wise

Exploring Pathways into Tech Careers

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Contents

Executive summary

Women are significantly under-represented in digital technology roles (making up just 18% according to the most recent Office of National Statistics (ONS) data). Such roles are increasingly vital in making today's digital economy a reality. Identifying new pathways into tech careers and boosting the number of women working in digital roles will help a wide variety of STEM sectors to maximise their economic impact.

Given the low numbers of women working in tech roles, it can be difficult for STEM organisations to recruit and retain skilled staff with the appropriate digital skills. The most recent 2021 workforce statistics show that the number of women in tech roles is growing but not at a rate high enough to compensate for the growth in demand for skills and to fulfil recruitment gaps.

Companies are trying to recruit more people to fill roles and those concerned about gender balance in STEM roles want to reduce the gender gap now. This WISE research has been commissioned to identify any skills gaps lacking in current tech and digital technology training routes and to find out more about the routes employees have taken to get into a tech career (both traditional and non-traditional). We anticipate this research will aid employers in identifying ways to help close the digital skills gap and increase the number of women who are training, upskilling, or re-training into a tech career.

Our research finds that although younger women are increasingly choosing to start their career as digital specialists, women continue to be more likely to retrain into the tech workforce than choose it as a career to begin with. Many of those interviewed commented on the fact that stereotypes around computing and technology careers continue to abound in schools and educational establishments and girls are unlikely to see computing as a viable career choice straight from school or college unless they have strong role models and have been encouraged to explore digital skills in school.

Our survey found that not all respondents had computing qualifications but around 70% of them had a Core-STEM[1] undergraduate degree. Their STEM undergraduate degrees gave them logical thinking, problem solving and analytical skills which are particularly valued by employers and allowed those who completed a non-Computing related degree to more easily transition into a new career. 29% of respondents did not have any STEM undergraduate degree qualifications and had come into their tech roles via some unusual routes, re-training into their roles within the sector, usually after finding themselves in a role that involved digital skills (eg. website design) or through a related discipline, i.e. geography and Geographic Information Mapping (GIS).

The interviews confirmed that many of the roles advertised in the tech workforce do not need strong coding or programming skills but emphasised that soft skills such as communication, leadership and management are highly valued by all employers. The survey data showed that women are more likely to want to upskill into roles which require strong communication, relationship and leadership skills such as product management, project management or business leadership roles.

Of the courses taken by our survey respondents, 75% of those enabling upskilling were provided and paid for by the employer. Only 54% of those reskilling had their course paid for by the employer. Many companies have set up internal skilling courses for employees, since traditional college and university curriculums struggle to keep up with the rapid change of pace in the digital skills arena.

There is concern that in such a fast-moving sector, skills gaps are still emerging.

Employees working on the latest IT and Coding technologies need to constantly maintain their skills to stay competitive and students are hampered by learning curriculums that can be outdated by the time they get to an examination board. This leaves them with a steep learning curve if they decide to pursue a career in the tech workforce.

Companies are increasing dedicated to offering their own internal resources to offer self-directed learning to employees to maintain their competitive edge using online courses and Massive Open Online Courses (MOOC) from online platforms such as Coursera, FutureLearn and edX.

In line with the drive to plug skills gaps and keep up with a fast-changing industry, some companies are going one step further and setting up in-house 'Corporate Universities' which aim to provide learning resources that are "just-in time, on-demand and in-context." New research is made available to employees, allowing them to pursue lines of enquiry that are relevant to their current or upcoming projects. This all contributes to an environment which thrives on learning and development but relies on self-interest and self-investment to maintain a strong technical career.

This can sometimes put employees at a disadvantage if they work part-time, have family commitments, are returning from a career break (i.e. parental or careers leave) or are re-training into the sector – all of these are disproportionately likely to affect women and minority groups, making it more difficult for them to dedicate the time needed to gain the skills required to stay at the cutting-edge of technology.

Although women are increasingly likely to train into a tech role, there is some concern at the potential for a new gender divide in the tech workforce. Our survey showed that men were more likely to take advantage of advanced coding courses such as Network Architecture, Software Architecture and System Engineering while women were more attracted to roles in Business Management, Product Management and Project Management.

1. Core STEM subjects include: Physics, Maths, Further Maths, Chemistry, Healthcare Science Professionals (i.e. Radiologists but not doctors and nurses), Computing, ICT, Design and Technology and Other Sciences.

Introduction

The UK's technology industry is dynamic and growing at an unprecedented rate. 2020 saw the highest injection of venture capital investment ever ($15bn), third in the world next to tech megaliths, China and the US[2]. Technology roles account for 10% of all those advertised[3], exist in almost every sector of the economy, and are critical to the UK's recovery from the pandemic.

Big challenges remain, however. Not least the fact that the tech workforce lacks diversity. Recent data from the Office of National Statistics (ONS) confirmed that just 18% of the tech workforce were women compared with around 25% of the Core STEM workforce generally[4]. There are significant discrepancies in the roles being taken up too, with, for example, more women likely to be working in project management than systems engineering according to our research.

These numbers are despite the striking business case for a more diverse workforce - a 2019 government report found that reducing gender gaps in labour market participation, STEM qualifications and wages, could increase the size of the UK economy by around 2%, or £55bn by 2030. (Gender Equality Roadmap, UK Government, 2019)[5].

That women are still under-recruited, under-retained and under-promoted, makes little sense when one considers the wider skills gap in tech. The Institute of Coding (IoC) estimated that this was 500,000+ in 2016, with more recent estimates suggesting a need for 1.5 million additional people with advanced skills over the next two years[6]. The UK's 26-28,000 computer science graduates a year are a drop in the ocean against this background. The industry needs new talent and quickly.

There is a ready-made talent pool since around two thirds of female STEM graduates – around 17,500 each year – don't go into highly-skilled STEM work[7] and many more take career breaks and then don't return to their skilled STEM jobs. Employers therefore need to get creative in their recruitment practices. The WISE *Exploring Pathways into Tech Careers* research will help show where new staff might come from, offer recommendations for tech leaders wanting to widen their recruitment practices, and help them make the cultural change necessary to retain their staff.

2. *2020 in review: UK tech sector shows growth and resilience - Tech Nation*
3. *2020 in review: UK tech sector shows growth and resilience - Tech Nation*
4. *2019 Workforce Statistics – One million women in STEM in the UK - WISE (wisecampaign.org.uk)*
5. *Gender equality at every stage: a roadmap for change - GOV.UK (www.gov.uk)*
6. *How the Institute of Coding is responding to the UK's Digital Skills Gap - Institute of CodingInstitute of Coding*
7. The employment trajectories of STEM graduates, Leicester/Warwick Universities, 2018

Alternative training approaches

The skills gap is in part the result of an education system that simply can't deliver new information quickly enough. Hampered by academic learning curriculums that can take years to be changed, agreed and delivered, companies must find ways of training their own staff to remain competitive. Technology companies such as Arup and Capgemini have even gone so far as to set up in-house universities where staff can learn business-critical technologies as they emerge.

Another solution is short, intensive coding bootcamps offered by organisations such as Accenture and Sky. Similarly, the Institute

of Coding, Coursera, FutureLearn and other learning bodies offers short online or gateway courses into specialist sectors.

As the tech workforce has expanded, so have the types of job available. Niches include, but are not limited to, data science; cloud computing; robotics; machine learning; AI; cyber security; network architecture; nanotechnology and quantum computing, not to mention work around applications for sector-specific areas such as Fintech, Edtech and Medical tech. This list is not comprehensive but helps to show that the employment opportunities in tech are vast and exciting.

Attracting women

Attracting women into technology careers is no easy task. This report will look at the challenges and some possible solutions suggested by members of the tech workforce.

Those familiar with the gender balance issues in the UK's STEM pipeline will know that few girls and young women study computer science or related subjects at school or college (making up just 20.6% of GCSE and 14% of computer science A-Level students in 2021 according to WISE). The numbers for graduates are similar, with women making up just 16% of the total in 2018/19.

Despite organisations looking to make change, addressing this gender imbalance is very challenging. Recruitment in particular presents difficulties for organisations looking to improve diversity. Job adverts are often over-complicated and may not reflect the employer's genuine requirements. They often use acronyms and language which can be off-putting to those not familiar with technology. With the best of intentions, employers can also sometimes present a misleading view of the company's true diversity statistics (known as 'counterfeit' diversity). A company's ability to attract women and minorities will be affected if they are perceived as disingenuous in this way.

Similarly, companies need to find ways of offering part-time and more flexible working if they are to continue to attract women. Although women were disproportionately affected by the pandemic, according to an inquiry on the STEM workforce conducted by an All-Party Parliamentary committee[8], some changes in working practices may have helped. A 2021 Microsoft research paper showed that empathy for those balancing childcare and remote working during this period increased as a result of greater insight into a person's home life[9].

But as we know, necessity is the mother of invention, and the pandemic, Brexit and climate change have put the UK's beleaguered position into sharp relief. The nervousness among some sections of the workforce is leading people to retrain, and a career in technology is more future proof than most.

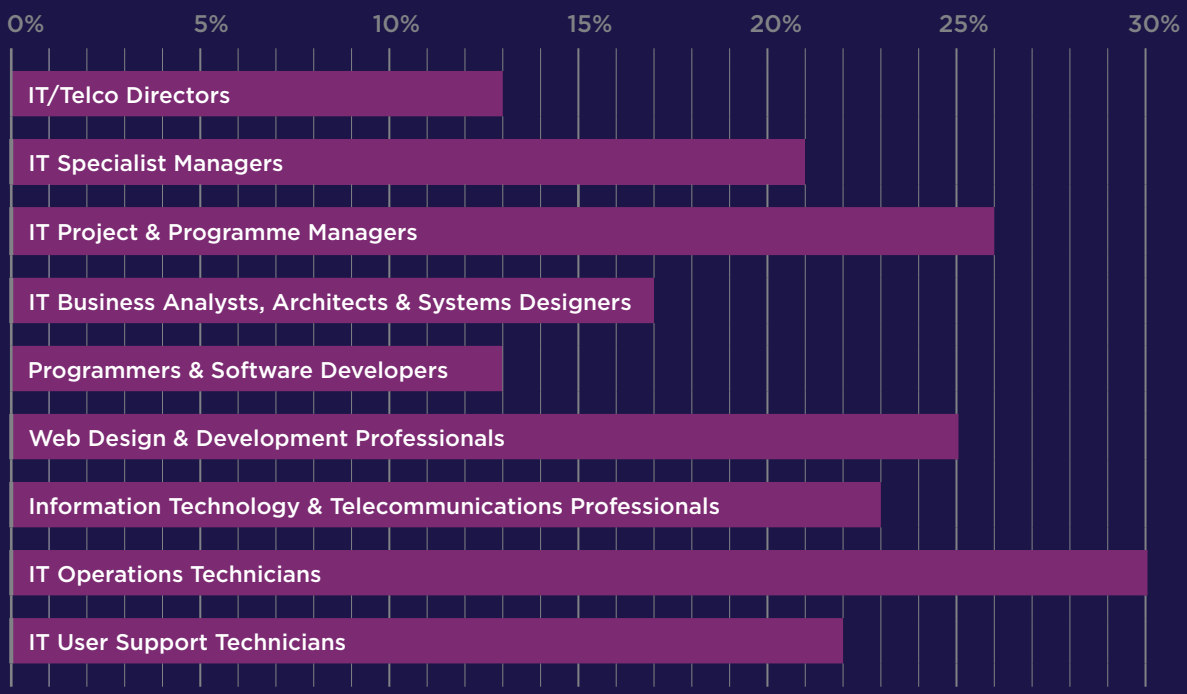
The pandemic changed some working practices for the better and UK tech businesses are currently in a unique position to use this momentum to diversify and create real cultural change on a permanent basis. This WISE report aims to illustrate the numerous opportunities for women to train into tech roles from a wide range of backgrounds. WISE wants to see more talented women upskilled, retrained and employed at the very heart of the tech industry.

8. *All Party Parliamentary Group report: Inquiry into equity in the STEM workforce | Equally Ours*
9. *The Next Great Disruption Is Hybrid Work—Are We Ready? (microsoft.com)*

Workforce data

Women currently represent on average, 18% of the IT workforce within the UK, an increase of 1.3% on 2019, although the data varies according to the roles considered. Women currently hold 30% of IT operations technicians roles and 26% of IT project and programme manager positions within the UK, but on average, only 13% of programming and software development roles and 13% of IT/Telco Director roles are held by women (**Figure 1**).

Figure 1: Percentage of UK Female IT Professionals and Technicians



WISE has captured the available data for a variety of regions across the UK as well as the data for the tech workforce as a whole. Data was taken from the employment and labour market dataset collected by the Office of National Statistics as this includes regional data as well as national data. Workforce jobs tables are updated quarterly in March, June, September and December. This dataset is based on the latest available stats from March 2021.

Please note in the following analysis that the percentages quoted for the regions represents the percentage of women working in those roles in the workforce in that region. The national data shows the percentage of women as a whole of the tech workforce across the UK.

Caution must be advised when comparing and contrasting values in the dataset gathered. Data is patchy and inconsistent. Some regions showed significant gaps in the data available which made year on year comparison almost impossible. Northern Ireland in particular had no usable data on the relevant populations of roles within the region. It must be queried as to how accurate the

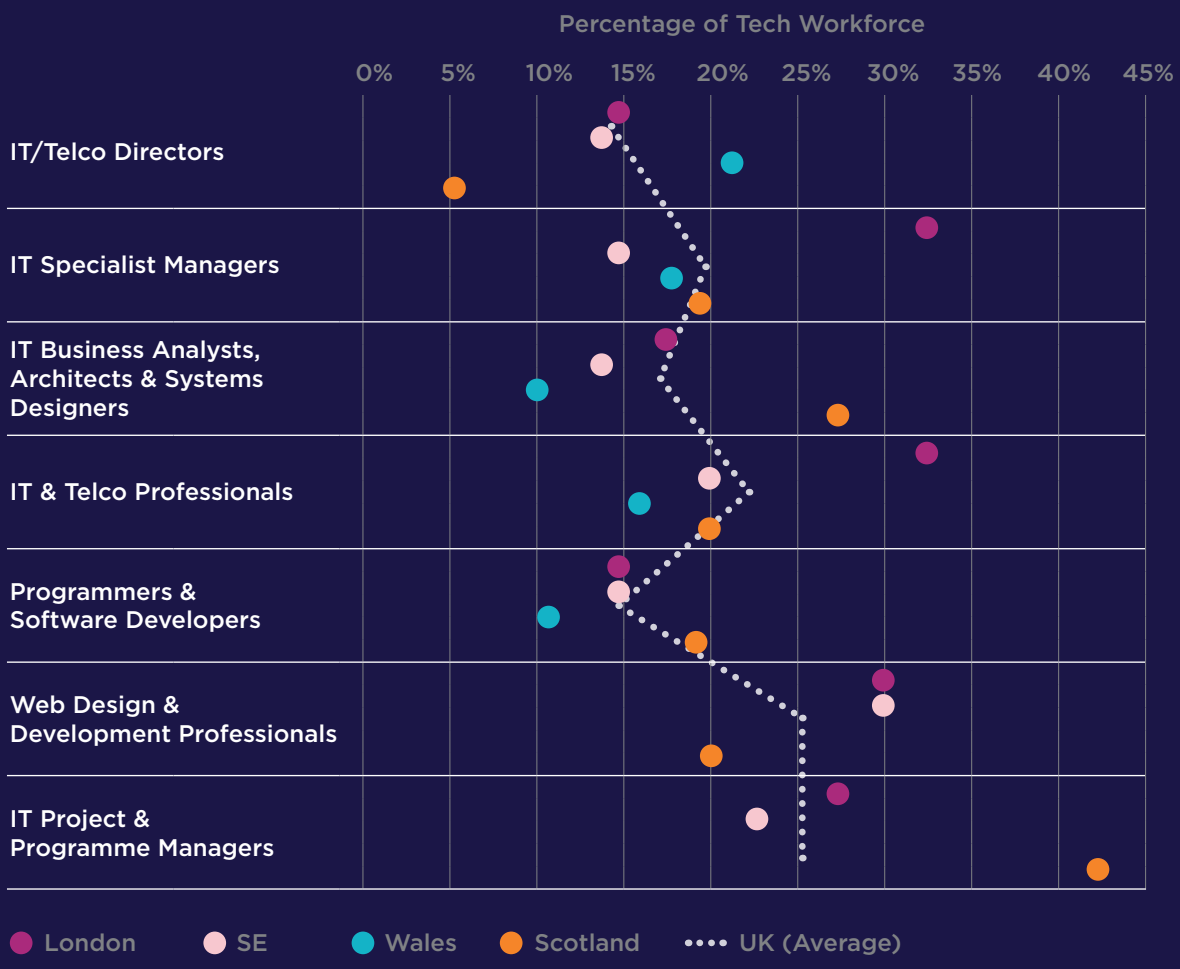
data analysis can be when estimating a workforce population with such an inconsistent dataset.

Care must be taken in the way in which the statistics are presented as well. To illustrate this, we will look at the number of females working as IT project and programme managers in different regions.

An example of this is Scotland showing that 42% of IT project and programme managers in the region were female (**Figure 2**). London has 'just' 27% of the workforce identifying as female. Looking at the population numbers, however, shows that London has a tech workforce five times the size of Scotland working as IT project and programme managers (21,600 people compared to 4,700 people). That translates to 5,900 females working in London as IT project and programme managers and 2,000 females working in Scotland in the same role. London retains the bigger workforce (almost three times more females working in those roles) despite a headline statistic that is less attractive.

Looking at population ratios instead (**Figure 3**), however, there has been a

Figure 2: Female Tech Workforce Regional Data – UK



Source: ONS

Figure 3: Numbers of female IT Project and Programme Managers in 2019 and 2020

success in Scotland since 2019 which is not reflected so easily in the statistics quoted. In 2019, Scotland had 1,000 females working in an IT project and programme manager role. In 2020, that number went up to 2,000 – doubling the number of women in those roles in that region. Looking at that statistic in relation to the change in London in the same time, London saw an increase from 4,900 to 5,900.

Putting those increases into perspective shows that the same number of females were recruited in both regions in a year, but in 2019, Scottish firms doubled the number of females working in an IT project and programme manager role while London firms only recruited 20% more females in the same roles. Overall, Scotland is far more successful at attracting females into those tech roles, but there are less roles available in the workforce generally in that region.

Just this one statistic and the numerous ways in which it can be analysed highlights the issues in simplifying the workforce statistics too much. Quoting a single workforce statistic for a highly complex sector of the workforce in the UK and assuming that a single number represents how well organisations and schools are attracting, recruiting and retaining women in that sector is illogical.

It would be much better to share regional workforce population changes year on year and look individually at regions rather than analysing the UK tech workforce as a whole. This would highlight the fact that for example, the number of people working in an IT operations technician role in the SE decreased by 5,400, but the number of IT and telecommunications professionals in the same area increased by 5,200.

Some of the reasons for these population changes will be related to the reclassification of occupations associated with information technologies in the Standard Occupational Classification (SOC) Review (SOC 2020)[10] where the IT operations technicians major unit was split into two sub units: IT operations technicians and Database administrators and web content technicians and the information technology and telecommunications roles were split into four subcategories including cybersecurity

10. *The redefinition of IT occupations in SOC 2020 by minor and unit group; ONS*

and IT network professionals (Figure 4).

This highlights yet another area of concern for the report – the consistency and classification of information technology occupations in a rapidly developing sector. The SOC 2020 review necessitated the reclassification of many IT roles due to their scale and the complexity of their constituent tasks with many knowledge requirements changing significantly since the last classification review in 2010.

Although the SOC classification system works well to estimate the number of people working in a specific role with specific qualification, it does not capture so easily where those people are working and which industrial sectors they support and does not account so easily for experience rather than qualifications – an area of growing concern in a sector where skills are rapidly becoming more important than qualifications.

Sharing regional data as well as UK-wide data on the roles, however, offers a unique way to share best practice by identifying the regions that are doing well in attracting females to tech roles and being able to investigate what made the difference in that area.

Figure 4: ONS Labour Work Force Standard Occupational Code Review 2020 – reclassification of IT roles

SOC2010	SOC2020
Major group 1	
1136 Information technology and telecommunications directors	1137 Information technology directors
Major group 2	
213 Information technology and telecommunications professionals	213 Information technology professionals
2134 IT project and programme managers	2131 IT project managers
2133 IT specialist managers	2132 IT managers
2139 Information technology and telecommunications professionals n.e.c	2135 Cyber security professionals
	2136 IT quality and testing professionals
	2137 IT network professionals
	2139 Information technology professionals n.e.c.
2137 Web design and development professionals	214 Web and multimedia design professionals 2141 Web design professionals
Major group 3	
3131 IT operations technicians	3131 IT operations technicians
	3133 Database administrators and web content technicians[1]
3421 Graphic designers	2142 Graphic and multimedia designers
3563 Vocational and industrial trainers and instructors	3573 Information technology trainers

Source: Office of National Statistics (ONS). New Figure. Shift Figure numbers from this point accordingly.

All of these recommendations must take into account, however, the fact that the statistics are only as good as the source they come from. The huge gaps in data across different regions in the UK restrict the analysis that can be done and limits the ability to estimate the overall population changes to the workforce in the UK.

Top findings from the survey and interviews

1. Women are more likely than men to re-train for a job in Tech

Working in a technology role requires a constant need to learn and understand new technologies and coding languages – it is an ever-evolving sector. 46% of survey respondents stated that they have taken additional qualifications to get into their current role. 74% of those said they had taken a course to add to their existing skillset. The remaining 26% said that they had reskilled into their current role (**Figure 5**).

Upskilling was defined as building on previous experience/complementing current skills and reskilling (or re-training) was defined as training into a new area of expertise.

We can investigate further into whether there are any differences between females and males in terms of whether they are reskilling or upskilling into their roles (**Figure 6**). Our research shows that, proportionately, females are twice as likely to reskill into a technology role compared to males.

We can also further break down the difference in upskilling/reskilling by age and seniority. It must be noted here that very few males from our dataset responded as reskilling, compared to a larger proportion of females. As a result, the following graphs represent just those who responded 'yes' to the question about taking additional qualifications. The results have not been weighted further to reduce any overestimations.

The results clearly show when results are split by gender and age as well as the qualification type, that those who have upskilled follow the general survey population trend for age – both male and female, however those who reskilled are predominately female in the age range 25 – 44 and do not follow the age trend so closely.

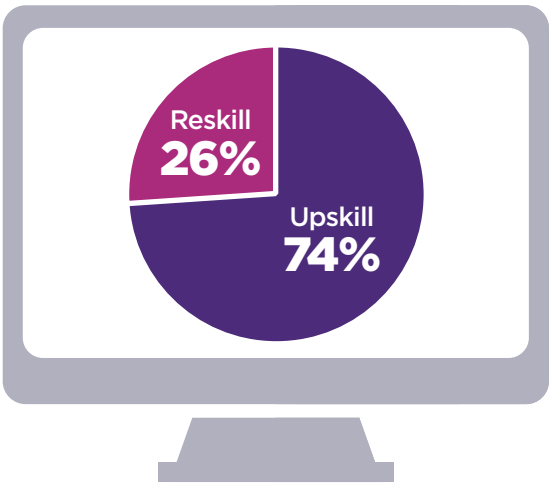


Figure 5: Proportion of respondents who had taken additional qualifications split by whether they had reskilled or re-trained

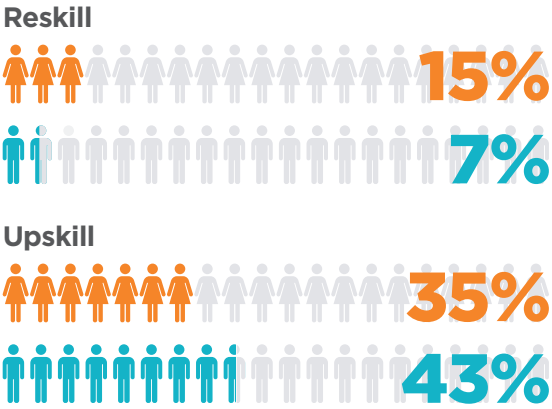
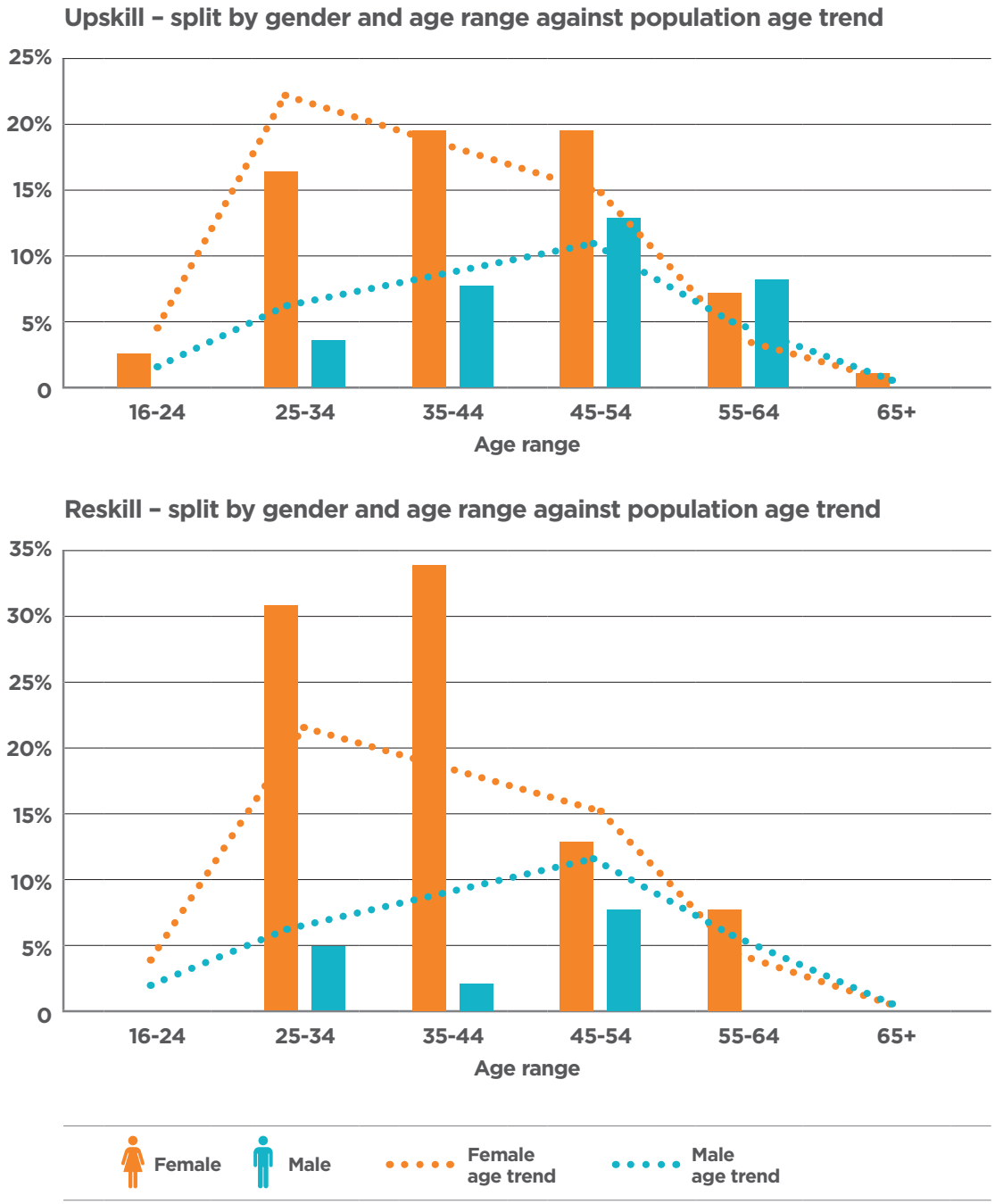


Figure 6: Proportion of respondents who had taken additional qualifications split by gender and training qualification type (reskill / upskill).

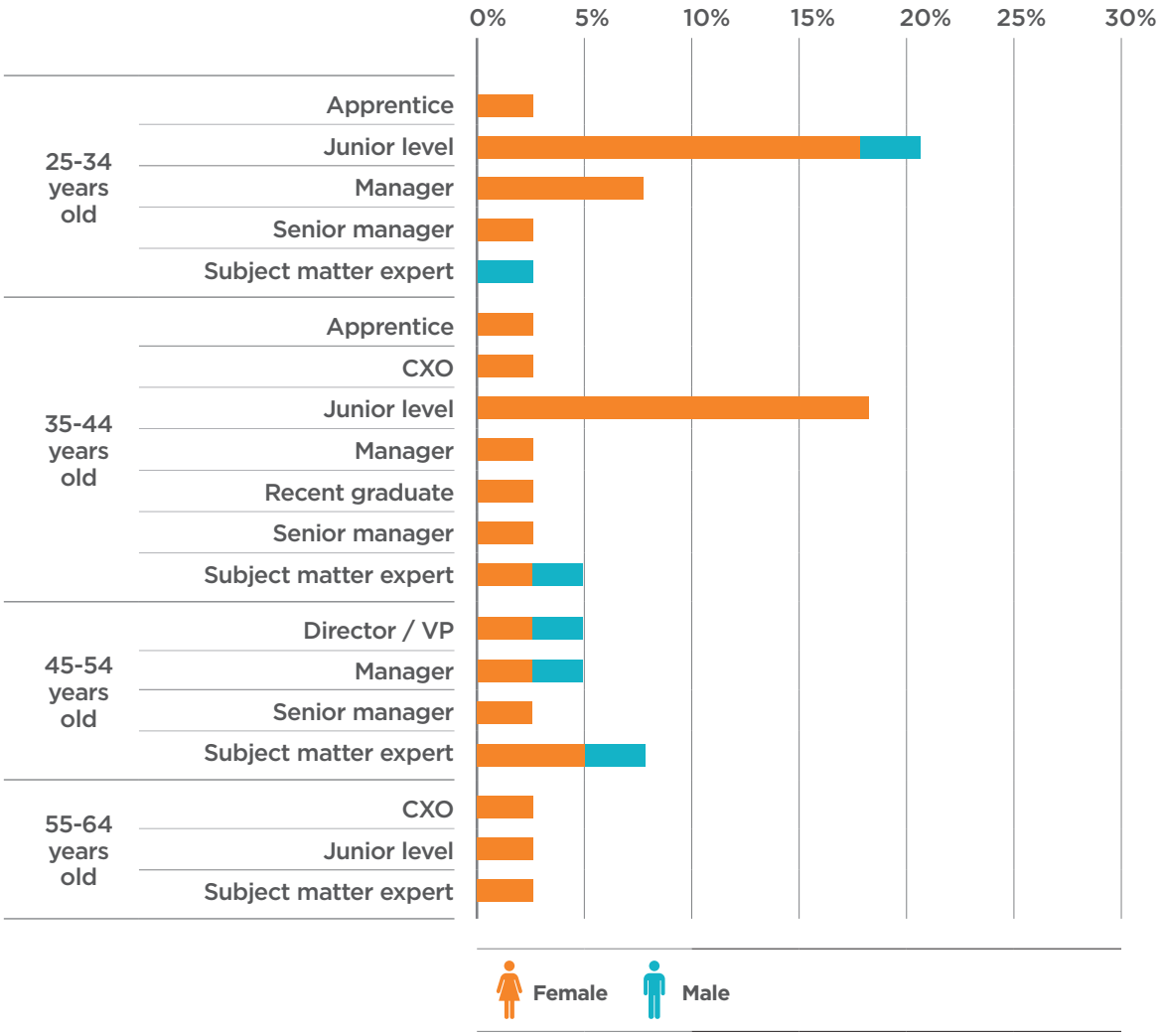
"I would say, men are more determined in their approach to their tech careers. I think women are less focused on that."

Figure 7: Proportion of respondents who had taken additional qualifications split by gender, age and training qualification type (reskill / upskill).



Looking in more depth at those females who reskilled and the seniority of the roles they currently occupy, we can see that the majority (38%) are currently working at a junior level within their organisations (**Figure 8**).

Figure 8: Proportion of respondents who had reskilled split by gender, age and seniority in their current role.

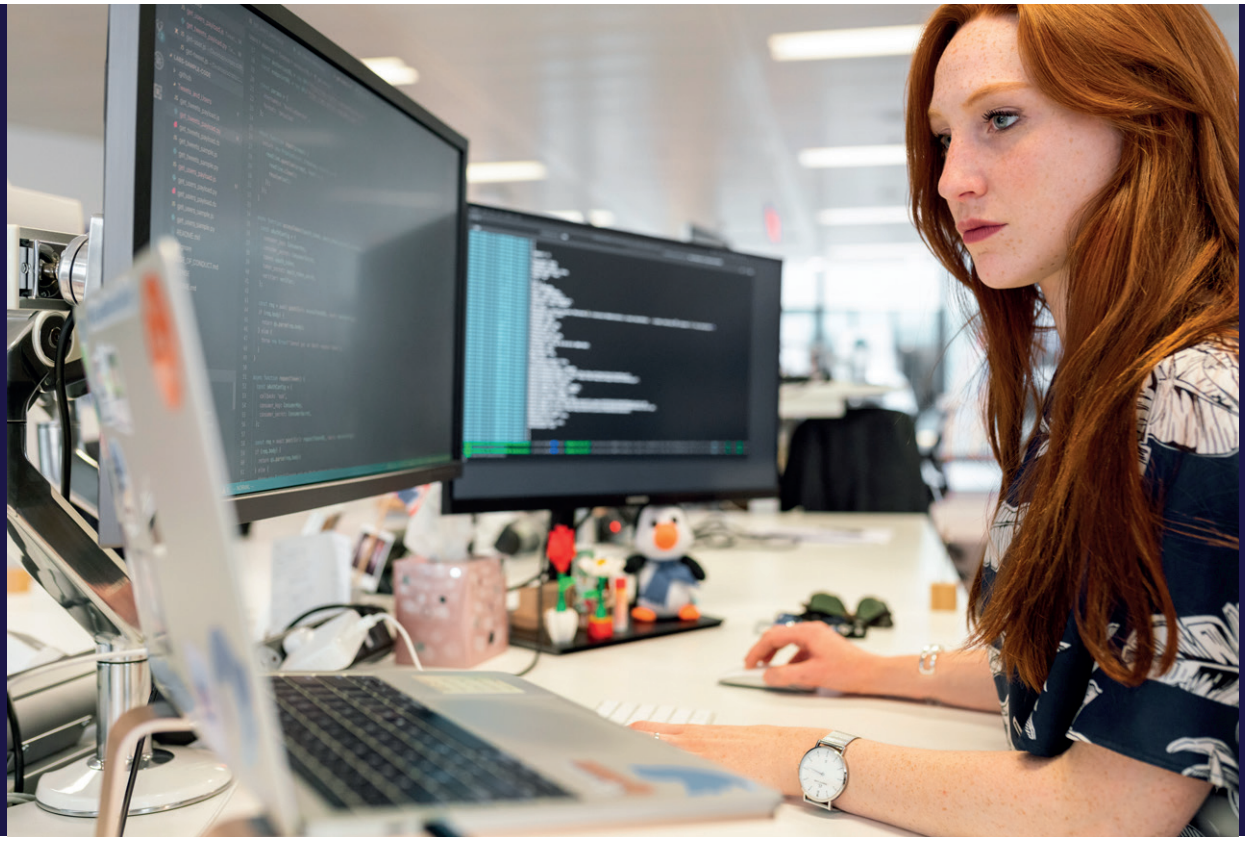


It is heartening to see that increasingly women are seeing the potential and opportunities available in the sector and training into new careers. These finding correlate well with the qualitative data gathered during the interviews in which many of our interviewees confirmed that women were less likely to deliberately contemplate entering a Tech career straight from school or college but were likely to re-train into the sector at a later point in their career.

Many of our contributors also talked about the continued presence of media stereotypes and societal pressures causing young women to presume a career in Tech is just for men.

"I would say it took a couple of years for me to realise that it was something I could actually do, because I always thought of working in Tech as, you know, hacking the mainframe and 20 screens and everything you see on the films – I didn't think that it could possibly be for me. How could I do it? But actually a lot of it is just the application of logic and common sense."

"There's a big misconception around tech jobs that you have to be a crazy clever maths or science genius to get in. The key skills I really use from my science degree are my problem solving skills; my analytical thinking. It's nothing technical, I don't use my fluid mechanics, or any other technical knowledge."



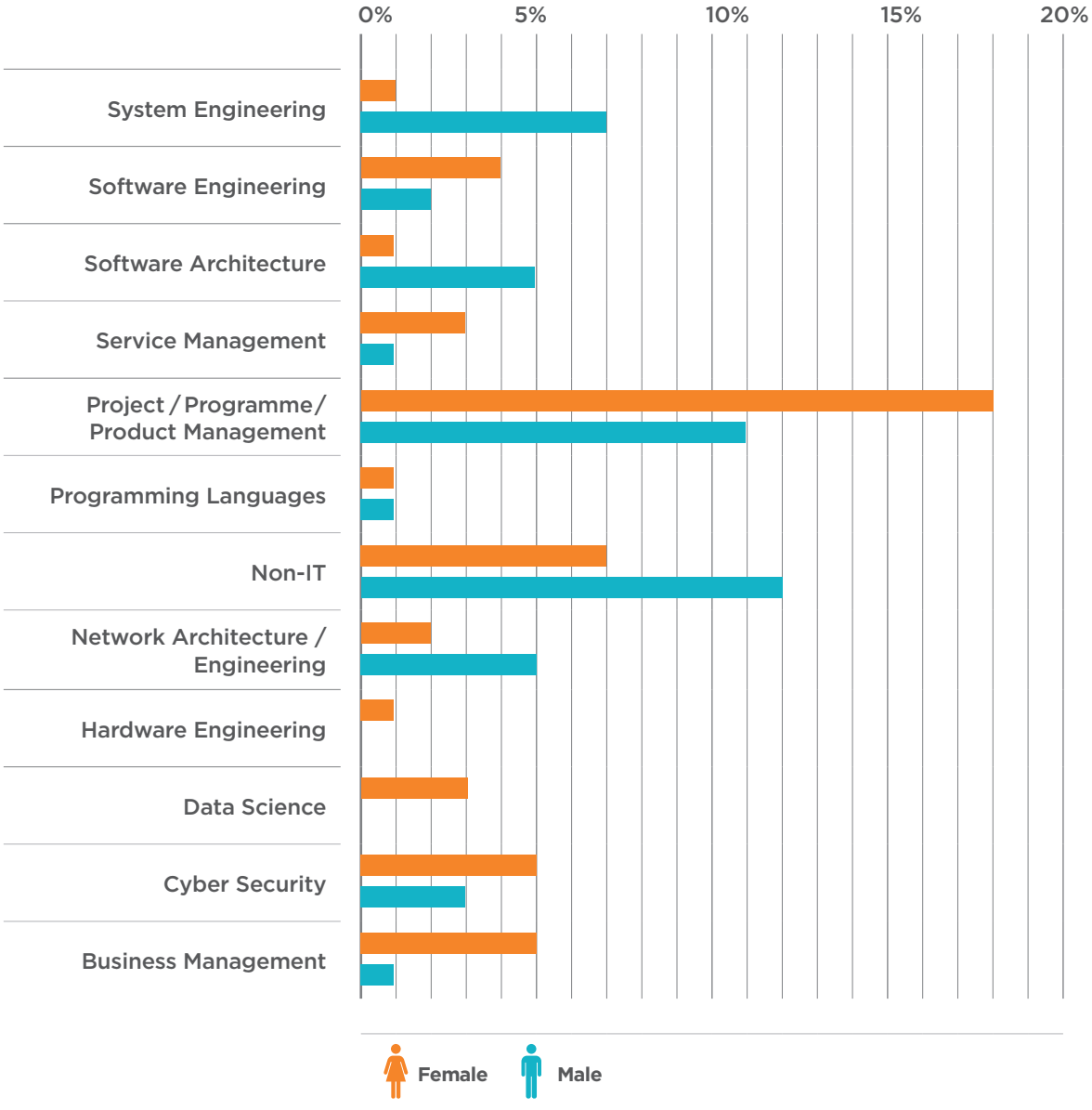
2. There remains a gender imbalance in the careers chosen by men and women

The constant and fast pace of change in the IT and Tech industry means that all those involved in a technology role need to retrain regularly. This can take the form of upskilling or retraining.

Qualitative data gathered during the interviews confirmed that there is some evidence that females and males are choosing different career paths through the subjects they take additional qualifications in (**Figure 9**).

Males, on average, showed evidence of choosing qualifications which increased their technical career skills (advanced programming and enterprise architecture) while females appear to be choosing to upskill into roles that required transferrable skills, such as product management or data analysis roles.

Figure 9: Proportion of respondents who had reskilled split by gender, age and seniority in their current role.



This finding raises the prospect of another gender divide in tech in the future. Although the number of women moving into the tech workforce is growing, the number of women doing highly technical programming or coding jobs will not significantly increase to match demand without continued encouragement and educational impact from schools, colleges, universities and organisations for girls and women to learn how to code from a younger age.

Many of the female interviewees who had re-trained into a Tech career commented that it was very difficult to transition into another career later in life. The move from a senior position to a junior role, the fact that very few tech jobs are advertised as part-time or true flexible working, all contribute to a reluctance to move jobs. The fact that it takes a lot of time to maintain coding knowledge and stay abreast of the latest developments in the extremely fast-moving tech sector also contributes to a reluctance to move into very technical roles.

"I get told quite a lot that my technical skills aren't quite up to scratch. What they mean is my technical skills aren't as developed as my other business skills, but I've had 20 years of another career."

Coding bootcamps tend to run over a few short weeks and are often considered a 'fast track' into well-paying tech jobs. They benefit from lower tuition costs, shorter class times, and a practical learning curriculum. Two of our female interviewees were employed as full-time programmers after participating in a bootcamp, and research shows the format suits women well. Data collected during a project with the Institute of Coding (IoC) found female participation in such schemes was over 50% (compared with an average of 36% for more traditional courses).

"What I've observed is the men tend to want to stay technical – my male colleagues are more obsessed with being super technical and knowing in depth code, whereas women seem to be more attracted to DevOps or data science – you need to understand the code but you don't have to be sitting coding every day."

"I have seen more women wanting to work in Artificial Intelligence [AI] *because there have been some issues raised around the ethics and bias of AI. Machines like Siri and Alexa tend to be trained by men and don't think about the issues women have. In the past year or two, this has really come into the public eye and there are a lot of women who want to make change."*

3. Females prefer studying part-time

Looking at the delivery methods of additional courses taken by all survey respondents, the majority (60%) of participants opted for a part-time course, 24% a mixture of full-time and part-time, and just 16% opted for a full-time course. Splitting the data by gender (**Figure 10**) shows that females are a third more likely to have taken a part-time course compared to males.

Looking just at those who took an additional course and splitting the data further by age, delivery method and gender (**Figure 11**), it becomes even more evident that the majority of females responding did their training part-time and are aged from 25 to 54 years of age – this does roughly reflect the ratios of females who took part in the survey, however, the data could equally be inferred to reflect the fact that this is the age group most likely to have other interests and responsibilities as well.

Figure 10: Delivery method of course, split by gender – all respondents (weighted)

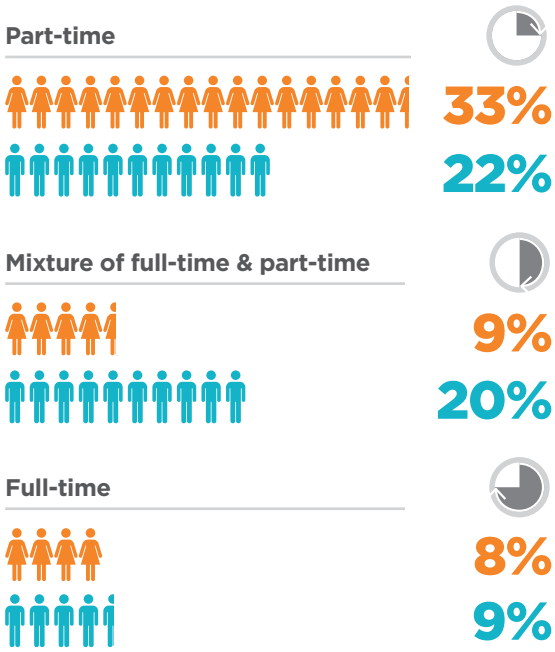
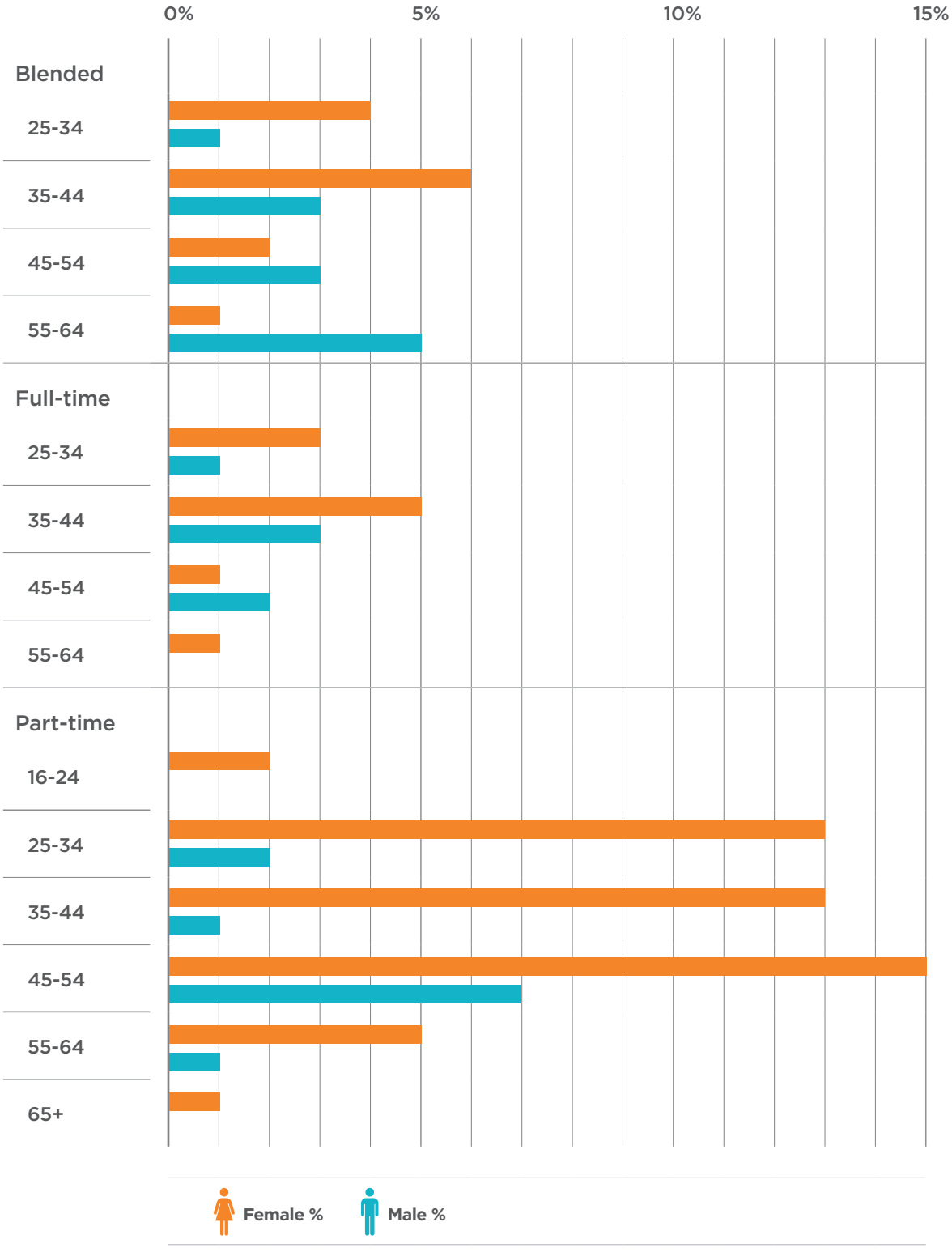
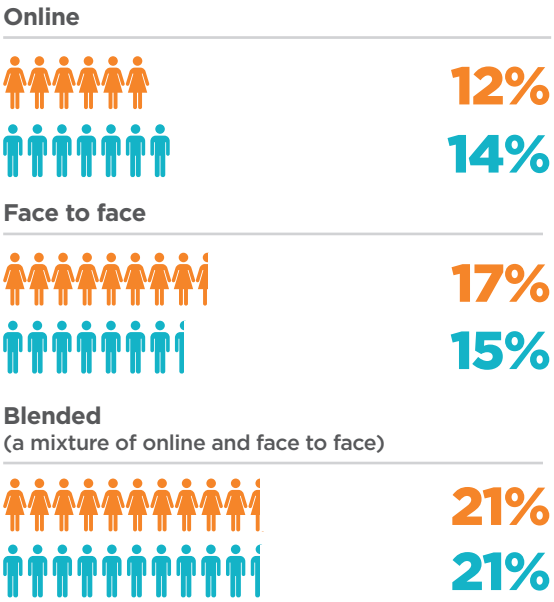


Figure 11: Delivery method of course, split by gender and age – all respondents.
Note that this data is not weighted and reflects the direct ratios of the respondents.



We asked respondents whether the course they had taken was online, face to face or blended (a mixture of the two) (**Figure 12**). Blended courses were the most popular, followed by face to face and then online. There was very little gender difference in the answers indicating that there is no specific preference for the physical location of the courses.

Figure 12: Delivery method of course, split by gender and age – all respondents. Data is weighted.

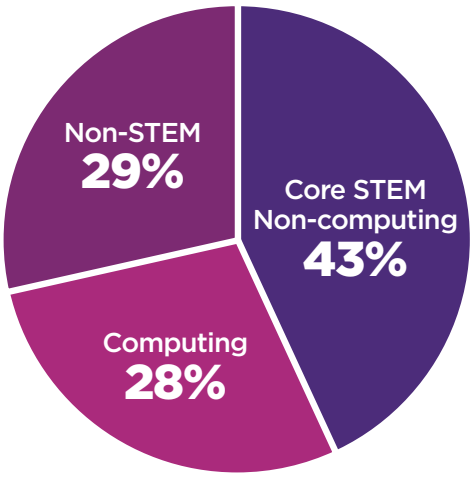


4. You don't need a Computing undergraduate degree to work in a digital skills role

WISE Tech Survey found respondents working in technology roles had a wide range of educational backgrounds and this was reiterated by our remarkably diverse interviewee group. Although a significant majority had studied computing or STEM, a significant minority (around 30%) studied non-STEM subjects at undergraduate level including environmental planning, radio broadcasting, marketing, criminology, accounting and more.

This illustrates that despite the stereotypical reputation portrayed in popular media and an external lack of understanding of the jobs available within the sector, once you are aware of the possibilities available to you, the tech workforce is fully capable of absorbing, encouraging and making use of a diverse range of employees from a wide range of backgrounds.

Figure 13: Undergraduate subjects grouped by academic discipline – all respondents



Of the participating survey respondents (**Figure 13**), 87% had undertaken an undergraduate degree. Degree topics were grouped by academic subject and varied from Computer Science to Engineering,

Physics, Chemistry and Mathematics, to Arts/Humanities and English/Languages.

Looking at individual subjects, the top responses in the survey were Computer Science (21.4%) followed by Engineering (15.9%) and Arts/Humanities/Geography (14%).

72% of our survey respondents had not completed an undergraduate degree within Computing and almost a third of the respondents did not hold a STEM undergraduate degree of any kind.

Grouping the subjects helped us understand more about the most common academic disciplines of survey respondents. We grouped all respondents into Computing, Core STEM* (excluding Computing) and Non-STEM subjects. Computing in this case was defined as a degree including Computer Science, Coding, Data Science, or Information Technology; we also included those who took a combined degree including a form of Computing.

The data clearly shows that a degree in Computing is far from compulsory for a career in tech – and this was reiterated by the interviews. Many interviewees said that the problem-solving skills accrued when studying a Core STEM subject are invaluable within the tech industry. They also confirmed that the way you think and approach your work is more important than the subject studied at undergraduate level. This is reflected by the fact that the third largest single subject response for undergraduate degrees came from those who had taken an Arts and Humanities degree.

"A key skill required for the tech industry is thinking logically, analytically, and being able to problem solve."

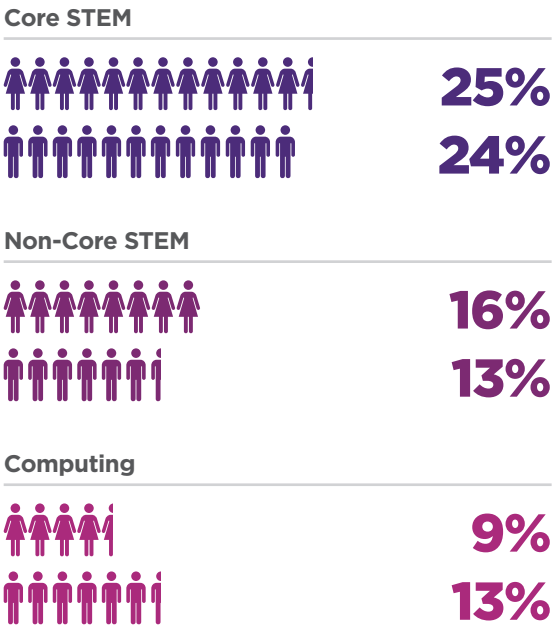
"Some engineering skills are useful for a career in tech: First it's important to know what you don't know and second, the design and development principles learnt in engineering can be applied to the construction of software systems."

* Core STEM subjects include: Physics, Maths, Further Maths, Chemistry, Biology, Computing, ICT, Design & Technology and Other Sciences.

When undergraduate disciplines were grouped in into Core STEM, Non-Core STEM and Computing and split by gender (**Figure 14**), the data showed that males were more likely to study a Computing undergraduate degree (13% compared to 9% of females), while more females were more likely to study a degree subject outside Core STEM (16% compared to 13% of males) and move into the tech industry later in their career.

Undergraduate degree data was also split further by individual subjects to assess whether there were significant differences in the subjects studied at undergraduate level between men and women. It was found that men were almost 50% more likely to take a Computer Science or Information Technology undergraduate degree than women but there were minimal differences for most other subjects.

Figure 14: Undergraduate subjects grouped by academic discipline and gender



"As long as people are willing to learn, it doesn't matter if you're not technical – you can find a place that suits you."

"There were 6 women out of 100 people on my Computing degree at university. That said, I've never had performance concerns about a female developer – I guess they're learning their skills elsewhere."

Case study

Damien McCloud

Associate Director in Advanced Digital Engineering, Arup

"We're often looking for qualifications that don't yet exist."

Damien McCloud, Associate Director in the Advanced Digital Engineering Department at Arup, specialises in geospatial and Geographical Information Systems (GIS) and has an additional role as a global digital skills network leader. As such, he has some strong opinions on recruitment and believes some of the best tech workers come from non-traditional backgrounds.

He said: *"Women looking to shift to a career in tech can feel they aren't qualified, but the sector is changing so much that we're often looking for qualifications that don't yet exist. There is no chartership for AI, machine learning or cloud engineering, for example. Frankly we need to get out of the habit of recruiting on this basis."*

He explained that a Python developer who has a lot of experience coding as a hobby and having never worked in a corporate environment might be significantly better suited to a coding job than a graduate with a little bit of experience. "*Unfortunately, many employers won't touch the former because they don't have a degree."*

Assessing CVs carefully is another important part of recruiting well, according to Damien, who sees this as a "a dark art". He said: "*We have a guy who studied a totally non-technical masters then did a 12-week coding course – he is one of our best Amazon stack engineers. We interviewed him because we knew the course but wouldn't have done so normally. His passion was clear from his CV even though he didn't have degree in computer science."*

Damien explained the male female split in GIS is around 50/50 – unlike traditional technology-based industries since most people come into the field with a degree in geography or environmental science and then specialise. He took a degree in geography himself, then a master's in GIS, but as he explained the field can be a gateway into web development, enterprise architecture, or digital product management.

Regarding training, Damien had to read up on big data, geo-data science and remote sensing himself since GIS technology is ever changing. The company also pays for training when it is required. In addition, Arup has a LinkedIn learning license and every individual has access to the full suite. The company also funds training time. Other online courses offered by Pluralsight, and Coursera are available too.

In terms of alternative training methods, the company operates 'Google Fridays' where staff are told to play with some project data as if they are redelivering the project. *"We're trying to be innovative and clever with how we train people"*, he said.

Recruiting diverse people into tech

Damien uses D&I recruitment practices that might be of interest to other employers in the D&I field. He posts on Mumsnet and other alternative jobs boards, assesses CVs on their merits; and is putting his new apprenticeship scheme through a male/female language assessor.

Damien is involved on a panel assisting with the creation of the new T-Levels qualifications (a technical form of A Levels). He sees such qualifications as a new way of recruiting more diverse candidates and Arup are looking at getting geo-spatial information into Level Two. This will mean staff who wouldn't normally have a chance to do a degree get to work for the company and gain valuable corporate experience.

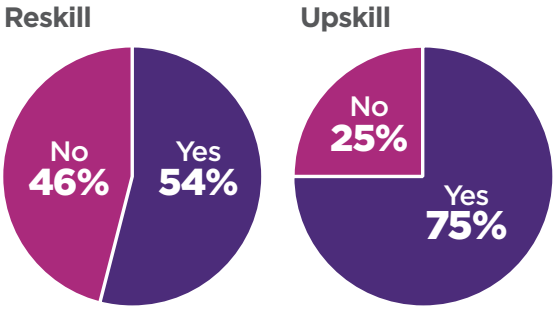
Damien also believes that apprenticeships are undervalued and underused. During several industry meetings on the subject, Damien said the conclusion was that *"apprenticeships are core to skills pivoting (using the same skills to move between sub-sectors) but the levy is being underused by big companies like Arup. One way of tackling this would be for the apprenticeship levy to be paid to a company for pivot training, rather than full apprenticeships.*

5. Companies are providing their own internal academies to keep staff current with new skills

Technology is evolving at an unprecedented rate and recruiting staff with the right skills is one of the biggest challenges currently faced by tech employers. Companies need trained staff and quickly, but as our research demonstrates, the education system is struggling to keep up with candidates that have the right coding and corporate experience.

Organisations are increasingly investing time and money into their staff by training them internally to build upon skillsets and retain or retrain them into Tech roles. Elsewhere, industry specialists like Matthew Applegate are finding ways to teach technology that appeal as much to girls as boys.

Figure 15: Did your employer provide your training?



Of the courses taken by our survey respondents, 75% of those enabling upskilling were provided and paid for by the employer, whereas only 54% of those reskilling had their course paid for by their employer (**Figure 15**). This indicates that employees would rather pay to upskill their staff in their current area of employment, rather than re-train them into new roles.

In-house universities

In some cases, in-house training has led to the development of full-blown universities. Some are more well known, such as Google's Googleplex and Intel's Network Builders, but other companies have also invested in additional training academies to contribute significantly to the sector's knowledge and skills base. For example, employee-owned engineering and technology company, Arup, has been running its own university for 10 years. The faculty works as an information resource, a training centre, and a way of ensuring staff use the same language around emerging concepts.

The university also has a 'foresight horizons' research function. This looks at the company's future business needs as well as market trends and opportunities. In recent years, the agenda has included machine learning and artificial intelligence, as well as 'safe' smart city lighting using mobile data. The university collaborates with other institutions such as the research council and Cambridge University.

Arup University Director for UKIMEA, Florence Lam, says that the company looks for staff from a diverse range of personal and educational backgrounds. *"The company recruits a broad selection of graduates, interns and apprentices which, together with in-house training and skills, help to create the innovative environment needed to tackle the most complex problems faced by the technology industry today."*

Capgemini also has an in-house university and research institute which regularly releases papers on cutting-edge subjects such as Climate AI, smart money and autonomous cars. Although some of the university's teaching programmes are

classroom based (at its Les Fontaines campus in France for example), many more are online. Since its inception in 2003, this corporate university has delivered programmes to 182,000 Capgemini employees via various methods including in-class and virtual lessons, online games and social learning platforms.

Employees are encouraged to use the resources to take on self-directed learning. In line with the drive to plug the skills gap and keep up with a fast-changing industry, the company aims to provide learning resources that are "just-in time, on-demand and in-context". New research is made available to employees, allowing them to pursue lines of enquiry that are relevant to their current or upcoming projects and strengthens the hypothesis that employees are upskilled by their current companies rather than encouraged to reskill.

Elsewhere, technical universities such as Cambridge Christ Church University (CCCU) have recognised the disconnect between tech education and business and are trying to bridge the gap themselves. CCCU's Edge Hub, a new STEM facility with a computer science department, was established in collaboration with the local tech and engineering industry and their business problems are given to the students to solve. Like Arup, CCCU wants a diverse student population, and the EDGE Hub has lower entry requirements onto tech courses than other universities (with students encouraged to take a catch-up first year where required).

The relationship between the tech workforce and education is evolving in interesting ways and this looks set to benefit women and others with less than traditional backgrounds.

Case study

The Creative Computing Club

Commentators have long argued that a new approach to education is required, and Matthew Applegate's Creative Computing Club is just that. Formed in 2012, the school teaches children aged 8-16, of whom 47% are girls. It has schooled 2,000 kids in 9 years and all its GCSE entrants have received a grade A or higher.

Pupil numbers doubled as a result of online teaching during the pandemic and courses are now taught both nationally and internationally. The club has strong links with the games industry and government and its tech-savvy students are eagerly snapped up by employers once they are old enough to work. In short, clubs like this are helping to create that desperately needed supply of technology-ready girls and boys.

After an initial exposure to computing at an American high school (Apple had donated Macs to schools as part of its bid to become the computer of choice for the education sector), Matthew moved to the UK as a teenager without his computer and found school more difficult. He was told he wasn't clever and would probably end up working in a supermarket – this understandably knocked his confidence. However, the internet gave him access to the gaming community and he became adept at hacking programmes.

"I was just tinkering, trying to understand how the systems worked. I was driven by curiosity," he said. He was spotted by Rewired State, an organisation that found innovative uses for government data, and quickly moved into a leadership position. Matthew was involved in projects at the very highest level of government, and has since been awarded a Masters degree in education from Cambridge University. A natural teacher, Applegate wants all children regardless of gender, to have access to the opportunities he very nearly didn't have.

Matthew argues that the traditional education system fails on two fronts. First, it knocks the enthusiasm for tech out of girls. Girls and boys at primary school are equally interested in the subject, but this drops at GCSE, still further at A-level, and by university the number of females taking Computer science is very low, just 16.2% in 2020 according to the British Computing Society. A father of two daughters, Matthew wanted to address this imbalance. His methods have included teaching them young – the club's intake is 8-16 years old; holding more and smaller classes; ensuring girls are in all marketing images; and providing exposure to female tech role models.

Second, the system fails to inspire children generally, this ultimately feeds into the wider skills gap in the tech workforce. Matthew says: *"The school system is falling apart in terms of technology teaching. You'll find most IT teachers are the ex-geography or sports science teacher and they just happen to be good with a computer. Teachers like this are only ever going to do surface level stuff. And why on earth would a computer scientist or app developer go into teaching in a school anyway? The pay's really bad and the career as a whole in the UK is oddly frowned upon. Teachers are seen as low status. It just isn't the same in other countries, like Japan for example."*

Another problem is the boring GCSE curriculum. *"It is dry, textbook driven and abstract. It doesn't provide real world examples,"* Matthew explains. The Creative Computing Club teaches the same 2-year GCSE curriculum in 9 months using applied examples.

The club pairs teachers, who have strong communication skills, with technologists conducting exciting industry-related work. This team create and teach classes together.

Topics include the Internet of Things, Big Data, Cloud Computing, Robots, VR and AR, AI, Smart Sensors, Cybersecurity and Renewable Energy. Each module lasts for 6-8 weeks. At the end of every half term Matthew and other teachers will consult with the children on what they want to learn next.

"We link real world problems to these exponentials, so we were looking at Big Data when the Cambridge Analytica scandal broke for example. We don't want provide the kids with legacy information that is of no use to them."

6. Transferrable Skills and Alternative Routes into Tech Careers are increasingly valued by Employers

Around half of our interviewees arrived into their tech career via a non-traditional route, by either re-training or using existing skills. Many commented on the fact that their original (often non-STEM qualifications) had given them useful competencies. Among the most valued were communication, leadership, logic and data analysis, creative problem solving and an enthusiasm for learning.

The majority of interviewees said that being able to understand and communicate technical requirements was a more important element of their day-to-day work than technical programming or coding.

Many reported experiencing a lack of understanding around what exactly a job in 'Tech' meant. They felt that Tech jobs were traditionally stereotyped and that careers advice in schools provided no clarification. Prior to entering the sector, several people remarked that they had not known that technology jobs would be available to people from such a wide range of backgrounds.

WISE strongly recommends that the careers advice in all educational establishments must showcase the wide range of jobs available and companies must be prepared to be more flexible in their recruitment strategies if they wish to attract more girls and women into the sector.

"I was able to communicate and solve technical requirements needed on the project with people who were not necessarily technical. Not everyone can be technical on the team so being able to communicate well is a great asset. The client needs to know what you're doing what you're building for them what the application does."

"Soft skills put you head and shoulders above people that you work with. I guess the ability to organise work yourself is important too."

Case study

Roxane Heaton

Digital Director, Morrisons

"My team knew they could trust me since I had their back, and in turn they helped me learn."

Roxane's route into technology was not altogether conventional and her success could easily be attributed to the many transferrable skills she learned prior to taking her current position. She says her key skills include integrity, honesty, impartiality and an ability to communicate. Roxane learnt much about the technical aspect of her work by asking questions of a team that she works hard to support and develop. She explains that this two-way relationship has been key to her success: *"My team know they can trust me since I totally have their back, and in turn they support and help me learn."*

A charismatic and seemingly confident person, Roxane has an open approach to starting a new career or project. This will undoubtedly have helped her progress in technology, since not being willing to "have a go" can be a disadvantage in a career that requires constant learning and upskilling.

Roxane attributes her confidence to attending an all-girls' boarding school, where she was taught that "the world was her oyster". Roxane's parents are scientists, instilling a passion for air shows and planes when she was little, and after studying Maths, Physics and Geography at A-Level, she won a place to study aeronautical engineering at Bristol University.

However, post university she changed tack and took a position as engineering training manager with the Royal Navy. After a couple if years of work, the organisation funded a MSc in defence simulation modelling which helped Roxane advise on synthetics work on automation. The MSc also acted as the critical 'upskilling' bridge between engineering and the digital world, and she moved into a new role as Deputy Chief Technology Officer at the UK Hydrographic Office, the only trading fund of the Civil Service, before moving to Morrisons where she became Head of Technology and later digital director.

The first role with Morrisons required running the online business and the technology that interfaced with Ocado, as well as overseeing software developers, testers and enterprise architects. Roxane's move into tech management aligns with one of the patterns to come out of our research, that women in technology tend to go into management. It had its own technical aspects, though, as Roxane explains: *"when sales transactions went wrong in the middle of the night, I needed to be able to understand why, and who to go for the relevant artefacts such as technical drawings or documentation."* It was Roxane's role to facilitate the conversations through to resolution.

Roxane set about teaching herself some of the basics on retail and delivering interfaces to clients – she did this by asking questions of her team. Roxane also completed an MBA which helped her get up to speed with profit and loss and ratio management and other practices required for her job. Roxane started a new role as CIO of MacMillan Cancer Research in September 2021.

Case study

Trudy Norris-Grey

Chair, WISE

"My creative streak meant I could see how the technology might benefit a customer and fix their problems".

Trudy Norris-Grey has had an impressive career. She worked as managing director (MD) of several leading companies, notably Microsoft, where she was global head of the smart cities division based in Seattle, and BT where she was MD of strategy and transformation. Trudy is currently Chair of UCAS and the WISE Board and uses insights gained during her time as a senior tech leader to help encourage girls and women to pursue a career in tech and shift the gender balance in the industry.

Like many very successful women in technology, her route into the industry was unconventional. Originally from Swansea in South Wales and one of eight children, her first position was as an accountant. It was in this capacity that she took a job for Vodafone and then DEC it wasn't long before her line manager spotted her people skills and suggested she go into sales.

Trudy was quick to learn about the products and how they might fit within a business. This helped her achieve the numbers she needed to be successful. *"My creative streak meant I could see how technology might benefit a customer and fix their problems,"* she says. Trudy delivered consistent results and was promoted, a pattern continued until she was managing entire teams and organisations.

Taking pride in doing a good job and her experience as a parent were two key ingredients to Trudy's success. *"I wanted the best for my children. They learn to walk and you hold their hand and then you want them to run. I took this attitude into work. I genuinely wanted my team to succeed. I was told that that's what set me apart and I think it's true,"* she says. Trudy pushed her team because she saw their potential to do more and better – this created a camaraderie which led to successful sales and good customer relationships.

In terms of training, much of Trudy's was self-directed. She knew she needed to be up to date on new technologies, and although this meant she worked more than her contractual hours she felt this was a price worth paying.

She argues that tech companies are looking for a number of skills and that many of them are not technology related. Being able to solve problems is key, as is the creativity that goes along with this. Other essential and transferable skills are resourcefulness and the need to be conscious of being aware of what one doesn't know, as well as a propensity to go and find the answers.

She adds: *"Girls and women need to know that working in technology is interesting and it pays really well. They just need to enjoy learning and be able to deliver results."*

Recommendations

1. Employers must reduce the barriers to entry for new workforce entrants from non-computing backgrounds looking to re-train

A key finding of this report has been that the speed of change faced by the technology workforce can prevent people retraining into it. This is particularly true for people coming from a non-computing background. The steep learning curve and time required to bring skills up to speed may discourage women who might otherwise consider moving careers.

To overcome this barrier to entry, organisations must recruit new employees by offering structured support, free access to courses, time to learn and assistance from experienced staff. Provision of a mentor or an experienced professional to help with career development and provide guidance is highly recommended.

Companies such as Sky and Accenture use bootcamps to hire women looking to re-train into a technology role, but again care must be taken to ensure that those who graduate from these courses into a tech role are given support as well as time and space to continue their learning.

"Networking and building relationships is very important when looking to change industries. Everyone should have a mentor no matter what stage of their career and remember that it's never too late to change."

2. Increase emphasis on skills, not qualifications, in job adverts

Companies can do more to recruit women into the tech workforce by reassessing their recruitment practices. Many of our interviewees where insistent that there was little need for computing qualifications for the majority of roles in the workforce. This was reinforced by the large number of WISE survey respondents who entered a tech career without a computing degree.

Within job adverts and recruitment processes, there should be greater emphasis on transferable skills (such as problem solving and communication), rather than technical qualifications and experience which can be learnt on the job.

Recruiting managers should also review job adverts to ensure they are appropriate for the role required. They must be careful not to just recruit in the image of people that have previously worked for the company.

WISE works closely with STEM organisations to improve their job adverts. Common errors include:

- Masculine coded language
- Long unreadable lists that are text and jargon heavy
- Too many industry acronyms without definitions
- Historical job adverts that do not represent what the job role currently is
- A focus on qualifications which are not essential for the role
- A list of essentials which are not essential and could be trained quickly in house
- A requirement for years of experience
- A lack of information about projects that will be worked on
- No emphasis on transferable skills

- No information about the companies' values, how they support the community/ environment and no details on benefits
- A lack of integration on diversity and inclusion

These mistakes are known to deter women and minority groups from applying for roles across traditionally male industries. WISE recommends speaking to individuals who are working or have worked in the roles for which they want recruits. This will help them define the necessary criteria for the role.

It is important to give internal staff the opportunity to challenge recruiters and agencies on the criteria, skills and attributes required for the job. WISE recommends breaking adverts down to only a few essential criteria and focusing on required skills where possible as opposed to qualifications.

"I don't tend to pay too much attention to formal education or how my developers learn their skills – its more about what they can demonstrate. We therefore have a practical element in our interviews. This helps people demonstrate skills rather than rely on qualifications."

3. Advertise career opportunities in unusual places to attract candidates for re-training and those who have been on career breaks

Organisations should actively recruit women into technology from a range of locations. This can be done by advertising roles on different websites that promote inclusive working and part-time hours (such as the WISE jobs board, Mumsnet, 923 Jobs and Timewise jobs).

Consider researching local women's groups and advertising roles on local social media. Promote re-training courses and part-time opportunities as well letting know candidates you are happy to consider job shares. Look at universities with STEM programmes that actively focus on diversity. Offer job experience and summer placements to university students.

Job adverts should be advertised well in advance of interviews to give candidates more time to search for the jobs and apply. Gender decoding tools such as Textio can be used to help screen out gender specific words – some organisations deliberately use a slightly more feminine tone to their job adverts. This attracts both women and more candidates overall.

4. Offer mentoring and coaching opportunities to develop and retain staff

Mentoring and coaching programmes can be a great way to showcase role models and opportunities within the digital skills sector to women currently working in different industries.

WISE is currently running a six-month Transferable Skills Mentoring Programme with Network Rail. The scheme pairs mentors from Network Rail with potential recruits – mid-career women – looking for insights into how their skills might help them move into a new sector. The project has been successful so far with many mentees actively applying for jobs within the rail industry, and many more reporting increased confidence as a result of the programme. This scheme could easily be replicated by other businesses wanting to help women move to a new role or career.

"The WISE & Network Rail Transferrable Skills Programme was a great opportunity to be matched with an external mentor from a different industry with extra support, input and training from WISE."

"In my workplace, we don't have a mentorship scheme of any sort right now. And I think that would make a huge difference, both for getting women into the business in the first place, but also retaining them later on down the line."

5. Employers must collaborate with educators to improve transferrable skills for new workforce entrants

According to a recent report from HESA[11], Computer science graduates have amongst the highest unemployment rates in the UK (6%) despite there being a huge demand for candidates with these skills. Many graduates report feeling that their universities and colleges don't prepare them for industry or provide the soft skills required to help them interact in the workplace.

The focus on theory means elements of their computer science education can quickly become obsolete in such a fast-moving sector, and a lack of practical examples relevant to modern corporate organisations can be a problem. Universities and schools need to improve their workplace skills earlier in the pipeline to ensure young people get the mix of transferrable skills needed to gain jobs in the first place. Colleges and universities also need to focus on building relationships with local industrial partners and working more collaboratively with industrial organisations to offer their students real-world experience in advance of joining the workforce.

Industrial partners also need to do their part in aiding students into the technology workforce by reviewing job requirements and barriers to entry. Asking for several years of industrial experience for a graduate job, requesting specific qualifications, insisting on specific coding languages and experience and using sector acronyms to describe the positions all contribute to failures to recruit graduates and career returners / re-trainers into technical roles.

11. www.hesa.ac.uk

6. Statistics datasets must account for new technology trends

For this survey, individuals were asked whether they were working within an information/communications technology role. At present, there is no consistent methodology of reporting; some publications quote the number of women working in Information Technology firms, others quote the number of women in tech roles as a total. Other datasets (including the ONS dataset used to define the workforce numbers for this research) quote occupations such as web designers, which are at the periphery of tech occupations and include them in the statistics quoted for technology roles.

Although a few regions, such as the UK and Scotland, have robust datasets there are significant gaps for either the total numbers or the data related to individual professions. Both the Wales and Northern Ireland data are particularly unreliable.

The ONS collects a broad range of other data relating to the UK workforce and there is the opportunity to request access to more complex datasets that could potentially provide insight into variables such as educational level of individuals and unemployment trends.

WISE recommends that there is a review of the classification of the positions defined as 'technology roles' within the tech workforce. Moving forwards, this will allow us to monitor gender imbalances in the positions chosen by men and women more accurately.

7. Increase the visibility of role models and careers advice

The number of women entering the tech workforce is promising, but more work needs to be done to encourage further awareness of careers within tech and what they can offer. High numbers of women are retraining – interest is rich, and WISE recommends that increased effort is put into increasing the visibility of women in the tech workforce.

One way of doing this is to increase understanding of the roles and opportunities available using role models. We recommend creating greater visibility of diverse people working in these positions by sharing their personal experiences and stories. This would increase awareness of opportunities within the sector. If a person sees someone like themself in a role, they are better able to envisage themselves following the same path.

Conclusion

The tech workforce is rapidly expanding, as are the numbers of people moving into tech jobs from other professions. There is a great deal to be positive about regarding the tech workforce since it already accommodates much diversity in background, experience and expertise. A large proportion of those working in tech have non-computing degrees and have instead retrained into the industry. This diversity in background is likely to create a virtuous circle going forwards since diverse workplaces will make tech jobs more attractive to staff from diverse backgrounds. Despite this, however, the number of women in the tech workforce remains stubbornly low and WISE recognises that there is still much work to be done.

Employers must look outside their traditional recruitment pool when hiring staff, perhaps by making use of networks and connections in other sectors. When hiring, organisations should look past qualifications and technical requirements where technical skills can be learnt on the job, and instead emphasise transferable skills such as communication and problem solving. Employers might also want to consider using bootcamps when taking on new staff or seek out apprenticeship graduates or those with T-levels – a technical qualification launched in September 2020.

Once staff are recruited, employers must provide them with the time it takes to keep up to speed with developments in technology since an inability to maintain and develop skills and knowledge will result in staff attrition.

Combined, these practices will help to promote a better gender balance in the tech workforce as our research shows that women are more likely to retrain into another career than men. However, there is one particularly tricky aspect of the gender imbalance within technology and this is that women tend not to retrain into the most technical roles such as systems engineering, systems architecture or other positions requiring a back-end understanding of the computing network. Arguably these roles do require a computer science degree or at the very least fairly lengthy in-house training. The move to the cloud and increased use of software versus hardware means that this traditional training is required less frequently than it once was, but it remains imperative that we continue to push for a better gender balance in traditional Computing education to achieve gender parity in these areas too. This push should run alongside the broadening of recruitment practices and the recognition of transferable skills.

This report's recommendations put most emphasis on retraining and recruitment practices, but to achieve change we need a joined-up push from employers recruiting for tech staff, education and training providers, and organisations like WISE. Collaboration will help us build on changes already happening within the tech workforce to create momentum and ensure more women get access to the many and varied opportunities available in technology.

Appendix

Report methodology

The aim of this research is to identify skills gaps lacking in current tech and digital technology training routes and to find out more about the routes employees have taken to get into a tech career (both traditional and non-traditional). We hope to help employers close the digital skills gap and increase the number of women who are training, upskilling, or re-training into a tech career.

Data for this report was collected using an online survey and individual interviews. The WISE Tech survey gave numerical measurements, allowing us to identify key themes which we explored in more detail during the interviews.

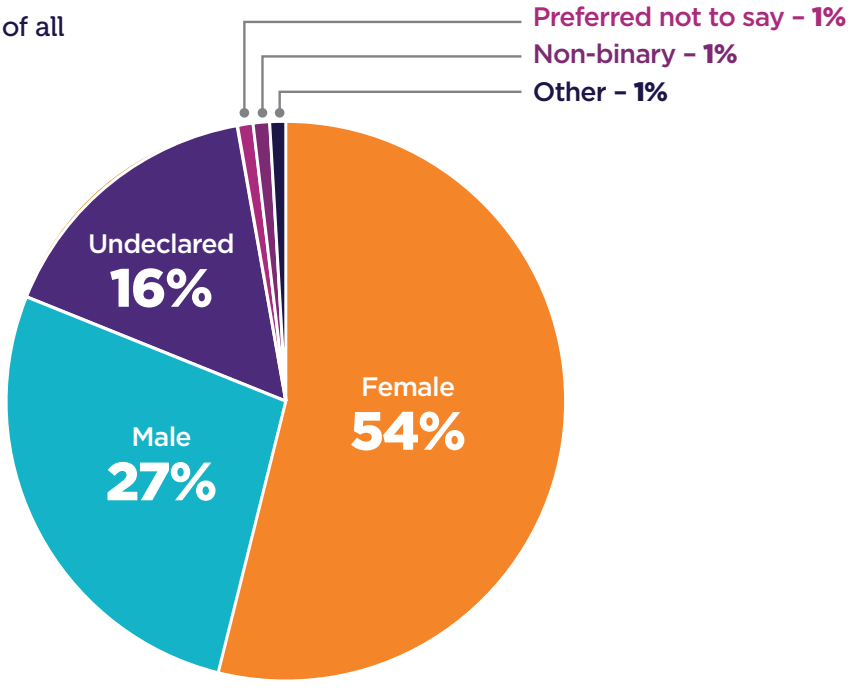
The WISE Tech survey consisted of 32 multiple choice questions – with free text boxes provided for any options marked as 'Other'. The survey was open from February-August 2021 to anybody working within an information/communications technology role. For the purposes of this research, respondents defined their own roles in the Tech workforce.

WISE received 646 survey respondents: 400 identified themselves as currently working in a valid role, a further 26, currently not working in the industry, wanted to pursue a career within the information/communications technology sector.

Demographic data was not a compulsory field for survey respondents and there were a number of respondents who chose not to declare their gender identity or preferred not to say. When we broke down our survey respondents by gender (**Figure 16**), 65% of those who gave a gender identity identified themselves as female, 33% as male, 1% as non-binary and 1% as other. It was not a surprise that we reached a disproportionate number of females since we recruited many survey respondents via our newsletters, social media and through WISE member organisations.

To fairly compare male and female experiences, in many graphs, we have extrapolated the data to weight responses evenly throughout this report. This was

Figure 16: Gender split of all survey respondents



only done when we had sufficient answers to justify a trend within the results. It is noted when this is not the case. As we received so few responses from those who identified as 'Non-binary' or 'Other' and were unable to identify any gender correlations from those that did not wish to declare their gender or did not complete the demographic section, we have not extrapolated any data from these responses.

Care must be taken when considering the results of this survey as it is not a typical representation of the Tech workforce (according to the latest Office of National Statistics (ONS) data (2021), women make up just 18% of the Tech Workforce). However, this dataset can be used as a guide for current, potential and emerging trends, particularly in relation to gender balance and the views of women working or looking to find work in a digital skills role.

A broad range of age groups completed the survey (**Figure 17**). The majority of respondents (69%) fell within the 25-54 age bracket. WISE is heartened that our survey showed a growing number of younger females working in tech roles via both a traditional STEM education and after re-training.

Although this trend is perhaps unsurprising given that the digital skills workforce is expanding so rapidly, we

Figure 17: Age split of survey respondents

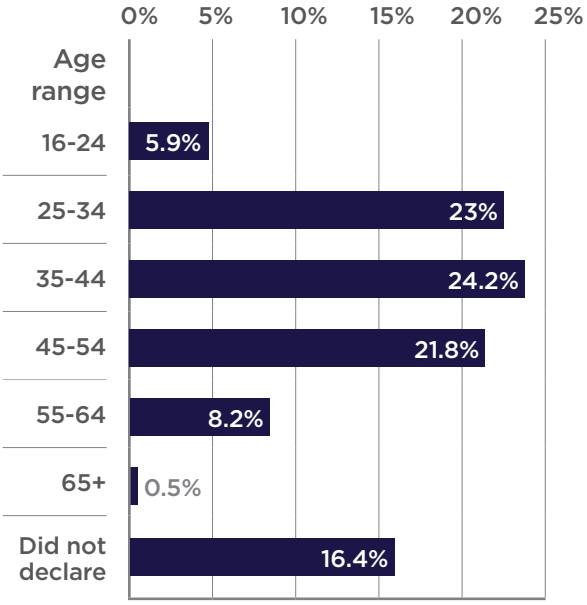
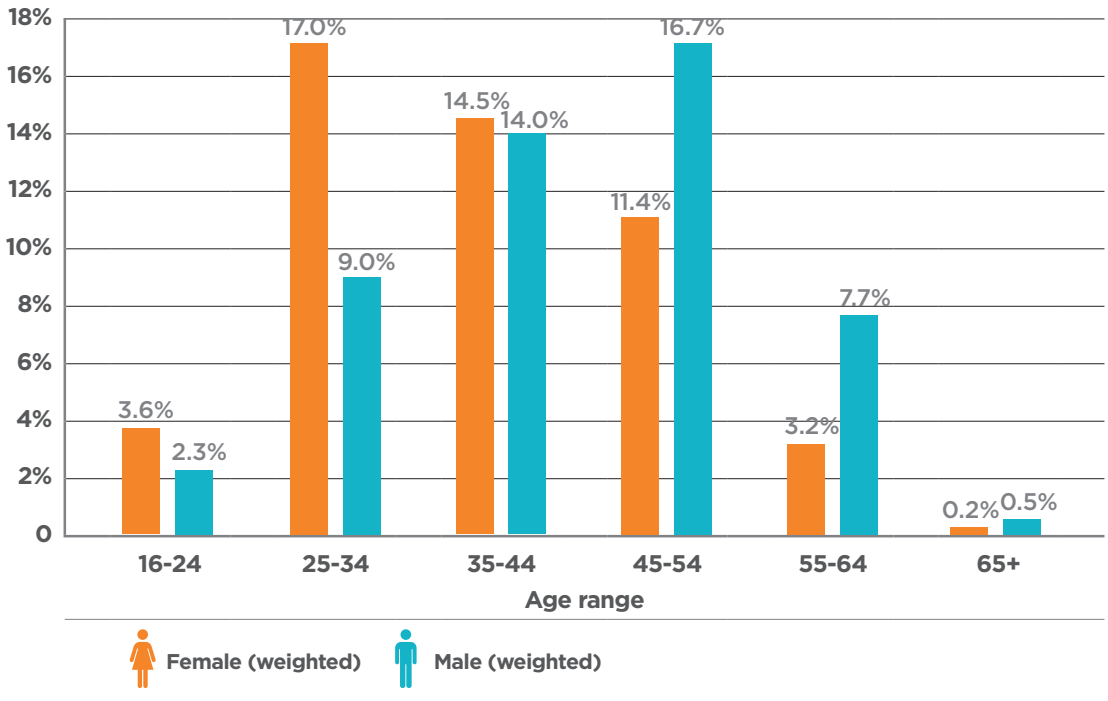


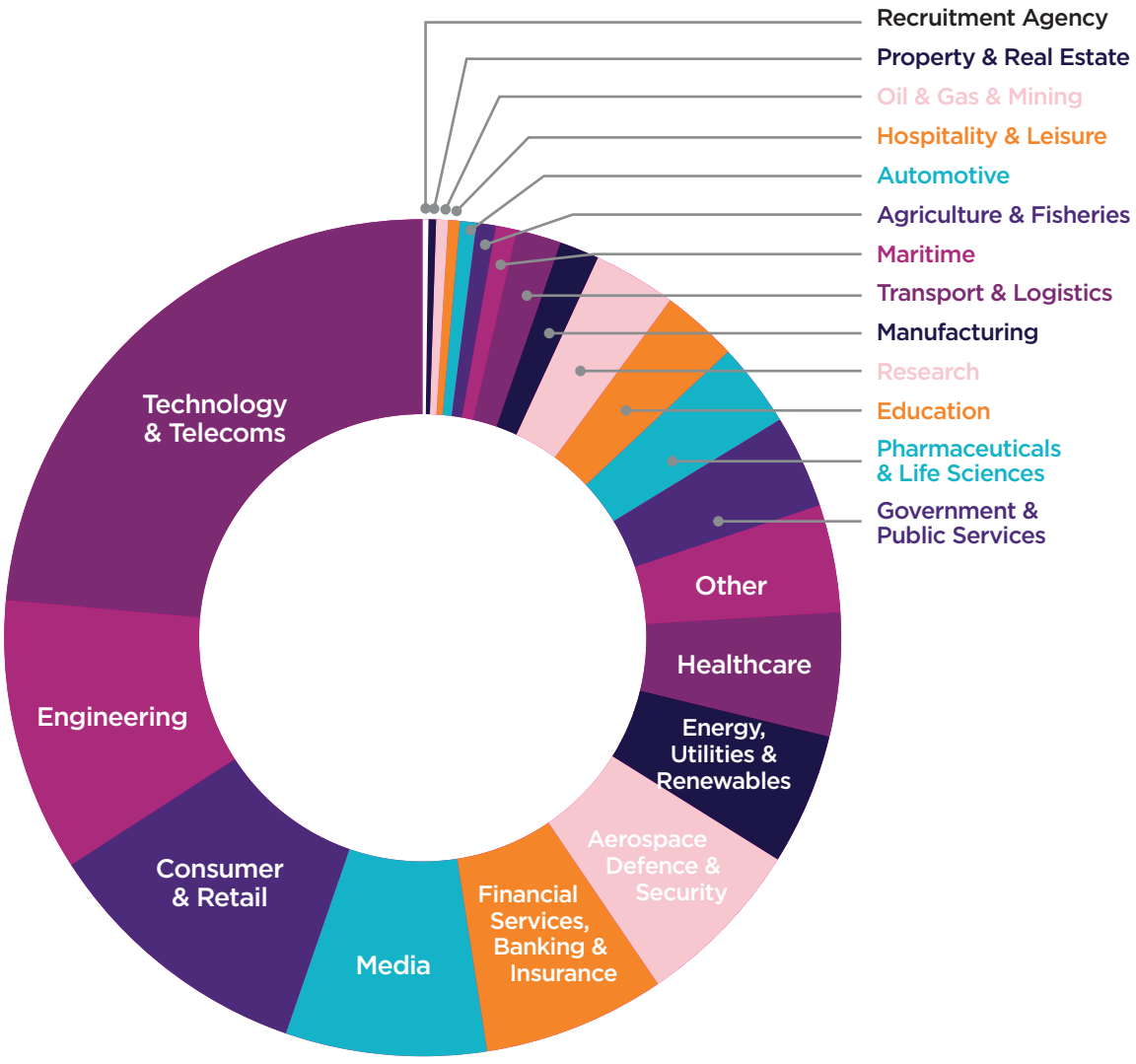
Figure 18: Gender split of survey respondents by age. Data is weighted.



expect it can only have been helped by the growing movement to increase the representation of women in IT. Groups like WeAreTechWomen, Code Like a Girl, and festivals like WeAreTechWomen are likely to have played their part in the shift while academic institutions such as the Institute of Coding and the Chartered Institute of Coding (BCS), among others, are increasing their focus on the need for more diversity within the tech workforce.

Respondents for both the interviews and the survey came from a wide range of industries (**Figure 19**) from the more traditional STEM firms such as Engineering, Energy, Oil and Gas, Defence and Aerospace to those working in the Fintech sector, media, telecoms and communications companies and a significant proportion from consumer and retail – a growing area where technology specialists are increasingly required.

Figure 19: Industry sector split of survey respondents



The full range of sectors included:
- Aerospace, Defence & Security
- Agriculture & Fisheries
- Automotive
- Consumer & Retail
- Financial Services, Banking & Insurance
- Education
- Energy, Utilities & Renewables
- Engineering
- Government & Public Services
- Healthcare
- Hospitality & Leisure
- Manufacturing
- Maritime
- Media
- Oil, Gas & Mining
- Pharmaceuticals & Life Sciences
- Property & Real Estate
- Recruitment Agency
- Research
- Technology & Telecoms
- Transport & Logistics

The wide range of sectors that are all competing for skilled technical specialists indicates the extent to which tech specialists are required across a broad range of sectors and emphasises the importance of attracting more women into the tech workforce to help fulfill job roles.

When asking questions about courses (for example, upskilling or re-skilling) respondents were asked to pick a representative course and answer the remaining questions about this.

In addition to the online data survey, WISE conducted interviews with 28 men and women working or wanting to work in technology roles to gain further insight into the gender divide seen in the workforce. These interviewees were drawn from volunteers who took part in the survey and represented a wide range of employees from apprentices and graduates to CXO-level, full-time and part-time workers.

The work experience of interviewees varied from those looking for their first job in the sector to those who had worked in it their entire working life. Several interviewees were re-training for a role in the digital skills workforce, while others said they found themselves in a Tech role through unexpected career choices. Finally, many talked about their experiences of working in a male dominated workforce and provided insights on the challenges and opportunities facing women within the sector.

WISE would like to thank everyone who took the survey and all our interviewees – we have used many of their quotes anonymously. All interviews were conducted by WISE staff and quotes are only attributed where anonymity has been waivered. All statements, views and quotes are taken directly from the interviewees and have only been adapted to abridge or anonymise the information contained within.

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