented groups in apprenticeships, and particularly higher apprenticeships (needs to include support costs not just the training component).

Teaching Digital Skills in schools

- Promoting and developing skilled teachers of Computer Science in schools, including funding provision (current funding is perceived as inadequate and the teaching profession is not seen as desirable by potential ICT graduates (CAS 2016)).
- Ensuring that schools can only achieve the top Ofsted grade if they take pro-active steps to ensure their careers advice does not stereotype individuals.

- Encouraging the integration of IT with other science subjects at school to help combat the stereotypical image of an IT professional which is deterring young people from considering it as a profession.

Skills Frameworks and Professionalism

- Aiding the ease of movement between workplace learning, such as apprenticeships, and formal education, potentially supported by skills and competence frameworks mapped or linked to qualification frameworks.
- Supporting further professionalisation of the ICT industry and consider licensing of ICT professionals for certain levels in specific areas e.g. health and cyber security (BCS 2006).

Flexible Working

- Promoting flexible working for all workers (not just women returning to work after time out for a family) including greater opportunities for home-based working, which could be tied to digital broadband rollout. Many staff are reluctant to take opportunities for fear of associated stigma and impact on careers, even if advocated by employers (HR 2014).

Workforce Diversity

- The publication of workforce diversity and STEM education diversity stats, and setting of targets to promote greater ICT workforce diversity across the spectrum of ICT job (US Dept. of Labor 2015, ONS 2015).
- As an employer of significant numbers of scientists, computer scientists and engineers, the Government should exemplify and champion best practice in terms of opportunities for women at all levels, including on boards, committees and task forces sponsored by government departments. In addition, publicly funded infrastructure projects should consider workforce diversity when awarding contracts.
- Encouraging companies to train managers to recognise and counter gender and ethnic bias (ClearCompany 2015):
    - 70% of Google's employees are male, and 61% are white, and they're now trying to change that (Googleblog 2014). They are retraining their managers in diversity awareness, and changing recruitment advertising and targets.
    - 57% of employees think their companies should be more diverse (GlassDoor 2014). To achieve this, managers should reconsider recruitment strategies and use "blind" selection processes, where a candidate's name, gender, educational institute, ethnic background and home address are not available during shortlisting. In this way, shortlists are created based on skills, knowledge and ability.
    - Radically Diverse Companies Outperform Industry Norms by 35% (Forbes 2015). Greater publicity around this point, particularly through employer forums, combined with advice on recruitment policy and strategy, and availability of diversity training, could encourage employers to achieve greater diversity in the workforce.
- Encouraging start-ups, social enterprise, and entrepreneurship in BME communities, providing local jobs and role models (Voice4Change 2016).

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