BCS Insights 2019

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INTRODUCTION

Welcome to BCS Insights 2019.

Over the past few months we have been doing research amongst our members – and analysing other research - on some of the most pressing issues facing the IT industry. Issues that also hugely impact society and our day to day lives.

In addition to the quantitative results, we also got a lot of member comment – the personal experiences and ideas that add flesh to the bones. This publication contains highlights of three research areas: diversity, AI and the needs of IT leaders. Throughout are highlighted members' comments – the 'think', 'feel', 'do' boxes - and at bcs.org/BCSInsights2019research attendees have exclusive initial access to the full research and other supporting documents.

BCS has an informed membership – and we want to bring together the key thinkers and policy makers to be a part of the conversation around these very significant topics.

Paul Fletcher
CEO. BCS, The Chartered Institute for IT

DIVERSITY & DISABILITY INTRODUCTION

In the UK, 18% of the working age population are accounted for by people with disabilities, whether visible or invisible. While this article will look at some distinct advantages that some people with disabilities can offer, the motivation for broadening inclusivity should not, of course, be about that.

This is a question of fairness in society, doing the right thing and dignifying people with the flat playing field to gain employment that others already have.

Not all disabilities are visible. Through the year there are a number of awareness weeks looking at, for instance, invisible disabilities, which covers conditions like dyslexia, ADHD and Asperger Syndrome (high functioning autism), through to Irlen Syndrome (a problem with the brain's ability to process visual information).

IT is an enabler for those with a wide variety of, not only invisible, but visible disabilities. And that is great as far as it goes – tech can provide solutions. But what about being a source of employment?

It is becoming more widely known that some neurological differences lend themselves not just to competency, but to enhanced IT abilities. One illustration of this came from the launch of BCS's diversity research in 2018. One speaker talked about the oft-hidden role of conditions like Asperger's in relation to disability, the difficulties it creates during job applications and the limitations it can place on allowing talented people to display this during job interviews.

THINK

WOULD A 'TURING TEST' APPROACH, LIKE THE ORCHESTRA BLIND AUDITION, WORK TO IMPROVE DIVERSITY IN IT RECRUITMENT? (I.E UTILISING A CHAT ROOM ENVIRONMENT, WITH NO VISUAL COMPONENT, Q&A ONLINE, OR EVEN VOICE ALTERING TECH).

This was Gabriel Herman of Aspierations, an organisation that works to get people with Asperger Syndrome into the workplace. In their words, **'the Asperger community boasts a wealth of talent that UK business is currently missing out on.'**

In the case of those with Asperger's and related issues, employers get employees who are built to focus on the task in hand, eschewing **'seemingly meaningless social interaction with colleagues'** to quote Aspierations again. If they are given a highly structured environment in which to work, they can be a huge asset to an organisation.
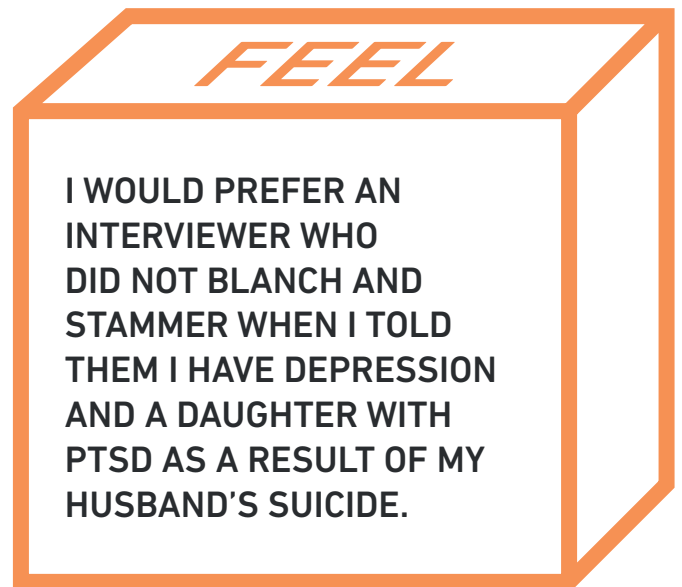
According to the National Autistic Society, the latest prevalence studies of autism indicate that 1.1% of the population in the UK may be on the autistic spectrum, which translates as over 695,000 people in the UK who may be autistic.

Taking a wider view, about 15% of the population is thought to be neurodiverse, with dyslexia affecting about 10%.
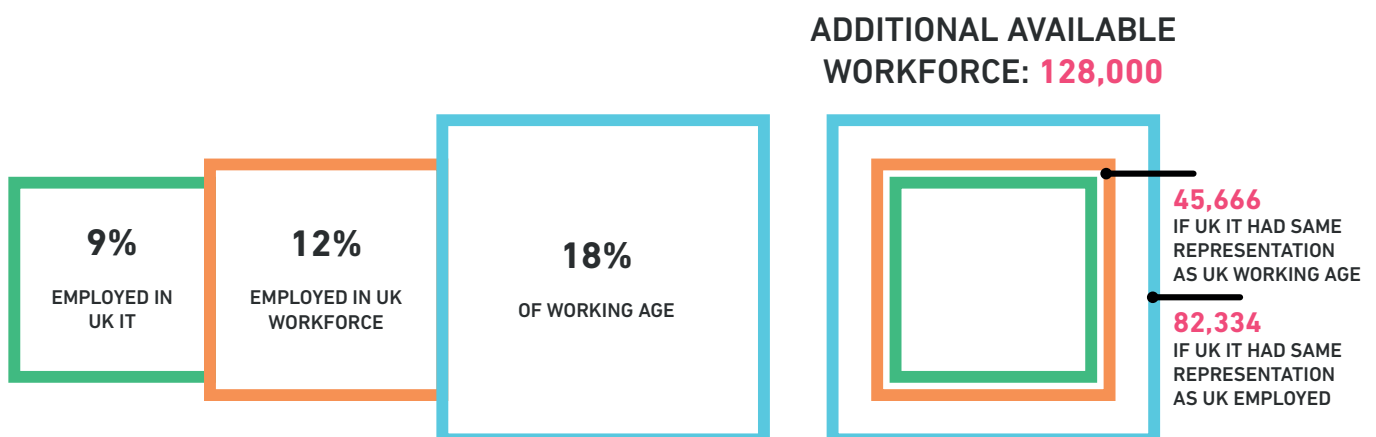
John Levell FBCS CITP, joint chair of the British Dyslexia Association, says neurodivergent individuals are often very successful – and he lists a long line of high-flying entrepreneurs including Elon Musk, Jo Malone, Bill Gates, Anita Roddick, Steve Jobs, James Dyson, Bill Hewlett and Stephen Spielberg.

John Levell also points to research carried out by Professor Julie Logan of CASS Business School in 2011 that indicates that entrepreneurs in the UK are twice as likely to be dyslexic as the average, or three times more likely in the US. He argues, therefore - wouldn't it be good if we built our organisations to fully exploit this latent pool of talent? But he says there is also the problem of perception – of these differences being seen in the context of educational difficulties and he adds: 'The Equality Act has brought these protected characteristics to the attention of our HR teams, in a disability context and the medical model – seeing neurodiversity as a problem to fix – has set in.'

FEEL

I WOULD PREFER AN INTERVIEWER WHO DID NOT BLANCH AND STAMMER WHEN I TOLD THEM I HAVE DEPRESSION AND A DAUGHTER WITH PTSD AS A RESULT OF MY HUSBAND'S SUICIDE.

THE IT SKILLS GAP AND PEOPLE WITH DISABILITIES

9%
EMPLOYED IN UK IT

12%
EMPLOYED IN UK WORKFORCE

18%
OF WORKING AGE

ADDITIONAL AVAILABLE
WORKFORCE: **128,000**

45,666
IF UK IT HAD SAME REPRESENTATION AS UK WORKING AGE

82,334
IF UK IT HAD SAME REPRESENTATION AS UK EMPLOYED

Source: BCS Analysis of ONS figures.

8%
OF IT DIRECTORS ARE DISABLED (DDA DEFINITION)

This can make people, especially those who are older and already have successful careers behind them, less likely to disclose they are dyslexic or have ADHD and so on.

Neurodivergent people simply see things differently – and John says that's an asset: **'That difference can bring the leap of thinking that is needed to drive innovation, the spark of creativity or vision needed to transform a product a service or a whole market.'** He believes instead of concentrating on weaknesses it's time to concentrate on the strengths that can come from looking at the world in a different way.

128,000
IT SPECIALISTS IN THE UK WITH DISABILITIES IN 2018

DO?

ASSUME ALL CANDIDATES HAVE SOME FORM OF HIDDEN DISABILITY.

But there are barriers. To recruit people, not just on the dyslexic or autistic spectrum but from all areas of disability, proactive diversity measures need to be taken to make things fairer. For instance – there is a relationship between autism and creating interview structures that allow autistic people to shine. And, indeed, to ensure that organisations can truly draw from the whole talent pool. Simple things like where an interview is held and how that is described and advertised, the structure of the interview, and the language used in asking questions can influence who applies and the interview outcome.

Raising awareness in the business of the value of diversity is an ongoing job, but one that is well worth it. This view was expressed by one BCS member in this way: **'Broader diversity brings broader backgrounds and experiences, thus new and fresh perspectives.'**

DISABILITY KEY FINDINGS

- Though accounting for 18% of the working age population, people with disabilities constituted only 12% of the total UK workforce in 2018.

- There were 128,000 IT specialists in the UK with disabilities in 2018 – 9% of all IT specialists in the UK at that time.

- If representation were at the level seen for all workers, this would equate to an extra 45,000 IT specialists in the workforce.

- Representation varies across the UK and during the 2014-18 period, it was noted that just 6% of IT specialists in London were disabled.

- Representation of people with disabilities also varies within IT roles and in 2018, just 8% of IT directors were disabled (Disability Discrimination Act definition).

- Over the 2016 - 18 period, approximately 16% of all unemployed IT specialists in the UK had disabilities (5,000 in total) and the associated unemployment rate (5.1%) was more than double that for IT specialists as a whole.

- Representation of IT specialists with disabilities is lowest amongst the energy/ water, construction and banking/finance industries (7% in each case).

- The median hourly earnings of IT specialists with/without disabilities in 2018 was £20phr.

- In 2018, just over four in ten IT specialists with/without disabilities (43% and 42% respectively) stated that they were a manager/ foreman or team leader.

- Though highly educated, disabled IT specialists were less likely to have a higher-level qualification than IT specialists that were not disabled (64% vs 68% respectively).

- IT specialists with disabilities are also less likely to hold a degree in an IT related discipline than others working in such occupations. (12% compared with 17% without disabilities).

- IT specialists with disabilities were more likely to receive job-related education/ training in 2018 (28% stating that education/ training had been received in the previous 13 weeks compared with 23% of those without disabilities).

- Disabled IT specialists are notably more likely to gain work via an agency than those without disabilities (26% versus 18% stating that they had gained work in this way during the 2014-18 period).

DIVERSITY ETHNICITY INTRODUCTION

Those who follow football will be aware of the ongoing comment (mostly outside mainstream media) on the treatment of Manchester City midfielder Raheem Sterling. Most of this has focused on the way his lifestyle is treated in some of the UK's most popular newspapers – and is widely held to reflect treatment of race. This is not the place to discuss those details – but is a good way of introducing the currency of issues facing people of non-white ethnicities in society in general – and in employment in particular.

Employment trends for BAME (Black, Asian and Minority Ethnic) people in IT are not good, although the race and ethnicity numbers appear to be more favourable than those for gender and disability bias. However, we don't have a complete picture of all the issues – and we don't claim to have all the answers – but we can, and feel we should, start the conversation. We know that products, services, apps and programs are better when developed by a diverse group of people. And that diversity, of course, includes ethnicity.

BCS wants to enhance the trust that we all need in the IT profession, and that trust is informed and benefited when it includes a representative mix of ethnicities.

Comparative with other sectors, the research has an interesting story to tell about diversity in IT. For example, in 2018, the median hourly earnings recorded for BAME IT specialists working in the UK stood at £22 per hour – an amount 11% higher than that recorded for IT specialists as a whole (£20 per hour) and 71% higher than that for all BAME workers in the UK at that time (£13 per hour) – these figures are for full-time permanent employees. There is a corollary here: namely that there is a big issue around international BAME and British BAME. British BAME people are far more disadvantaged, so, whilst the figures are lumped in together there is a more nuanced view that we can't fully reflect with the numbers alone.

Whilst disability and gender were seen as bigger barriers by members when measuring the 'main barrier to getting a first job in IT' – 5% considered race to be the top answer. The same percentage considered race the top barrier when answering causes for barriers to 'progressing in an IT career'.

In the free text answers we had several occurrences of terms that could also justifiably be seen as euphemisms for race. There is an understandable diffidence to say things outright and the ideals of open discussion have some way to go.

THINK

IT'S EASIER TO VICTIMISE WHISTLE-BLOWERS FROM MINORITIES.
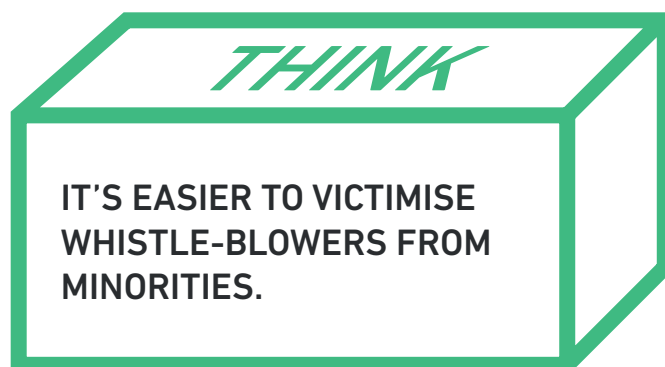
Inevitably, too, in a country with an unbalanced racial and ethnic demographic, there are regional variations: Representation of individuals from BAME ethnic groups amongst the IT professions across the UK varies from just 6% in the South West of England to 35% in London. The full research expands on this.

OVERALL ETHNICITY FIGURES REFLECT GOOD INCLUSION

12%

BAME PEOPLE IN WORK IN THE UK

14%

BAME PEOPLE OF WORKING AGE IN THE UK

19%

BAME PEOPLE WHO WORK IN UK IT

Source: BCS Analysis of ONS figures.

We had a rich seam of suggestions of what to do to address some of these issues (and these apply to the other three areas the research covers too – age, disability and gender).

Here are some of those thoughts:

01. Raising the profile of role models.

02. Ensuring that there are processes in organisations to monitor training, bonuses and promotion opportunities and how they are taken up by women, BAME people and those with disabilities. This requires a level of openness and honesty, of course.

03. Pressure government for better research figures on inclusivity – again, this is about open conversation. Note: This is happening – see the race disparity audit *(https://www.gov.uk/government/publications/race-disparity-audit)*.

04. Try to anonymise parts of the recruitment process where possible – for example, accepting CVs without names.

05. Increasing the use of BAME people in the interview process and on interview panels.

For point three, above, in addition to the race disparity research we have the ONS Quarterly Labour Force Survey, which the BCS report also analyses.

A main theme that comes through from many who want to see improvement is taking personal responsibility – a member comments: **'I'm white, male and lead on this for my department. I've been asked by other managers why I bother – and don't I have anything better to do. Policy is one thing – attitude is a much greater barrier.'**

FEEL

A TIPPING POINT NEEDS TO BE REACHED IN TERMS OF DIVERSITY IN SENIOR POSITIONS.

ETHNICITY KEY FINDINGS

- Individuals from BAME groups accounted for 14% of the working age population in 2018 but only 12% of those in work and 20% of the unemployed.

- At 19%, BAME representation was higher amongst IT specialists than within the workforce as a whole (12%) in 2018 and in total there were 266,000 BAME IT specialists in the UK at that time.

- BAME representation amongst IT specialists varies significantly across the UK - from just 6% in the South West of England to 35% in London over the 2014-18 period.

- BAME representation amongst IT specialists varied in 2018 from just 11% in the case of IT directors – to 29% of 'other' IT professionals.

- There were approximately 7,000 unemployed IT specialists from BAME ethnic groups in the UK during 2018 – 26% of all unemployed IT specialists in the UK at that time.

- BAME IT specialists were more likely to be self-employed than others during 2018 (14% compared with 10% of those from white ethnic groups).

- 50% of BAME IT specialists were working in IT businesses in 2018 compared with two-fifths (42%) of IT specialists as a whole.

DO?

PRESS GOVERNMENT TO INCLUDE COMPANY STATISTICS WHICH HIGHLIGHT INCLUSIVITY.

- In 2018, BAME IT specialists (full-time employees) were earning 11% more than IT specialists as a whole with median hourly rates of £22 and £20 per hour respectively.

- BAME IT specialists are less likely to be in 'positions of responsibility' than others in IT roles with 36% and 43% respectively stating that they were a manager/foreman or team leader in 2018.

- Almost nine in ten BAME IT specialists have a HE level qualification (86%) and 17% are IT graduates (with related under/post-graduate awards).

- BAME IT specialists are less likely than others to find employment from contacts in post (10% compared with 16% of white IT specialists over the 2014-18 period).

DIVERSITY AGE INTRODUCTION

Problems with ageism are a two-way street. Green, callow, wet-behind-the-ears... there are plenty of euphemisms to defend not fully respecting the young. Likewise, those over 50... there is a saying that mathematicians do their best work before 30, often misinterpreted as 'mathematicians are useless beyond 30'.

This is not the place for a treatise on the fetishization or marginalisation of youth – but is IT missing a trick with its approach to older and younger workers?

The over-50 population is increasing – and it is evident that IT has a skills shortfall and an ageism problem.

Maybe the first idea that comes to mind in support of the argument for older IT professionals is that we still have large issues with legacy systems. Old systems represent a huge cost to strip out; have implications for a lot of expensive retraining; have huge underlying complexity and, even with the newer approach of integrating new and old; require expert knowledge.

Today some banks are still on mainframes; C is widely used; Fortran – which has a 2018 update replacing the 2015 flavour – is over 60 years old; as is COBOL. Even languages like Java are nearly 25 years old. There is potential drama in the fact that these and other legacy applications are still used in air traffic control, nuclear power plants and the aerospace industry.

Whilst these are real issues, there is a problem with this line of reasoning – it is inherently ageist. All this implies that older people are needed because of older systems. Legacy people for legacy systems is not a useful message.
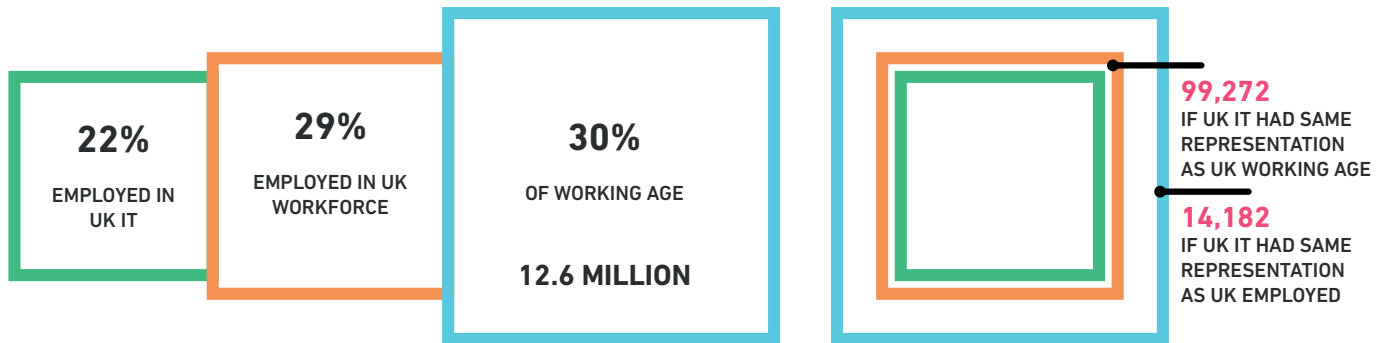
There are at least two other avenues worth exploring – the benefit to society as a whole, and the personal attributes of older workers. The Centre for Better Ageing draws attention to the general societal benefits: 'Society is failing to realise the tax-raising potential of this age group... Official figures show that halving the employment gap between people aged 50 and state pension age and those in their 40s could see income tax and National Insurance receipts rise by 1% (just under £3 billion) and GDP up to 1% (£18 billion).

'It could also help to reduce the welfare bill, with £7 billion a year currently being spent on benefits for people aged 50 to state pension age who are out of work.'
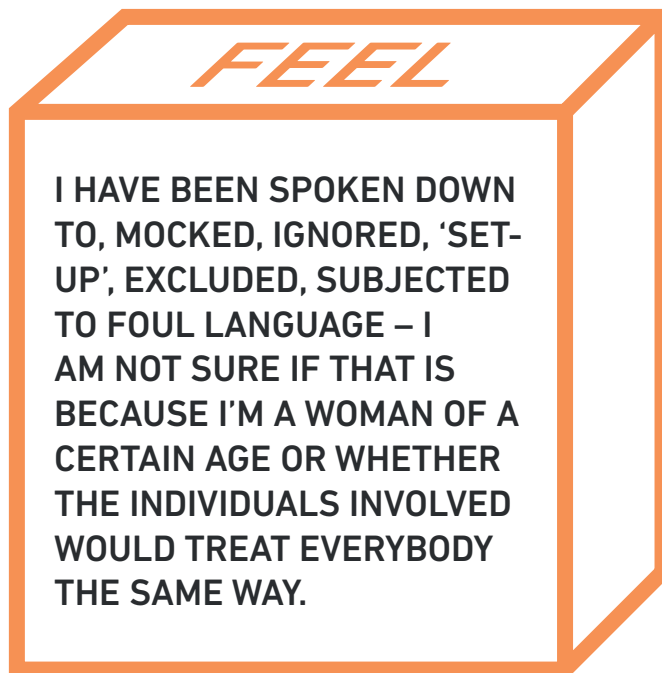
THINK

IT IS SEEN AS A YOUNG PERSON'S CAREER WITH AGE AND EXPERIENCE BEING LESS VALUED.

THE IT SKILLS GAP AND PEOPLE OVER 50

ADDITIONAL AVAILABLE WORKFORCE: 113,454

22%

EMPLOYED IN UK IT

29%

EMPLOYED IN UK WORKFORCE

30%

OF WORKING AGE

12.6 MILLION

99,272
IF UK IT HAD SAME REPRESENTATION AS UK WORKING AGE

14,182
IF UK IT HAD SAME REPRESENTATION AS UK EMPLOYED

Source: BCS Analysis of ONS figures.

FEEL

I HAVE BEEN SPOKEN DOWN TO, MOCKED, IGNORED, 'SET-UP', EXCLUDED, SUBJECTED TO FOUL LANGUAGE – I AM NOT SURE IF THAT IS BECAUSE I'M A WOMAN OF A CERTAIN AGE OR WHETHER THE INDIVIDUALS INVOLVED WOULD TREAT EVERYBODY THE SAME WAY.

Beyond the financial arguments, a Reuters' piece from last year quoted Jonathan Rauch, a senior fellow at the Brookings Institute and author of 'The Happiness Curve: Why Life Gets Better After 50' as saying, **'People are getting to their sixties with another 15 years of productive life ahead, and this is turning out to be the most emotionally-rewarding part of life.'** He then draws a line between this stability and the productivity of older workers – they 'tend to be reliable, conscientious, organised and mature – all of which is hardly surprising when life experience teaches you valuable lessons through the years.'

Whilst Reuters uses terms like 'the human capital of older workers', apparently without blushing, there is validity to these views.

59%
OF THOSE AGED 50+ HAVE A HE QUALIFICATION

DO?

PROMOTE AND NORMALISE WORK/LIFE BALANCE ARRANGEMENTS THAT WOULD IMPROVE WORKPLACE INCLUSIVITY FOR PEOPLE WHO NEED TO CARE FOR CHILDREN OR ELDERLY PARENTS.

Human resources blogger Lewis Lustman in a recent post came up with a long list of benefits of employing older people. Among these he includes: decades of potential relevant experience (admittedly that is tending toward the legacy argument again); mentoring capability; an increased likelihood of comfort with flexible hours; they well may stay in a role for much longer than younger staff; they are probably not job-hoppers; and their experience may contribute positively to brand ambassadorship.

A point that comes up when discussing all areas of diversity raises its head here too: an age-diverse workforce makes sense, since older employees represent a large segment of the buying public. They may know that market better than the rest of your team.

Oh, and let's just revisit our introduction with a counter-example: Eugène Ehrhart. He received his PhD in mathematics at the age of 66, and around the same age, he created the ground-breaking polynomial class now named after him.

16%

REPRESENTATION OF OLDER PEOPLE WAS LOWEST IN LONDON

AGE KEY FINDINGS

- Individuals aged 50 and above accounted for 30% of the working age population in 2018 (those aged 16-64), 29% of those in work and 20% of the unemployed.
- Representation of these 'older workers' was much lower amongst IT specialists, and of the 1.4m people working in such roles in 2018, only 22% (312,000) were aged 50 and above.
- If representation was the same as within the workforce as a whole (i.e. 29%), there would be 95,000 additional IT specialists in the UK aged 50 and above.
- Across the UK, representation of older people in IT positions was lowest in London where just 16% were aged 50 and above over the 2014-18 period.
- Only around one in eight web designers/developers are aged 50 and above (13%) but amongst IT directors, over one third are of this age (35%).
- In 2018 there was estimated to be 8,000 unemployed IT specialists in the UK aged 50 and over – equating to an unemployment rate of 2.4%.
- Older IT specialists were more likely to be working on a self-employed basis than their younger counterparts (15% versus 10%) and were also more likely to be working part-time (8% versus 4%).
- The median hourly earnings for older IT specialists in 2018 was £22 per hour – 11% more than that for IT specialists as a whole.

1.4 MILLION
ONLY 22% ARE AGED 50 AND ABOVE (312,000)

- Older IT specialists are notably more likely to hold 'responsible positions' – more than half (52%) having managerial/supervisory status in their job (compared with 42% of younger IT specialists).
- Older IT specialists are less likely to have a HE qualification and in 2018 only 59% of those aged 50 and had a qualification at this level compared with 70% of those aged 16-49.
- Younger IT specialists are also more likely to hold an IT degree than those aged 50 and above.
- Older IT specialists are notably less likely to obtain employment through direct applications or recruitment agencies than others, but more likely to gain employment through contacts within the employer organisation.

DIVERSITY GENDER INTRODUCTION

BCS first undertook research on the gender split in IT in 2013. We included in early versions, before we expanded the remit two years ago, the topline figures from 2003 onwards. These would make for the most boring graph imaginable, varying, as it does, between 17% and 16% each year.

So, are we shouting into an echo chamber? Is this a point not worth making? Are the arguments for diversity not proven?

Enhanced objectivity, improved product design, different thinking approaches, innovation – these are some of the advantages that organisations have seen through encouraging diverse work forces. These are strong arguments for the benefits of diversity in the workforce, but these have been criticised by some as being subjectively qualitative rather than quantitative. Economic arguments have been more difficult to make, not least because of the complexity of large organisations and the effects of correlation rather than causation in decision-making.

THINK

MY SON WAS AT A CYBER COURSE IN THE SUMMER – 90% WERE MALE – THAT'S AT GCSE. WHEN I DID MY BSC IN COMPUTER SCIENCE, THE HONOURS CLASS GENDER SPLIT WAS ALMOST 50–50.

Research from July 2018 showed the measurable benefits of diversity. Harvard Business Review took a business with plentiful records and a consistent approach – the venture capital industry – and found compelling arguments in favour of diverse teams. They report '**the success rate of acquisitions and IPOs was 11.5% lower, on average, for investments by partners with shared school backgrounds than for those by partners from different schools. The effect of shared ethnicity was even stronger, reducing an investment's comparative success rate by 26.4% to 32.2%.**'

And, back in 2015, McKinsey research drew direct lines between organisations that have good racial, ethnic and gender diversity with financial returns above national industry medians.
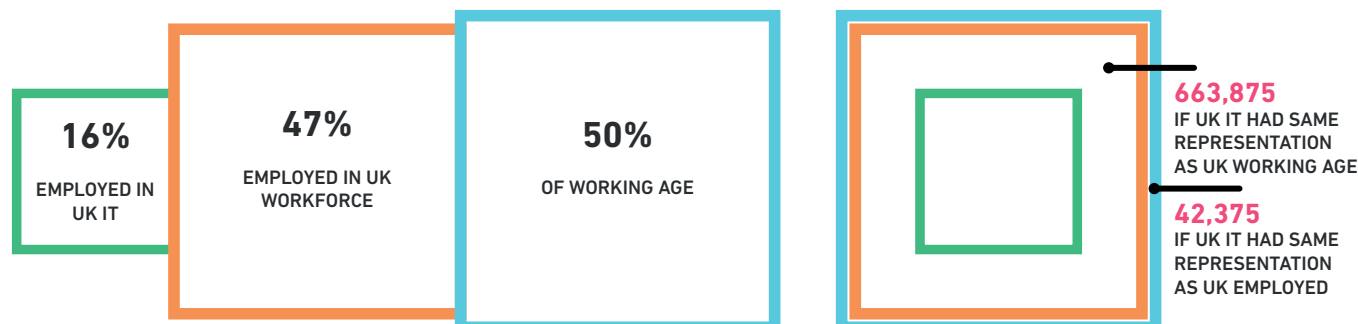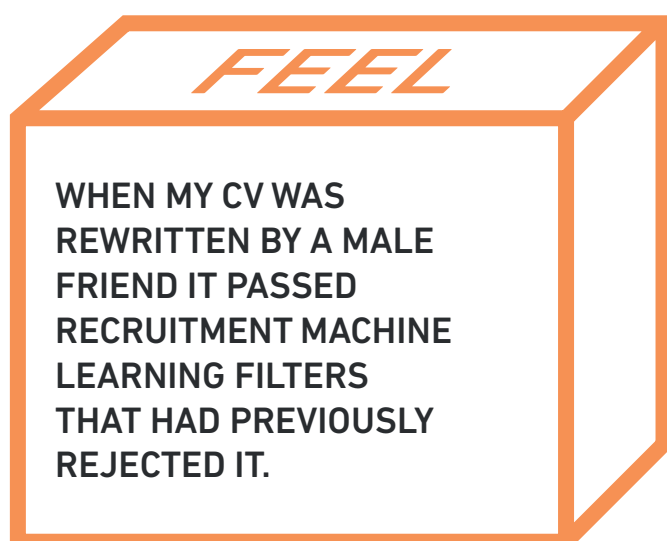
Some of the comments BCS received were highly instructive. One drew attention to the 'issue de jour', AI bias. Reports a member: '**I have had serious problems with recruitment consultants who seem to view women as less experienced regardless of what the CV says. It is also clear that machine learning algorithms are biased (trained on mostly white male CVs?). I have experimented with this and found that my CV does not make it through machine learning filters used by current employers. However, once rewritten by a male friend it gets through. Clearly the subtle differences in phrasing and hobbies are enough to bias filters against anyone who is not like those previously hired.**'

WOMEN IN IT

ADDITIONAL AVAILABLE WORKFORCE: 706,250

16%
EMPLOYED IN UK IT

47%
EMPLOYED IN UK WORKFORCE

50%
OF WORKING AGE

663,875
IF UK IT HAD SAME REPRESENTATION AS UK WORKING AGE

42,375
IF UK IT HAD SAME REPRESENTATION AS UK EMPLOYED

Source: BCS Analysis of ONS figures.

FEEL

WHEN MY CV WAS REWRITTEN BY A MALE FRIEND IT PASSED RECRUITMENT MACHINE LEARNING FILTERS THAT HAD PREVIOUSLY REJECTED IT.
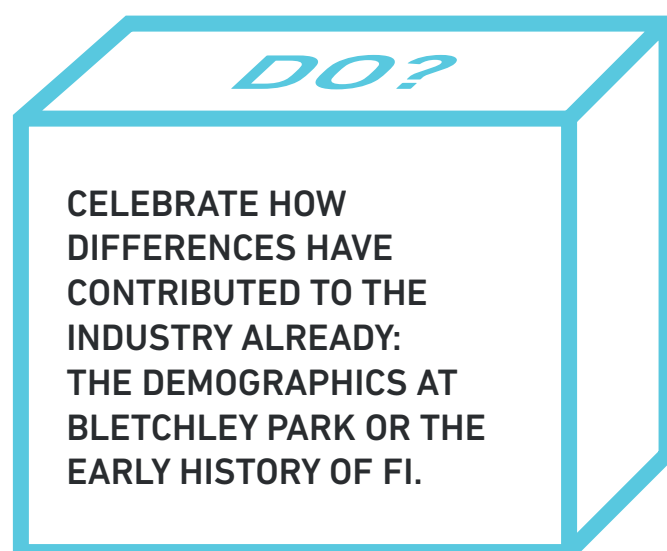
Rebecca George OBE, in her introduction to the 2017 report, wrote: 'There are lots of examples where simple, organisational changes can be made to alter the status quo – but it will require a myriad of changes, sustained focus and collaboration across organisations, employers, government, schools and community groups if we're to change anything.' That stands for 2019 too.

A game changer could be the increase in awareness. In the research we asked about training in this area – 57% reported some
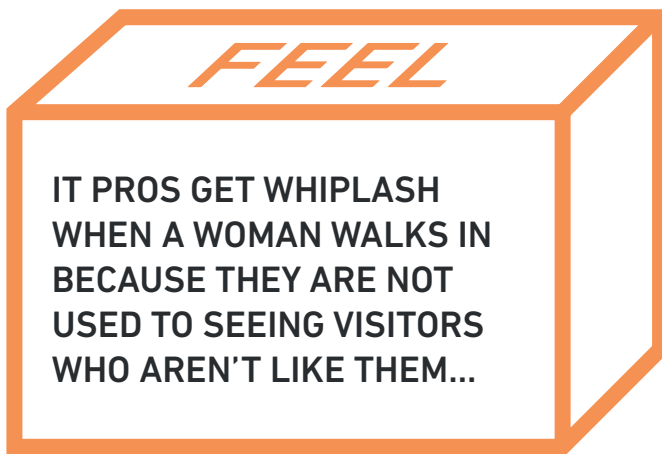
general gender equality and diversity training and 30% have received unconscious bias training. The 36% who answered 'none at all' indicates that some organisations are doing better than others. Several comments indicated a serious level of commitment on the part of some. One commenter said they had received 'awareness training as part of an overall ethics programme' and another noted that their general diversity training had a 'specific transgender bias.'

More of the same will help move those intransigent numbers.

DO?

CELEBRATE HOW DIFFERENCES HAVE CONTRIBUTED TO THE INDUSTRY ALREADY: THE DEMOGRAPHICS AT BLETCHLEY PARK OR THE EARLY HISTORY OF FI.

GENDER KEY FINDINGS

- Women accounted for 50% of the working age population in 2018 (those aged 16-64), 47% of those in work and 46% of the unemployed.

- There were 226,000 female IT specialists in the UK workforce during 2018 - 16% of the total at that time.

- The level of female representation in IT varies by job type - from around one in twenty IT engineers and telecoms engineers (5% and 3% respectively) - to around one in three IT project/programme managers (30%).

- The unemployment rate for female IT specialists over the 2017/2018 period was just 2.0% - lower than that for male IT specialists (2.2%) and less than half the overall rate for the UK labour market (4.3%).

30%
OF IT PROJECT / PROGRAMME MANAGERS ARE FEMALE

- The gender balance for IT specialists was worse within the manufacturing, construction and IT sectors (where women accounted for just 12%, 12% and 13% of IT specialists).

- Female IT specialists were almost five times more likely to be working part-time than males (i.e. 14% versus 3%) – most often as they did not want full-time work.

- At £18 per hour, the median hourly earnings for female IT specialists in 2017 was 11% less than that recorded for males working in IT positions.

- Female IT specialists appear just as likely to be in 'responsible positions' (i.e. those with managerial/supervisory responsibilities).

- Female IT specialists are marginally more highly qualified than their male counterparts and in 2018, six in ten (60%) held a degree or equivalent level qualification.

- Female IT specialists were nearly three times less likely than males to hold an IT degree (5% compared with 14%).

- Female IT specialists are notably less likely to obtain employment through the use of agencies or in-company contacts.

FEEL

IT PROS GET WHIPLASH WHEN A WOMAN WALKS IN BECAUSE THEY ARE NOT USED TO SEEING VISITORS WHO AREN'T LIKE THEM...

- Female IT specialists were less likely to be working in micro-business sites (those with up to 10 staff) than their male counterparts (i.e. 10% of female IT specialists and 14% of males).

INTERESTING READING?

Want some more? … As a BCS member you'll enjoy access to all our research and insight.

And you can influence discussion on the ethical challenges impacting our industry.

Join us. Join the conversation.

bcs.org/join

INCLUSIVE RECRUITMENT

The job advert
Think about how people with low vision, dyslexia and other differences will receive your advert design.

The power of words
How you describe the role will influence who applies and who ignores your ad. Are you signalling bias through your choice of words?

Provide unconscious bias training
Training can help us to spot and understand our own preferences and biases.

CANDIDATE SELECTION

Go anonymous
It's about skills, knowledge and experience. Use blind selection - remove names, ages and dates.

Widen your pool of assessors
A diverse team looking at CVs will spot a wider range of positives and possibilities.

THE INTERVIEW PROCESS

Be flexible
Offer candidates a choice of interview style - face-to-face? Skype? chaperone? Other needs?

CREATING AN INCLUSIVE RECRUITMENT EXPERIENCE

Questions please
Use plain language, avoid jargon and acronyms. Focus on skills and knowledge and encourage non-verbal evidence. If you can, use real-life scenario testing.

Web accessibility
Your website is a shop window and the doorway into your organisation. Don't make it a barrier.

Access your web form
Ask only what's needed to make an objective decision.

Work with an agency
Ask for a diverse selection of candidates from your recruitment agency. You're paying them.

Phone or laptop?
Ensure people can apply for your job using a mobile phone. Not everybody has a laptop or PC.

Use a diverse interview panel
People who see themselves reflected in your interview panel will know you truly believe in diversity.

Don't wait to be asked
Offer special arrangements rather than waiting for them to be requested.

It's about the numbers
Score all candidates numerically against the same criteria, ideally on identical scorecards.

Just assume...
...everybody has an invisible disability. Think about lighting, noise, closeness to toilets and easy access when picking your interview room.

IT LEADERS INTRODUCTION

BCS started producing the IT leaders research (formerly Digital Leaders, previously 'What do CIOs need from their CEOs') in 2012 – and in that time business transformation and organisational change has always been very high on the agenda, if not top.

For the priorities of 2019 (where more than one option could be selected), continuous innovation came out top, with 54%, followed by operational efficiencies (52%), and then business transformation and organisational change (45%), But, when asked to single out their number one priority, 22% chose business transformation and organisational change as the top answer.

A minor surprise this year was that when asked which technologies their organisations are prioritising for 2019, cloud came out top (53%), followed by cyber security (52%) and automation (36%), with IT governance and agile methods both on 34%.

When asked to identify their top priority, cyber security and cloud could not be separated, with both on 15%.

But, here is the main concern: Only 12% of participants feel their organisation has enough resources to achieve success in 2019. The theme of doing more with less and maximising the efficiency of current staff was quite common in the comments we received. This is a typical member view of what is required: **'Getting talent with both technology and business skills and experience who have a decent applicable educational background.'**

88%
OF ORGANISATIONS DO NOT HAVE ENOUGH RESOURCES FOR SUCCESS IN 2019

ADDITIONAL RESOURCE NEEDS

Any business in almost any domain will mention an increased budget as an aid to business success. IT leaders are no different, but they also recognise the value of people, as evidenced by the response to our question on rating the additional resource they considered necessary to achieve their organisational goals.
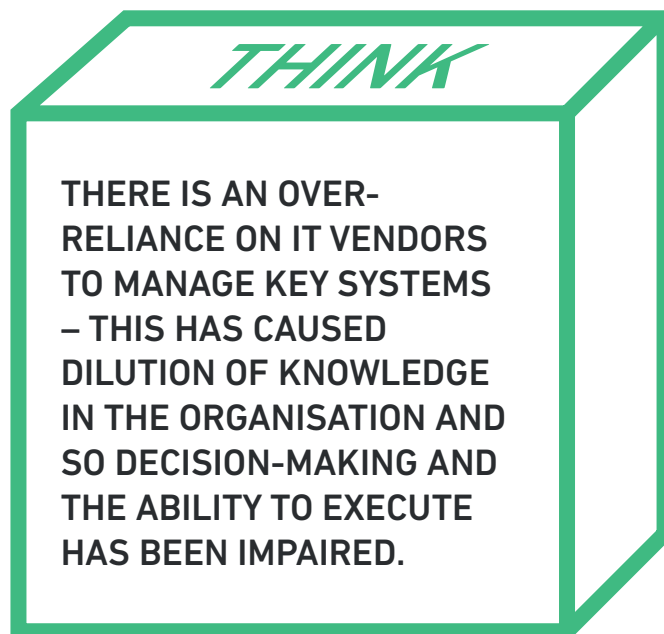
Here is the result:

01. Enhanced IT capability and skills in existing workforce (62%).

02. Additional IT staff that are suitably qualified (45%).

03. Increased budget (42%).

04. Enhanced IT capability in leadership team (30%).

05. None – we have enough resources (12%).

06. Other (5%) e.g. continuous knowledge enhancement; enhanced flexibility.

SKILLS GAPS

The IT skills gap as general conversation happens a lot. But we wanted to ascertain some specifics from members. A lot of commenting in this section was about responding to the pace of change. The list of the specific disciplines, where a gap was spotted was unsurprising, including data science, cloud, big data, machine learning, agile, python and cyber security issues of all stripes. An interesting addition here was industrial blockchain, with one member commenting: 'everybody in blockchain seems to be focused on Fintech and the workforce is focusing on that.' Another interesting specific mentioned was 'migration between legacy and non-legacy tech choices.'

There were also an extensive number of comments on more business and personally-oriented skills gaps. Significantly, understanding regulatory compliance and the impacts on the organisation's working was mentioned – alongside the general requirements of GDPR – including data security by design. A practical comment in this area drew attention the effect of increasing legislative change within the industry, a gap requiring 'resources who understand how to translate regulatory requirements and apply them pragmatically to internal systems.'

The self-reflective nature of this question also provided a couple of useful self-aware comments. One member said his organisation needed 'a meaningful ability to engage with our users to make sure we are delivering what business outcomes they need,' while another wanted to get his employees 'understanding how the business really works – why it works, as opposed to what it does.'

THINK

THERE IS AN OVER-RELIANCE ON IT VENDORS TO MANAGE KEY SYSTEMS – THIS HAS CAUSED DILUTION OF KNOWLEDGE IN THE ORGANISATION AND SO DECISION-MAKING AND THE ABILITY TO EXECUTE HAS BEEN IMPAIRED.

Among the other interesting issues raised were:

- Over-reliance on IT vendors to manage key systems – this has caused dilution of knowledge in the organisation and so decision-making and the ability to execute has been impaired.
- Skill acquisition and management.
- Basic understanding of engineering processes and the transformation of ideas into reality. 'There is a lack of vision, technical leadership and engineering capability within the organisation,' wrote one member.

Where tech and business needs overlap, a few points were also made. We should 'identify the "trend du jour" and build credibility,' says one member, whilst another offers a useful caveat: 'the challenge, as ever, is to know which are simply short-term fads, and which actually represent crucial long-term shifts in the technology market that we, as an organisation, simply must invest in.'
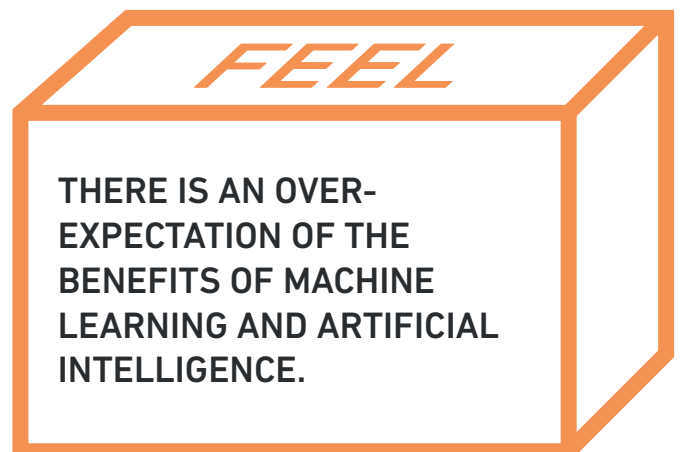
RESPONDING TO THE SKILLS GAP

In addressing the gaps in a business, the answers reflected the lack of confidence in resources available – but in a way that could well benefit IT professionals. The top three answers are really things that should lead to upskilling – but could also be viewed as 'cheap'.

With the lack of resource in mind it is perhaps a bit surprising that utilising apprentices came so low down the list – maybe a reflection that to achieve the first three would require similar assistance for permanent employees to progress, but without the base of knowledge that points 1 to 3 already imply. Maybe it looks a bit too hard to do when the going is tough.

01. Up-skilling / on-the-job training (74%).

02. Career development planning (45%).

03. Mentoring (36%).

04. General recruitment (36%).

05. Professional certifications (31%).

06. Headhunting (18%).

07. Suitable apprentices (17%).

08. Relevant professional body membership (11%).

IT LEADERS KEY FINDINGS

- The priorities for 2019 are continuous innovation (54%), operational efficiencies (52%), and business transformation and organisational change (45%).
- When asked to single out their number one priority, 22% chose business transformation and organisational change.
- The technologies that organisations are prioritising for 2019 are cloud (53%), cyber security (52%), automation (36%), IT governance (34%), and agile methods (also 34%).

- When asked to identify their top priority, cyber security and cloud could not be separated, with both on 15%.
- Only 12% of participants feel their organisation has enough resources to achieve success in 2019.

FEEL

THERE IS AN OVER-EXPECTATION OF THE BENEFITS OF MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE.

TRUST, OR NOT?

BCS undertakes a yearly look at the needs of IT leaders. This year we wanted to gauge their view on the industry itself – is IT trusted? How do we compare to other industries? What could be done practically?

We asked IT leaders how they believe the public's trust in the IT profession has changed in the past five years...

Here's the breakdown:
05. Much higher: 11%
04. Higher: 23%
03. About the same: 32%
02. Lower: 23%
01. Much lower: 10%

With a 65% score from much lower to 'about the same', what has caused the negative impact? Looking further into the data revealed that the main issues were in AI (only 28% positive and 45% 'about the same'); management of large-scale projects, which attracted 80% in the much lower to 'about the same' range; and the biggest single negative scorer 'use of personal data by organisations' which attracted a whopping 47% for 'much lower' – 86% in the 'much lower' to 'about the same' range.

Asked to list some of the things behind the negative impact scores, many of the usual suspects turned up. One member cited the recent O2 outage, asking **'who is responsible for renewing the certificate. Was it a software failure, or an incompetent admin clerk in procurement? Such reporting should point out whose function in Ericsson it was to renew the certificate, IT should not get it in the neck for this.'**

The ethical dimension came into some of these answers too, with 'a lack of women in technology' and 'a lack of moral standards in the exploitation of data' given as answers.

Interestingly a long-discussed problem – the lack of board understanding of IT - came up in this section as a driver of public misconceptions. One member wrote that there is a **'mismatch between IT understanding and capability within senior management vs. the IT expertise within IT management'.**

Of course, we also asked for reasons behind the positive answers. Here GDPR is viewed as a step in the right direction. Improved governance and customer communication about their data rights also came up several times as a mitigator of negativity.

Even the media can be seen as a positive influencer: with one member mentioning news items on how machine learning and big data projects (particularly when applied to genomics/health) are benefiting society. Another, talked about smarter IT tools making life easier, especially in cars. As they wrote:
'IT is not just data centres!'

Also mentioned as a positive were some of the big personalities in IT innovation – demonstrated by the big-scale thinking embodied by the like of SpaceX, driverless cars and increasing home automation.

IMPROVING THE PUBLIC PERCEPTION FOR TRUSTWORTHY IT

With that mixed picture, how can the industry ensure that its concepts are accessible to non-IT speakers?

Here is a selection of suggestions:

- We need transparency and plain-speaking, demonstrating that we are taking public concerns seriously.
- Let's do fewer features, but with more reliability.
- Why don't we have a published statement of ethical standards that members of BCS subscribe to and use as a support for decision-making?
- Deliver projects with the benefits we promise!

Another member expanded on these themes, writing that we need **'better collaboration with and transparency to the public – particularly where big data / machine learning is being used to make decisions about people's lives and futures (credit scores, banking, parole decisions etc) – these algorithms need to be published and open to scrutiny and challenge or they will always incur suspicion from the public.'**

A theme from our diversity research was also echoed here: personal responsibility. As another member says we need fewer overtly public disasters **'probably by better expectancy management to the business executive and more willingness to delay manifestly unfit projects at the UAT / security testing stage.'**

A final comment here brought into focus the balance of responsibilities, bringing in the role of the media: **'we need significant improvement of the media's understanding and coverage of technology.'**

FOR BCS

Members also gave feedback on the role we, as an expert member body, should take.

There needs to be **'greater understanding between professional bodies and professionals'**, said one member. **'There is a big gap between start-ups, app-focused companies and the ethical considerations supported by a code of conduct!'**

Another important role of BCS was identified as its **'independent voice, most voices are either media or tech giants, I cannot remember the last time an independent voice, like BCS, was in the news.'**

Other specific suggestions included:

- A professional registration for certified and experienced individuals that are well known and published.
- Open and honest reporting and real-life examples of what use of data statements in Terms and Conditions mean.
- More CITP showcases, more BCS-led education and endorsement.
- More whistleblowing by IT professionals.
- Strong evidence of principled decision making (e.g. the seven Nolan principles), with active involvement by independent experts in government, funding and technology projects.
- All IT specialists to be BCS or IET members.

SOME ANALOGIES

Let's conclude with a couple of analogies for taking the professionalism, ethics and trust in the industry forward. One member wrote that we need a **'code of conduct for worldwide IT professionals, with an oath similar to the Hippocratic oath alongside black-listing at several levels and a central database to check black-listing.'**

And another member concludes that we need **'compliance to an agreed gold standard of data security. The same as a restaurant kitchen displays compliance to food standards, IT needs a common hygiene factor compliance for data protection.'**

IT LEADERS SKILLS

When only 12% of IT leaders feel they have the resources to achieve their IT goals in 2019, what are the skills and capability needs they face?

In early 2019 BCS published its annual survey of IT leaders, looking at what resource needs they have, where the skills issues lie and what keeps them awake at night. The specific skills gaps list would come as no surprise: cyber security, cloud, DevOps, AI and so on.

It is in the detail where some other trends emerge. BCS always ask for personal comment in surveys for this reason.

Let's start with a member comment that covers a lot of the issues: the problem is **'getting talent with both technology and business skills and experience who have a decent applicable educational background.'**

Of course, talking qualifications, BCS has an extensive roster and they are a moveable feast because they reflect an industry in constant flux and progression.

Take AI, where we had a number of specific requirements raised, including prescriptive, predictive and cognitive analytics, RPA implementation and so on.

At a policy level BCS is involved with AI – the government announcing just this February a coordinated nationwide programme of industry-funded AI Masters courses based on recommendations and extensive input from the Institute.

In qualifications, BCS also recently launched the Essentials Certificate in Artificial Intelligence, looking at the terminology and general principles, benefits and types of AI. It also covers the basic process of machine learning, the challenges and risks associated with an AI project and the future of AI and humans in work.

AI is an interesting example because, while it was a discipline lost in a fog of hype (which it still is to an extent) its capabilities and potential benefits are now becoming more widely understood. That fits in rather well with a member comment that cites this challenge: to know which are simply short-term fads and which actually represent crucial long-term shifts in the technology market that an organisation simply must invest in. Blockchain, we are looking at you...

ADDITIONAL RESOURCE NEEDS

It's not all about budget, in fact, increased budget came third behind other personnel needs. **'Enhancing IT capability and skills in the existing workforce'** was the top answer in the survey, followed by **'acquiring additional staff that are suitably qualified'.**

74%
WOULD USE UPSKILLING TO FILL A CAPABILITY GAP

As the latter is also a large cost issue, many comments focused on efficiencies. Finding a way to enhance general knowledge in the workforce – **'continuous knowledge enhancement'** – was cited as an issue. Targeted training was also a common thread. In a related comment, one member wanted a way to address **'continuous reskilling'**, which links to the difficulties caused by a lack of knowledge transfer, also cited.

The consistency of the requirements for reskilling or upskilling shows a people-focus. Whether generated from necessity or a caring approach is perhaps unimportant against the fact that it is happening.

FILLING GAPS

One way of filling the gaps is with external partnerships. One commenter gave their approach: **'we use a flexible partnership model with external and internal teams, so gaps are very easily addressed. Where resources lack a certain skill, training is used to develop it.'** A caveat to this approach is mentioned by another commenter: **'much is outsourced, so the biggest challenges are managing those relationships and ensuring they act as trusted partners and advisors in a regulated environment.'** Filling gaps with partnerships moves the skills need from being predominantly technology-based to the business and management environment.

Another commenter warned against **'over-reliance on IT vendors to manage key systems, causing a dilution of knowledge in the organisation's decision-making and ability to execute.'**

The confluence of technology and business skills has long been a theme in the industry. One commenter mentioned a specific case, highlighting their need for **'the ability to embrace and integrate technology know-how in an IoT landscape for a business perspective.'**

Individual professionals also need to **'understand the ICT landscape,'** said one member, continuing that it's **'great to have skills in ringfenced areas'**,

but there is a need for enthusiasm to broaden skills and general appreciation and knowledge of other tech and business areas. Dare we say, this is one of the places where a professional body comes in.

DO?

THERE IS A BALANCE OF RESPONSIBILITIES: WE NEED A SIGNIFICANT IMPROVEMENT IN THE MEDIA'S UNDERSTANDING AND COVERAGE OF TECHNOLOGY.

This is reinforced by the need to **'have a broad spectrum of connected capabilities in emerging technologies'**, as another commenter phrased it. The idea of refreshing skills amongst staff is still vital, after a digital transformation project, if it is to be successful. In June *ITNOW*, we will be looking at more in the business transformation area.

In terms of addressing the capability gaps, the survey had this outcome:

- Upskilling / on the job training 74%.
- Career development planning 45%.
- Mentoring 36%.
- General recruitment 36%.
- Professional qualifications 31%.
- Headhunting 18%.
- Finding suitable apprentices 17%.
- Relevant professional body membership 11%.

ARTIFICIAL INTELLIGENCE

FORGET JOB LOSSES – FOCUS ON AUGMENTATION

One of the first bits of feedback BCS got from our survey of members on their current and planned use of AI was that most think there will be no job losses. There will be plenty of augmentation of roles, but nothing more. That wasn't a universally held view – but the subtext was clearly that we shouldn't be negative about it. And that wasn't the intention, so here we present some of the member views we garnered.

One member gave a useful overview: **'no jobs will be lost – all jobs will be affected and impacted. Some aspects will be automated, not replaced. After all, any rules-based role can be automated.'**

WHAT JOBS WILL BE AFFECTED – TWO YEARS OUT?

In the near-term there were some commonalities with roles that would be, and in some cases already have been, affected:

- Data analysts.
- Testing roles.
- Data entry.
- Helpdesks, service desks, call centre functions, customer first contact, pre-sales expert advice.
- Recruitment.
- Translation.

In the more business-focused roles, these came up:

- Credit control.
- Compliance violations, security monitoring and threat intelligence.

Areas where members thought enhancement would be more quickly seen included intelligent IT security analysis, next generation firewalls, enhanced business intelligence and market intelligence.

A specific business that came up several times was insurance; **'most low-value underwriting decisions will be made by machines. Repetitive clerical/administrative tasks also'** said one commenter. Another cited insurance underwriting – **'providing automated decisioning and decision-support based on new evidence sources such as health records.'** Another insurance related term that was considered will be affected by AI was FNOL – first notice of loss.

On a broader societal scale, big impact was also expected in medical diagnostics and other pattern recognition-led functions such as exo-planet detection.

Fitting with the theme of AI being an augmentation and enhancement of roles, rather than a source of job loss, were these two comments: **'I work in education and there is almost a threat that AI will replace or automate teachers. But I am really not convinced. I think there is opportunity for more automation to reduce workload.'**

'I see AI as providing decision-support for technical roles, not as a replacement for them. As such, AI with limited capabilities can be introduced soon (possibly within two years) and then refined and improved in service.'

WHAT JOBS WILL BE AFFECTED – FIVE YEARS OUT?

Further down the line, augmentation was still the watchword. One member writes: **'AI can augment the audit and data analysis task, which is likely to improve quality with increasing volumes. It is difficult to see a role in this sector that can be replaced, but it might enable timelier Q&A about legal texts and the like.'**

Here is a selection of other roles that members considered likely to be affected within five years:

- Lawyers (wishful thinking?)

- Greater automation on support: in marketing, market intelligence, analysing customers' behaviour through the internet; and in finance, analysis functions.

- Increasing automated vehicle control, automated traffic flow management, customs processing and smuggling detection, network traffic flow optimisation. (In April 2019 Elon Musk predicted level 5 self-driving cars by 2020, critics maintain it will be another decade).

- Automotive, elements of passenger transport, elements of highway traffic control, management / expert decision support tools, data querying and visualisation, linear optimisation problems, call centres, warehouse and dockside goods handling, some logistics, many fail-safe systems.

- Member tip for further reading: Just look at the MGI 2017 report to see some of the job functions from 800 jobs with 2,000 activities each requiring 18 capabilities. Possibly close to the 30% augmentation of 60% of jobs or approximately affecting 13M UK jobs.

- Fruitpicking (possibly a Brexit joke).

- Work requiring some judgement, but not much – enough that can be replaced by a 'good-enough' classifier: technical claims management, quality assurance supervision, data quality and acquisition translation checking routines, first draft translation.

- Front line product and application support. I work for a large HVAC manufacturer, and in my role in developing systems that allow customers to select our products, I am increasingly getting questions about the product (and applications) rather than the system that selects it. It is this area where a self-help service product diagnosis system that I can see coming on line to aid our engineers in providing this support autonomously.

- Teachers could possibly use automation more in terms of assessment - and then patterns might be presented in terms of individual pupil progress. There might be improvements in development of programming languages (PL) or pedagogies used in the teaching of computer science which will be because of AI/ML - for example using eye tracking and then ML to compare PL or pedagogical approaches... this is starting to be seen. There could be data crunching and data analysis type opportunities e.g. comparing GCSE results with other local data... this might be used to inform policy.

- Aircraft stand operations optimisation and early indicators of delays, apron and taxi-way movement non-compliance and optimisation.

THINK

WE WILL LOSE MIDDLE TO SENIOR MANAGEMENT, MID-LEVEL PROFESSIONALS – EVERYONE EXCEPT THOSE IN CREATIVE INDUSTRIES OR ROLES.

WHAT SHOULD GOVERNMENT DO?

Members had plenty to say on what involvement government should have with the complex issues emerging from AI application.

Here is a selection, under relevant headings:

THE MONEY

- Subsidies for companies undertaking AI automation capability development, as long as they have a proven track record. Subsidies for companies and organisations utilising AI automation.
- Grants for development of applications for social good.
- Invest in AGI more than AI. Include a much wider range of disciplines including ethical, psychological and biological.

LEGAL AND POLICY

- UK government needs to develop the legal and regulatory framework that supports an ethical use of AI and provides a greater degree of certainty to developers on issues such as liability and accountability. The 'implement first and fight the court case' approach of entities like Uber and Airbnb seems unsuitable for AI, which will be involved in decision making involving humans.
- Support and encourage thinking and debate around the ethical aspects of using AI including to encourage development of an understanding of ethics and the ethical challenges.
- Run roadshows for businesses about the opportunities AI offers.
- Legislate to relax restrictions on the use of personal data for training AI systems. At present, only large companies like Google, Apple and Amazon have sufficient amounts of usable data, so they have the edge.
- Develop a culture throughout society that values expertise and of software engineering being a 'profession' with professional standards and training. Many people still think a software engineer 'mends' their PC in PCWorld!

- Government should provide a legal framework for the delegation of decision making to AI systems, working with professional bodies to ensure ethical content is at the centre of AI activity, whilst providing professional certification through courses.
- We need a national standard that defines different categories of AI (particularly the delta between general and narrow), addresses ethical questions around the use of AI and makes clear the need for accountability when AI solution error rates have negative effects on consumers. A discussion around bias is also needed, making the case that while there will be inherent bias in AI systems, human bias has historically been much more of a challenge.

INFRASTRUCTURE

- Cancel HS2 spend the money on gigabit fibre throughout the UK. Tax relief on research and development; mandate AI in the civil service.
- Identify and fund real applications with tangible benefits, accreditation of systems, infrastructure investment (e.g. 5G for high bandwidths and data rates).

EDUCATION

- AI education should be taught at an introductory level from primary and secondary school.
- Government needs to see through the hype and 'me too' noise, and invest in maths, data and computer science skills. AI is hard, and most people will fail to gain benefits from it. We need to minimise nugatory investment. Stop positioning RPA as AI would be a good start.
- In the popular press AI loosely means machine learning statistical techniques - curve fitting and classification. But there are many other techniques that are more robust, traceable, and – critically – explainable.

- We need more Kaggle style competitions. (Kaggle is an online community of data scientists and machine learners. Kaggle allows users to find and publish data sets, explore and build models in a web-based data-science environment, work with other data scientists and machine learning engineers, and enter competitions to solve data science challenges.)

- What about another Alvey Programme? The original Alvey Programme was a British government sponsored research program in IT that was a response to the Japanese fifth generation computer project in the 1980s. It also looked at big issue subjects such as very large scale integration technology; intelligent knowledge-based systems and AI; software engineering and man-machine interfaces.

- We need to adopt the principles of explainable artificial intelligence to ensure AI is developed in a way that can be scrutinised and trusted by non-AI people and would help with bias and thus confidence in outcomes.
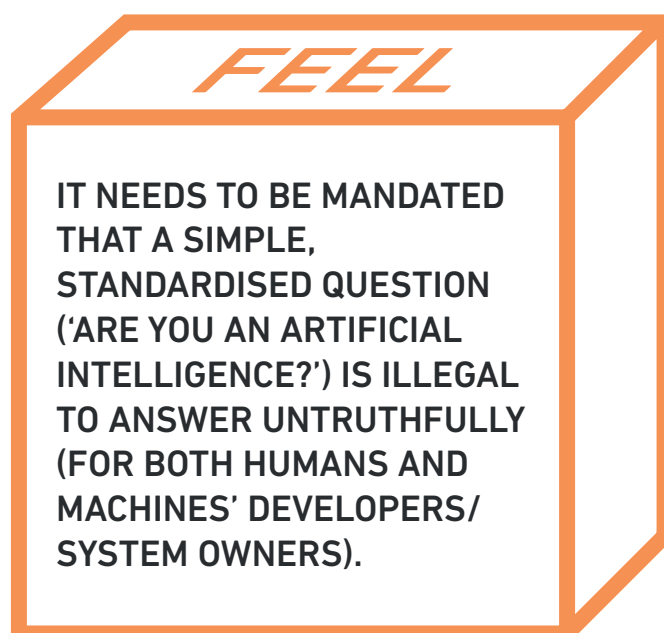
CONTEXT

- If we take the longer-term view, integrity of AI is the most important factor. We must comprehend AI's limitations. AI can add great value but must be used as a tool, part of the tool set, not a 'silver bullet'.

- We need to develop glass-box AI, which uses many human-understandable steps in its operation to demystify AI's inner logic.

- There must be a recognition that many in society will not wish to interact with AI or trust it in any shape or form, so must not be excluded by this desire.

- Pay attention to enabling technologies, for example artificial life, machine learning, data analytics, distributed architectures and biometrics.

FOR OUR CLOSING REMARKS, LET'S LOOK AT THE SERIOUS AND THE LIGHTHEARTED(?):

Government should:

- Make BCS the ethical leaders in the world.
- Create an AI institute.
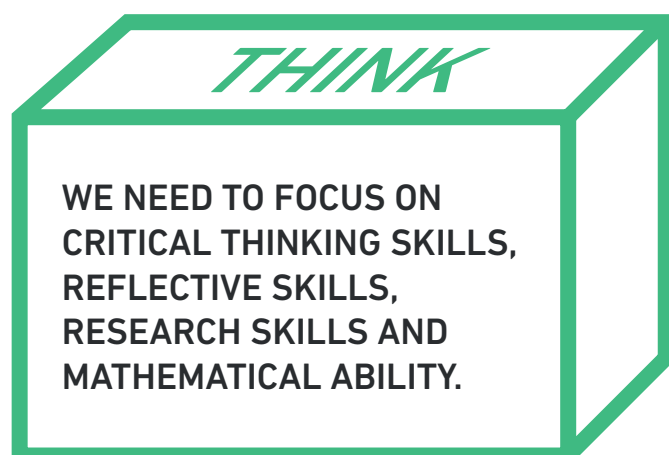- Replace themselves with AI.

AI KEY FINDINGS

- 54% of organisations polled currently use AI or machine learning in their business.
- Of the remainder, 32% plan to use it in the near future.
- The top use cited is 'automation of mundane or repetitive tasks', which 48% chose. This rises to 66% for future use, still the top answer.

- The lowest rated answer for current use was marketing and advertising 14%; and for future use it stands at 28%, still the lowest answer of the seven options presented.

- Top three answers on how to develop AI talent: Upskilling/on the job training 73%; career development planning 49%; professional certifications 38%.

- When asked the importance of AI in achieving the organisation's long-term goals, those rating it 'quite' and 'very' important was 64%.
- For current investment in AI innovation and research the top answer was the one to 10% bracket, with 38% choosing it.
- For where investment in AI innovation and research would be in five years' time: 45% said between 11 and 50% of their investment budget.
- When asked the most important project phases: 45% chose 'user requirements gathering' as their first choice. 'Monitoring for bias and bad decisions' made a fairly strong showing, with 40% rating this as one of the top three phases.

FEEL

IT NEEDS TO BE MANDATED THAT A SIMPLE, STANDARDISED QUESTION ('ARE YOU AN ARTIFICIAL INTELLIGENCE?') IS ILLEGAL TO ANSWER UNTRUTHFULLY (FOR BOTH HUMANS AND MACHINES' DEVELOPERS/ SYSTEM OWNERS).

THE AI SKILLS GAP

Whilst it is widely acknowledged that the UK has a general IT skills gap, the same obviously applies to new tech areas and areas of rapid growth. BCS asked its members about their experience of the AI skills market – where the gaps are and where they may soon emerge…

THINK

WE NEED TO FOCUS ON CRITICAL THINKING SKILLS, REFLECTIVE SKILLS, RESEARCH SKILLS AND MATHEMATICAL ABILITY.

First, we asked what skills are most difficult to recruit for. One member set the scene with this remark – '**What skills are most difficult to recruit for? Most of them. As most tools and technologies are quite young, experience is an oxymoron and so developer skills are lacking.**' In general, the answers to this question fell into four broad categories.

'IT SKILLS'

Data scientists was the most common free-text answer we had to this question. Machine language engineering also came up, with one specific mention for '**someone to put the dataflows in place so the AI can happen.**'

Here are three other specifics:

- Pragmatic / realistic metamodel technicians.
- Quantitative analysts.

- Those who can apply expert system methodology into website applications and link up with big data.
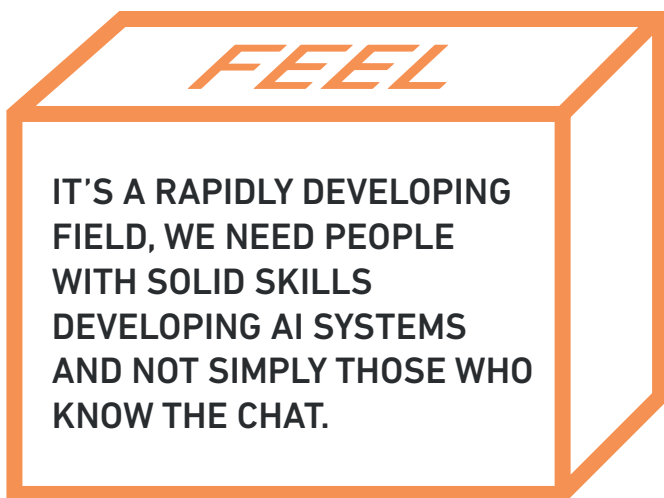
We can also drill into the data on skills and platforms by specific rates of mention: Google machine learning, Amazon and robot process automation came up regularly. Actually, name-checked were Tensorflow and IBM's Watson, both with 13 mentions; and Microsoft AI services, with 20.

The way forward? According to one comment, **'What we need are AI-focused science and engineering degrees, online training, and AI-specific certified operational, scientific and maintenance roles.'**

'UNDERPINNING PRINCIPLES'

Alongside mentions of specific technologies were a lot of comments on the personal qualities that respondents considered important. Among these, the ideas of critical thinking and creative thinking predominated. In short, as one member wrote, **'brains.'**

Other fundamentals cited were hard-core math skills; logic and common sense. Others drew a line between intelligence rather than knowledge, and recommended game theorists as being the type of people that could perform innovative algorithm development.

FEEL

IT'S A RAPIDLY DEVELOPING FIELD, WE NEED PEOPLE WITH SOLID SKILLS DEVELOPING AI SYSTEMS AND NOT SIMPLY THOSE WHO KNOW THE CHAT.

In line with BCS and IET's recent Turing Talk, statistical knowledge was also mentioned. Krishna Gummadi's talk looked at the difficulties of being truly unbiased in AI, not just because of the difficulty of cleaning data, but the fact that statistical operations mean than simply removing biased fields is insufficient to make the results truly unbiased.

DO?

RECRUIT MATHEMATICIANS. IT'S VERY HARD TO UPSKILL PEOPLE WITHOUT THIS BACKGROUND.
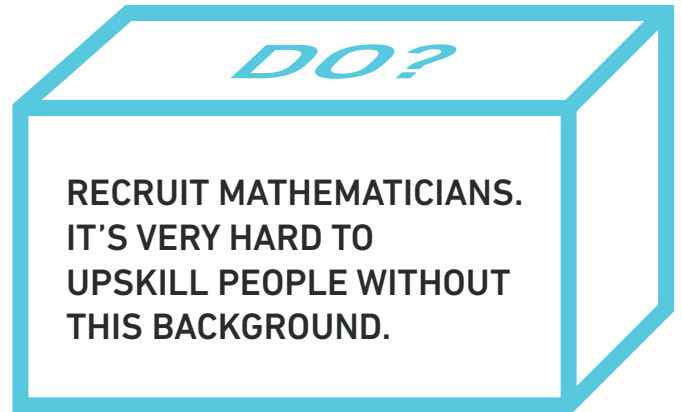
'BUSINESS SKILLS'

Another regularly occurring bugbear in the tech sphere is marrying tech nous with business need. A number of commenters thought that being business-minded was a skills gap worth mentioning – specifically the ability to map business benefits to relevant AI toolsets. Indeed, a general understanding of business need was considered vital to an AI specialists' skillset.

'ETHICS'

Unsurprisingly the other major area of concern was finding people who understand bias; those who can consider the wider benefits/societal implications of AI activity.

Two member comments in this area:

- We need people with an in-depth understanding of issues surrounding big data and its proper use.
- We need those who 'get' the ethical dimension.

To follow on from this research BCS is producing a fuller paper in September 2019 with the IET. Look out for it!

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ATTENDEE EXCLUSIVE

Attendees of BCS Insights 2019 have 30 days
exclusive access to the background materials for
the event.

These include:

- The research materials for AI, Diversity (four ONS
  analysis documents and BCS member views), and
  IT leaders.
- A document of member experiences and
  commentaries
- An anonymised verbatim document from BCS
  members on ethical dilemmas they have faced.

These are at **bcs.org/BCSInsights2019research**