

IET skills for a digital future 2023 survey



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The guide only intends to identify the relevant issues and to inform a public policy debate around the topic, rather than to provide a definitive solution.

The IET would welcome any comments you may have on the contents of this guide, and your ideas for future publications. Please get in touch by emailing policy@theiet.org.



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1. Executive summary



The Institution of Engineering and Technology commissioned YouGov to undertake a survey assessing the UK's digital skills gap, its impact on employers, and potential solutions to the challenge.

The results show that there is a digital skills gap in the technology sector, and it is having a serious impact on business according to engineering employers. Fortunately, these employers believe their workforce is agile and offer solutions to the gaps.

All figures, unless otherwise stated, are from the YouGov plc. Total sample size was 1,235. The fieldwork was undertaken between 27th September and 30th October 2022.

Key findings

The digital skills landscape



Many engineering firms report having at least some staff that regularly use **robotics / automation (47%), artificial intelligence (45%), and virtual reality (32%)**.

However, far fewer firms have a **majority** of staff using these technologies.



For most, 'digital skills' is broadly defined. IT / communications generally have a stronger understanding of the range and specifics of digital skills within the engineering profession.

Current workforce needs



Half of engineering employers report issues with skills in the external labour market of **technical workers (54%)** and their current engineering / **technical workforce (47%)**.



A digital skills gap may be holding back the UK economy. Among those employers reporting a digital skills gap in their technical workforce, **49% say it harms productivity, 35% say it restricts growth, 35% say it harms innovation and 29% say it reduces their ability to deliver contracts.**

Skills level within engineering employers



Technicians are most likely to be considered an important staff level for organisations (88%) and for employers with skills gaps at this level, nearly half provide additional training to counteract this (48%).



Around three in ten of those with skills gaps at the technician level change recruitment plans as a result, for example to recruit more technicians to get the necessary coverage (29%) or recruit at other levels instead (28%).

Future of digital skills



Skills in emerging technologies are expected to be more important in the near future than they are now, such as artificial intelligence (36%), extended reality (22%) and quantum engineering / computing (22%).



In terms of skills gaps in the near future – 31% of employers say that artificial intelligence / machine learning will be important to sector growth. However, 50% of these employers say they don't have the necessary skills in this area.

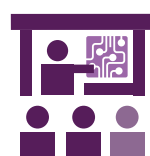


Three-quarters say their engineering / technical staff can apply existing skillsets to new situations, and would be able to adapt to new technologies (74%).

Technical training



Engineering employers identify technical skills shortages through qualitative feedback from managers (61%) and skills audits (31%).



Data shows that 87% of employers arrange or fund some form of training. The most common forms of training are on-the job (70%), in-house programmes (51%), online learning (51%), and formal qualifications (51%).



Findings show that 44% of engineering employers give their employees digital skills training. However, large employers (58%) are more than twice as likely as SMEs (27%) to give their employees digital skills training.

Strategies to gain digital skills



Half of engineering employers have a strategy in place for embedding digital skills with their workplace (51%). SMEs are less likely to have a strategy in place for this (41%). For 92% of those with a digital skills strategy, they will need additional skills to deliver it.



Employers state that the biggest impact the government could make is to support them as they reskill the existing workforce (58%), offer more funding for apprenticeships (39%), and support schools and colleges to offer better careers advice (33%).

2. Recommendations

Government

1. **Funding for upskilling and reskilling**, for example using the unspent apprenticeship levy. Funding should be more flexible for employers to use where they need it most.
2. **Sustained support for skills in emerging tech**, training should not be seen as short term but as an investment in the future. Training takes time and there are key areas identified that companies think they will need skills for in the future.
3. **Targeted support for SMEs**, who may find it more challenging to provide training to their employees.

Industry

1. **Broad understanding at a leadership level of the opportunities a digital strategy can provide, regardless of sector.**
2. **Increase the value proposition for technicians**, who play a crucial role in implementing and maintaining new technologies.
3. **Although most employers report that their workforce is able to quickly adapt, there is still a need for agile thinking skills to help deliver on their digital strategy.**

Partnerships

1. **Improve awareness of the benefits of harnessing digital technology**, driving more businesses to use cutting edge technology.
2. **Promote training partnerships, for example, using Institutes of Technology.** This can complement options such as in-house training.
3. **Broaden opportunities for developing digital skills**, for example professional registration and micro-credentialing.

3. Approach and analysis



Approach and respondent profile

The IET commissioned the independent research agency YouGov to deliver this research with UK employers of engineering and technology staff. For an employer to be eligible to take part in this research they had to employ at least one engineering or technology employee and overall employ at least six employees. There was no upper limit on the number of employees and the research includes views from organisations with six employees through to those who employ thousands.

The focus of the research was to explore the current understanding and challenges around digital skills, what digital skills are needed in the near future, and how employers are responding to digital technologies. YouGov worked with the IET to develop a survey, which was delivered to senior decision makers in engineering employers through an online mode. The fieldwork was conducted online between the 27th September and 30th October 2022. All of the professionals who responded were drawn from the YouGov panel of over 2.5m people in the UK.

In total 1,235 respondents from engineering employers completed the survey. All professionals who responded on behalf of the organisation they work for had managerial responsibility. The final achieved sample

was weighted to be representative of engineering employers by size and region. The sample provided coverage across the following target sectors, size of organisation, and nation (Figure 1).

Guidance on analysis

The data in this report represents the views of a sample of employers who employ at least one engineering and technology employee in the UK. The demographic make-up of the sample closely matches that of the UK employer population by organisation size and location (region). Therefore, when looking at data at the total population level, inferences can be made that the views of the sample collected here represent the views of the wider employer population. Throughout the report, the results at the total sample level are described using the term 'engineering employers'.

A number of industries are covered by the sample, however, the views of these individual industries should be interpreted as the views of the employers who responded to this survey. The achieved samples are not necessarily representative of the wider employer population in those industries. A number of industries have response numbers under 100 and in particular the aerospace & defence and energy industry responses should be treated with caution.

Figure 1: Breakdown of achieved sample by industry, organisation size and nation

	Unweighted base	Weighted base
Industry		
IT & Communications	205	200
Transport	147	142
Construction	255	258
Electrical & electronics	68	72
Aerospace & defence	37	36
Manufacture	442	446
Energy	37	36
Other	44	46
Size		
IT & Communications	72	82
Transport	243	277
Construction	185	212
Electrical & electronics	735	663
Nation		
IT & Communications	1092	1094
Transport	78	77
Construction	43	39
Electrical & electronics	21	24

4. The digital skills landscape



Key findings



Many engineering firms report having at least some staff that regularly use **robotics / automation (47%)**, **artificial intelligence (45%)**, and **virtual reality (32%)**. However, far fewer firms have a **majority** of staff using these technologies.



For most, 'digital skills' is broadly defined. IT / communications generally have a stronger understanding of the range and specifics of digital skills within the engineering profession.

What are digital skills?

There is a broad range of what employers consider to be 'digital skills'. When asked to describe digital skills in their own words, the most frequently given answers focused on computer literacy. Employers working in the IT and communications industry were more likely to relate answers to coding, specific software engineering, privacy software, and programming. Employers in other

sectors described digital skills as relating to IT skills, design, using basic computer software and analysing data. This suggests that employers working in IT/communications have a stronger and more specific grounding in what digital skills mean, whereas those in other sectors are less likely to be familiar.

Figure 2: What respondents described as "digital skills"

IT and communications

“ Skills required to design, deliver and operate the cloud, network and security services required to provide our customers with the capacity and capabilities to achieve their business goals. ”

“ Programming, cyber security, networking, software administration. ”

“ Coding, programming, software design, use of social media for marketing and communicating with stakeholders, data visualisation, work that relies solely on the use on online systems. ”

“ Software engineering, but also other skills such as product development expertise, knowledge of privacy, digital marketing expertise, user interface design and so on. ”

“ The ability to master new and potentially complex software applications and processes driven largely by software. ”

Other sectors

“ It's the ability to understand, process and analyse data. Using various packages to achieve this. ”

“ Use of IT software be that apps or traditional software such as CAD or MS office. ”

“ Excellent computer skills, including MS Excel, able to create presentations, research topics from reliable sources, experience using shared drives and platforms, potentially including some design and / or data management software. ”

“ Coding, programming, software design, use of social media for marketing and communicating with stakeholders, data visualisation, work that relies solely on the use on online systems. ”

“ IT literacy for creating websites etc. ”

“ Having good IT knowledge, but not necessarily being at a high level - coding or whatever. ”

“ Digital skills means modern computer skills. ”

“ Digital skills are defined as the ability to find, evaluate, use, share, and create content using digital devices, such as computers and smartphones. ”

Q: In your own words, what would you describe as "digital skills"?
Base: All respondents (1,235)

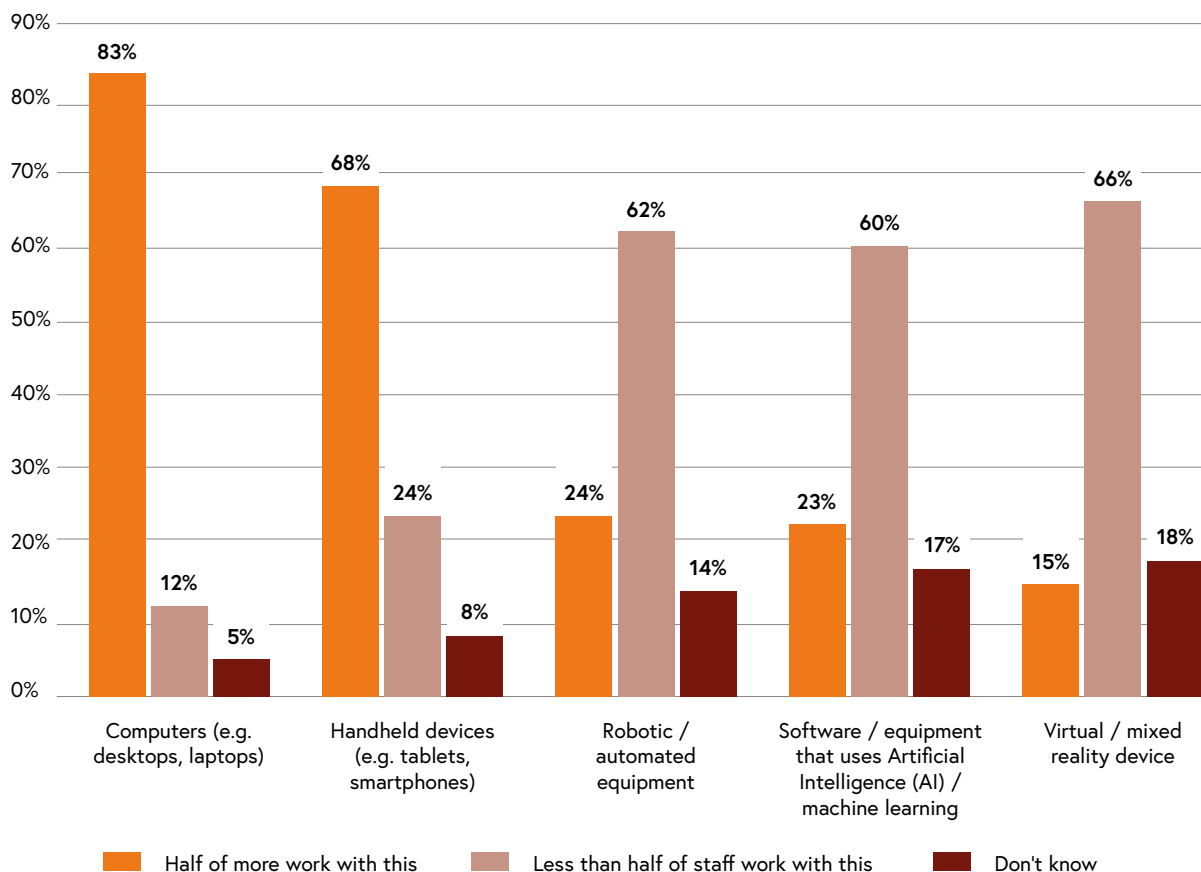
Who uses digital technologies?

A majority of employers said that at least half their staff regularly work with computers (83%), followed by handheld devices (68%). However, for robotic/ automated equipment (24%), software/ equipment which uses AI (23%) and virtual/ mixed reality devices (15%), fewer employers report that at least half of their staff work regularly with these technologies. A majority of employers report that less than half of their staff regularly work with these forms of hard/ software.

There is some variation between sectors in how likely they are to take up newer technologies within their engineering and technical staff. Those employers in IT/ communications are significantly more likely to report that at least half of their staff regularly work

with software/ equipment that uses AI (49%), this is followed by transport (25%) and electrical/ electronics (21%). The sector least likely to have half or more of their staff working regularly with software/ equipment which uses AI is manufacturing (15%, with 65% saying that under half of their staff work regularly with this). This same pattern can be seen reflected in the use of virtual/ mixed reality devices, where half of those in IT/ communications (34%) said that at least half of their staff work with these devices regularly, compared to the transport (19%) and construction (15%) sectors. Again, the sector least likely to have half or more of their staff working with this is manufacturing (9%), - 71% say that less than half of their staff work regularly with virtual/ mixed reality devices.

Figure 3: Proportion of your UK engineering/ technical staff who regularly work with each of the following



Q: Approximately what proportion of your UK engineering/ technical staff regularly work with each of the following?

Base: All respondents (1,235)

5. Current workforce needs



Key findings



Half of engineering employers report issues with skills in the external labour market of **technical workers (54%)** and their current **engineering / technical workforce (47%)**.



A digital skills gap may be holding back the UK economy. Among those employers reporting a digital skills gap in their technical workforce, **49% say it harms productivity**, **35% say it restricts growth**, **35% say it harms innovation** and **29% say it reduces their ability to deliver contracts**.

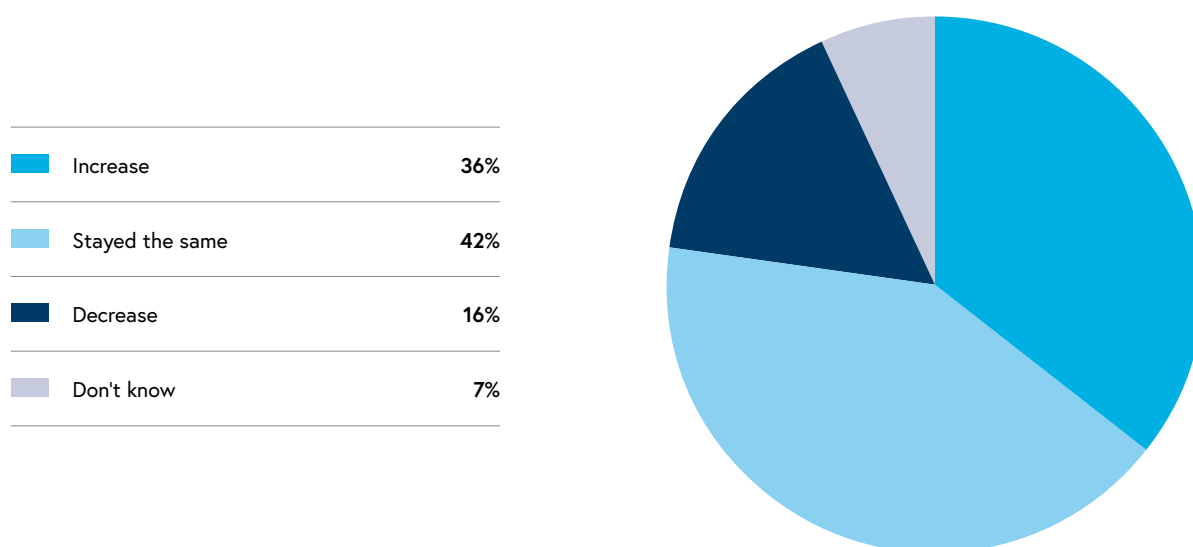
How does changing headcount affect skills needs?

Two-fifths of engineering employers have maintained a consistent number of engineering and technical staff over the past 12 months (42%), with 16% reporting a decrease. Overall, a third experienced an increased headcount (36%), rising to half in the IT/communications sector (50%). Smaller employers are more likely to maintain their headcount – almost two thirds of micro-employers said this (65%), falling to 52% of small employers, 45% medium, and only a third of large employers (33%).

The loss of these staff members has been felt in a number of ways. Amongst the engineering employers who have seen a reduction, several mentioned existing staff taking on a greater workload with some undergoing training to facilitate this.

Outsourcing work has also become a need for some, either to contractors incurring increased expenses, or to countries where labour costs are lower. Others felt the skills their organisation needed were hard to find in external candidates, again requiring training to improve existing skillsets or increased salaries due to the difficulty in recruiting or retaining staff.

Figure 4: Change in engineering/technical workforce headcount in the last 12 months



Q: Has your UK engineering/ technical staff headcount increased, decreased, or stayed about the same over the last 12 months?
Base: All respondents (1,235)

Figure 5: Change in skills needs due to decreased headcount

Q: You mentioned that the headcount of your engineering/ technical staff has decreased over the last 12 months... How have your organisation's skills needs changed as a result?
Base: All who say their engineering/technician headcount has decreased in the past 12 months (195)

“ Interpersonal relationships with the experts within have been increased. There's also a yearly budget per technical resource for training which they are actively encouraged to use. ”

“ The need to innovate has increased while workforce head count has shrunk. Remaining workforce required to help sort out additional burdens on the business. ”

“ We are squandering what more senior staff we have to fulfil workload, detracting from our strategic, standards, and compliance work. None of that has altered our skills profile. We want headcount, not re-profiling. ”

“ Remaining engineers have had to take on the work left by leaving staff. ”

“ They haven't. We find the long term staff are able to step up to take on more work for a better salary. ”

“ Smaller workforce due to reduced workload. ”

“ We cannot become competitive in production and innovative and remain less agile. ”

“ There is a major lack of skilled engineers in the current market. Our best tradesmen have been head hunted by larger firms and we have had to replace them with poorer qualified staff. ”

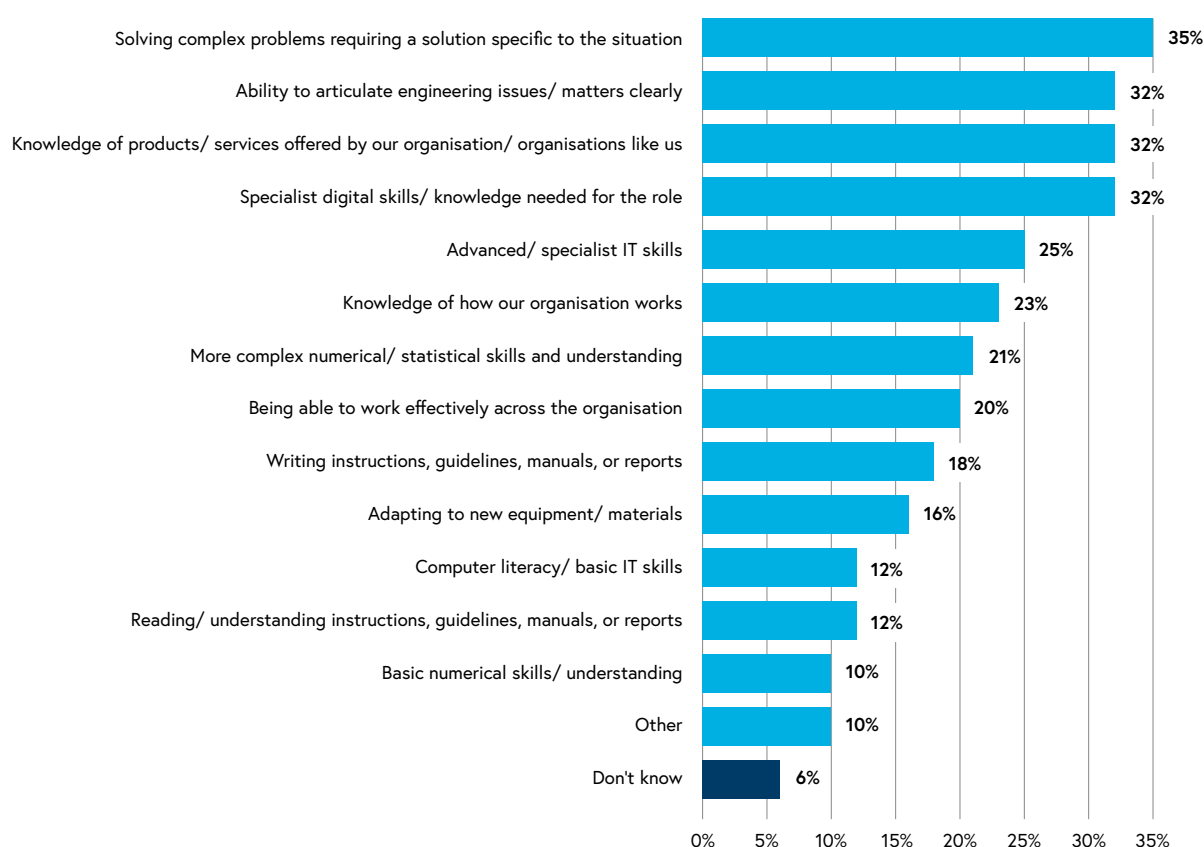
What skills shortages are employers seeing?

At a total level, over half of engineering employers surveyed report having difficulties with engineering/technical staff lacking skills when recruiting externally (54%). This is similar across sectors and organisation sizes. The core skills that engineering employers reported external hires to be lacking were:

- Solving complex problems requiring a solution specific to the situation (35%)
- Ability to articulate engineering issues clearly (32%)
- Knowledge of products and services offered by the organisation (32%)
- Specialist digital skills and knowledge needed for the role (32%)

Overall, two-fifths (40%) say the external labour market lacks any level of IT skill (basic or advanced) or skills in adapting to new equipment. Those in the IT/communications industry are most likely to report the external workforce is lacking in advanced/specialist IT skills (47%), while manufacturing employers are most likely to report skills deficits in adapting to new equipment/ materials (21%) – key digital skills in their industries.

Figure 6. Skills lacking in the external labour market



Q: You mentioned that you have difficulties with the skills in the external labour market when you try and recruit engineering/ technical staff... Which, if any, of the following skills are lacking?
Base: All who had difficulties with external labour market (673)

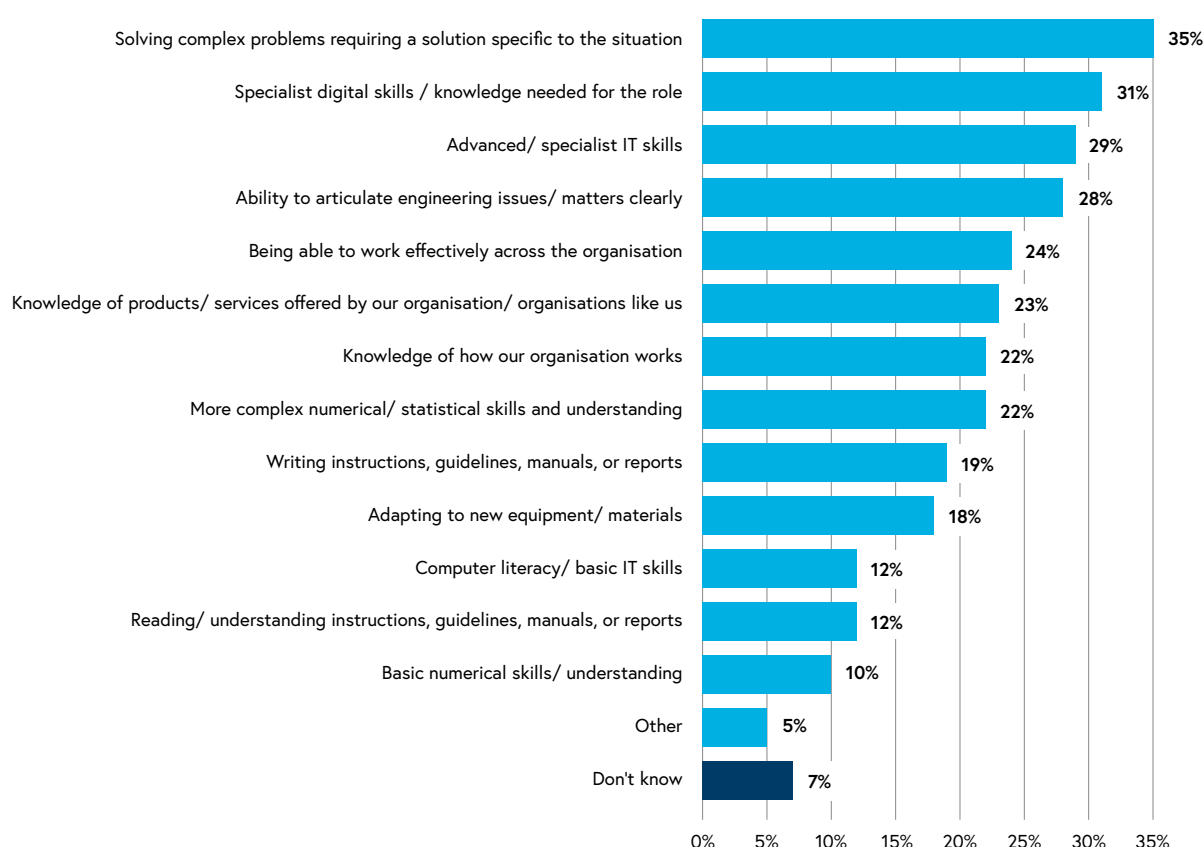
Alongside this, almost half of engineering employers (47%) report skill gaps within their internal engineering and technical workforce. Large employers are more likely to report this than SMEs (50% vs 44%), although there is little variation by sector.

The key skills lacking internally are broadly similar to those lacking in the external market:

- Solving complex problems requiring a solution specific to the situation (35%)
- Specialist digital skills and knowledge needed for the role (31%)
- Advanced or specialist IT skills (29%)
- Ability to articulate engineering issues clearly (28%)

Almost half of engineering employers who have internal difficulties say their staff are missing any level of IT skill (basic/ advanced) or skills in adapting to new equipment (47%). Again, the IT/ communications employers are most likely to see a lack of advanced/ specialist IT skills in their internal workforce (49%), while the construction industry is most likely to see a lack of computer literacy/ basic IT skills internally (17%).

Figure 7: Skills lacking in the internal workforce



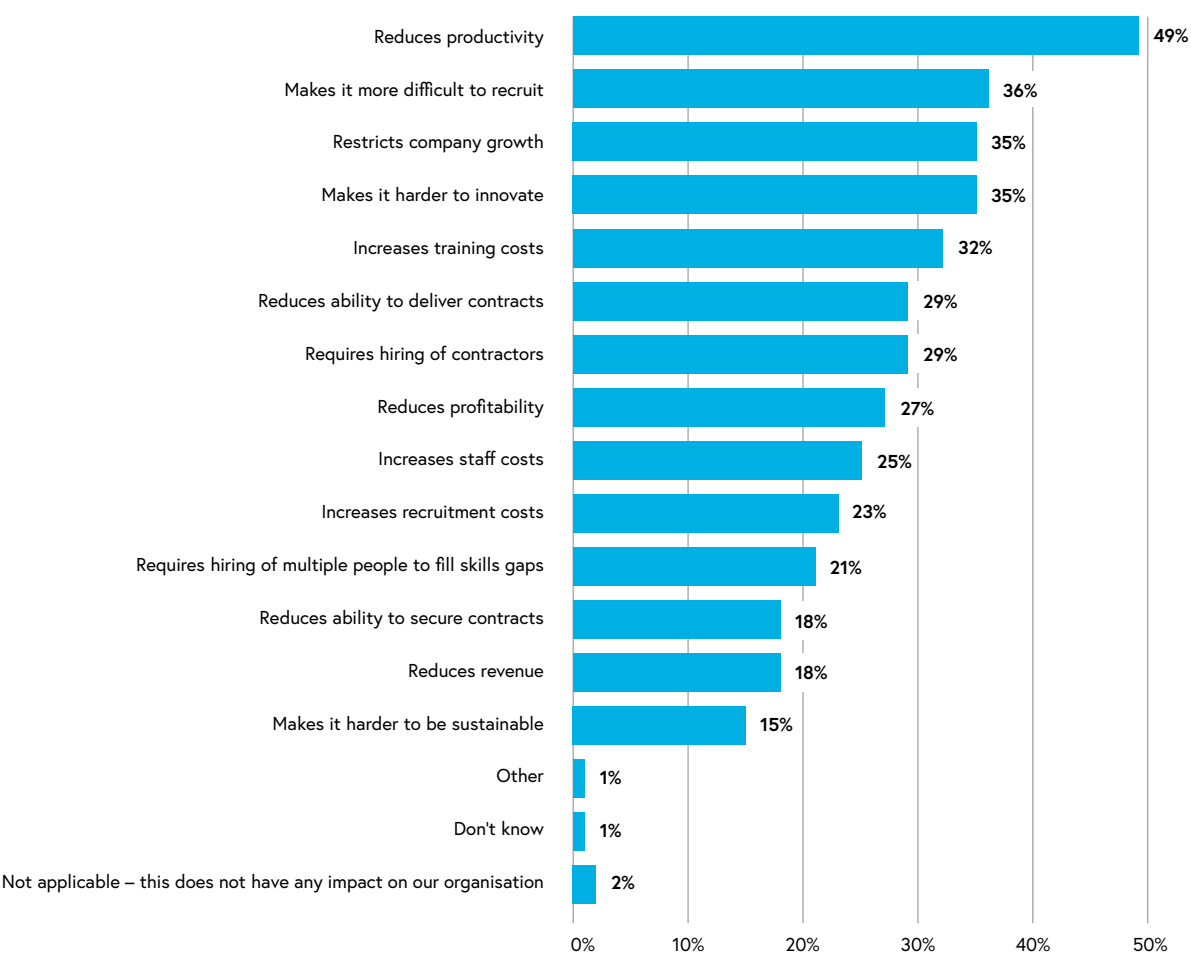
Q: You mentioned that you have difficulties with the skills in your internal engineering/ technical workforce... Which, if any, of the following skills are lacking?

Base: All who have difficulty with internal skills (586)

Of those who mentioned internal engineering and technical staff having skills gaps around new equipment or IT skills (i.e. "digital skills"), reduced productivity is the most commonly cited consequence (49%). Other ramifications include difficulty recruiting (36%), a barrier to innovation (35%), and restricted company

growth (35%). Reduced productivity is an issue across all sectors while difficulty recruiting is most commonly seen for employers with gaps in internal staff at a professional level (46%). This is consistent across industry and organisation size.

Figure 8: Impact of skills gaps in adapting to new equipment or IT skills internally



Q: You mentioned you see engineering/ technical staff with skills gaps around adapting to new equipment or IT skills... Which, if any, of the following impacts does this have on your organization?
Base: All who see skills gaps around adapting to new equipment or IT skills (412)

6. Skill levels within engineering employers



Key findings



Technicians are most likely to be considered an important staff level for organisations (88%) and for employers with skills gaps at this level, nearly half provide additional training to counteract this (48%).



Around three in ten of those with skills gaps at the technician level change recruitment plans as a result, for example to recruit more technicians to get the necessary coverage (29%) or recruit at other levels instead (28%).

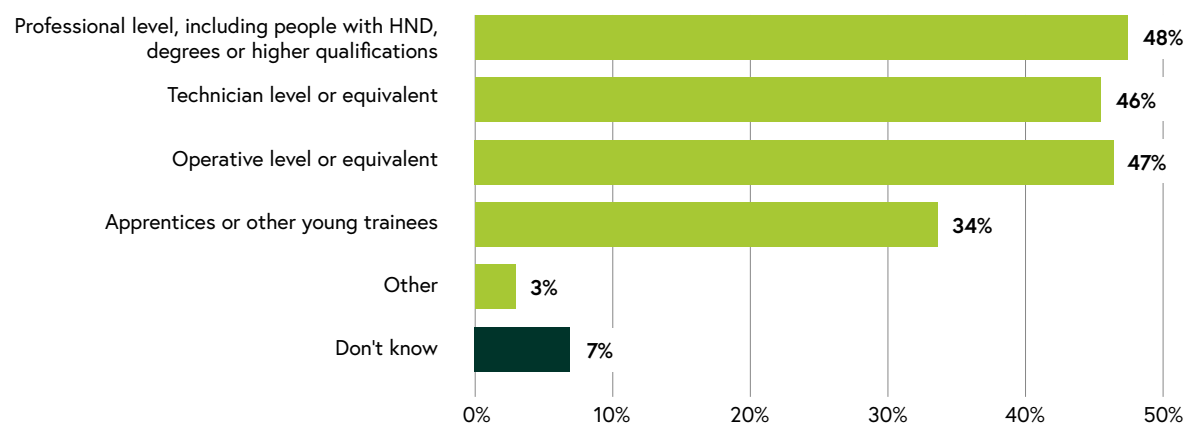
What levels are skills shortages seen in?

Of those who are facing difficulties with the skills in their engineering/ technical workforce, almost half say they are seeing gaps at a professional level (48%), operative (47%), or technician level (46%). Around a third say they are seeing engineering/ technical skills shortages in their apprentices or other trainees (34%). Large engineering employers are more likely than SMEs to say they are having issues with professional level technical skills (52% vs 43%) - but this may be in part due to the fact that large employers are more likely to employ this level in the first place (94% of those

in large organisations employ professionals with a qualification at HND/ degree or above, compared to 81% of SMEs).

The proportion reporting gaps in engineering/ technical skills at technician level is fairly consistent across engineering employees, with the exception of those in manufacturing – where over half (53%) say this is an issue. Those in manufacturing are also the most likely to say skills gaps are an issue at the operative level (51%).

Figure 9: What levels are affected by skills gaps in their existing engineering/ technical workforce



Q: You mentioned that you have difficulties with the skills in your internal engineering/ technical workforce... Do gaps in skills within your existing engineering/ technical staff concern...?
Base: All who have skills gaps in their internal engineering/ technical workforce (586)

How important is each skill level?

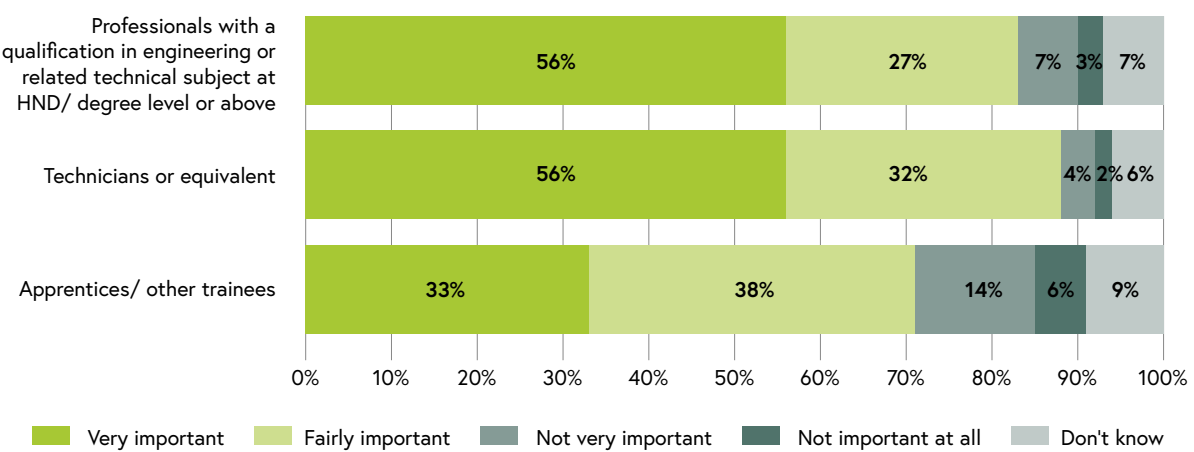
When thinking about how important various levels of engineering/ technical staff are to their organisation, technicians are considered the most important (88%), closely followed by professionals (84%). Around seven in ten engineering employers say apprentices/ other trainees are important (71%).

Almost all engineering employers who are seeing skills gaps at the technician level say technicians are important for their organisation (98%), and almost three quarters say they are very important to the organisation (72%). Those in large organisations are more likely than those in SMEs to say professionals

(86% vs 81%) or apprentices/ trainees are important (78% vs 63%), but there is no variation across organisation size for technicians – engineering employers are unanimous in thinking they are important (87% large vs 88% SME).

Engineering employers in the electrical/ electronics industry are the most likely to say technicians are very important to their organisation (65%), followed by those in the transport sector (60%). Only half of employers in IT/ communications think technicians are very important to their organisation (48%).

Figure 10: Importance of engineering staff of various levels to the organisation



Q: How important, if at all, are engineering/ technical staff at each of the following levels to your organisation? *Base: All respondents (1,235)*

Given that technicians are widely seen as important to engineering organisations, employers generally provide additional training where there is a shortage of skills. Half of engineering employers who see skills gaps at technician level say they provide additional training (48%). Around three in 10 recruit more technicians to get the necessary coverage (29%) or recruit at other

levels instead (28%). Just under a quarter are providing lower salaries/ benefits to technicians as a result of seeing skills limitations at that level (23%). There are no significant differences in impacts across organisation size - but for SMEs, lower salaries/ benefits is the second-most common impact of technicians lacking skills (27%).

Figure 11: Impacts of having skills gaps at technician level

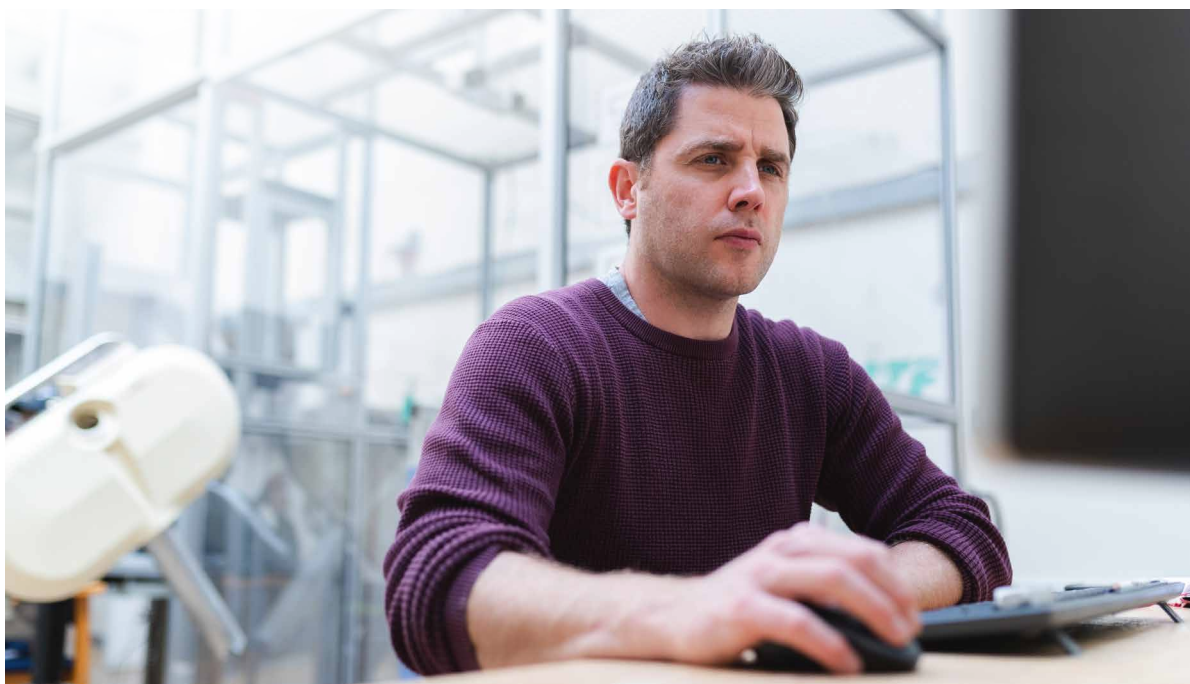


Q: You previously said that your organisation has skills gaps or limitations at a technician/ equivalent level... Which, if any, of the following impacts does this have on your technicians/ equivalent staff?

Base: All with skills gaps at technician/ equivalent level (272)



7. Technical training

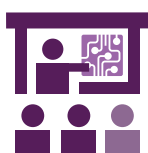


Key findings



Engineering employers identify technical skills shortages through

qualitative feedback from managers (61%) and skills audits (31%).



Data shows that 87% of employers arrange or fund some form of training.

The most common forms of training are on-the job (70%), in-house programmes (51%), online learning (51%), and formal qualifications (51%).



Findings show that 44% of engineering employers give their employees digital skills training.

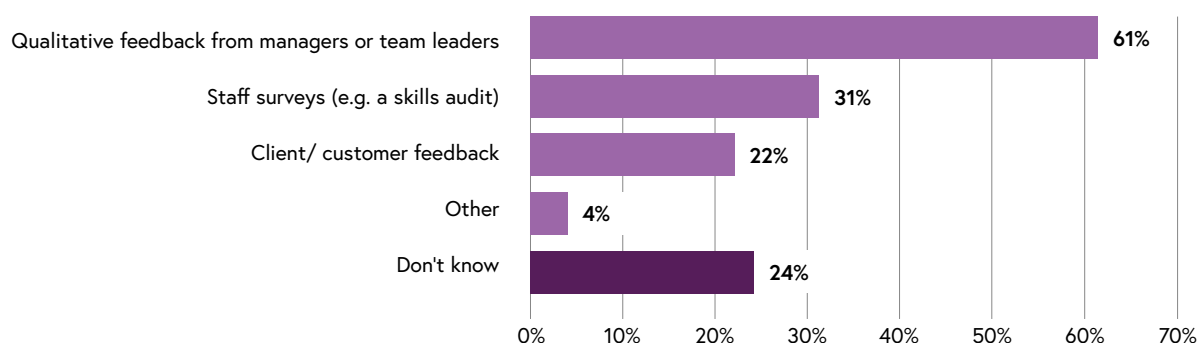
However, large employers (58%) are more than twice as likely as SMEs (27%) to give their employees digital skills training.

How do employers know what skills are needed?

Most engineering employers rely on qualitative feedback to understand whether there are skills shortages in the internal engineering/ technical workforce (61%). Only three in 10 conduct skills audits (31%), and a fifth use client/ customer feedback (22%). Large employers are more likely than those in SMEs to use skills audits to evaluate if there are skills shortages (37% vs 24%). Micro-employers with six to

nine employees were the most likely to say they use an approach not listed (10%). The other approaches direct observation of a small number of staff and other reviews (e.g. regular performance assessments).

Employers in the IT and communications sector are the most likely to say they consider client/ customer feedback (34%) in evaluating whether their technical workforce has skills shortages. They are also the most likely to use skills audits (38%), closely followed by those in the construction sector (37%).

Figure 12: Ways of identifying skills shortages within the engineering/ technical workforce

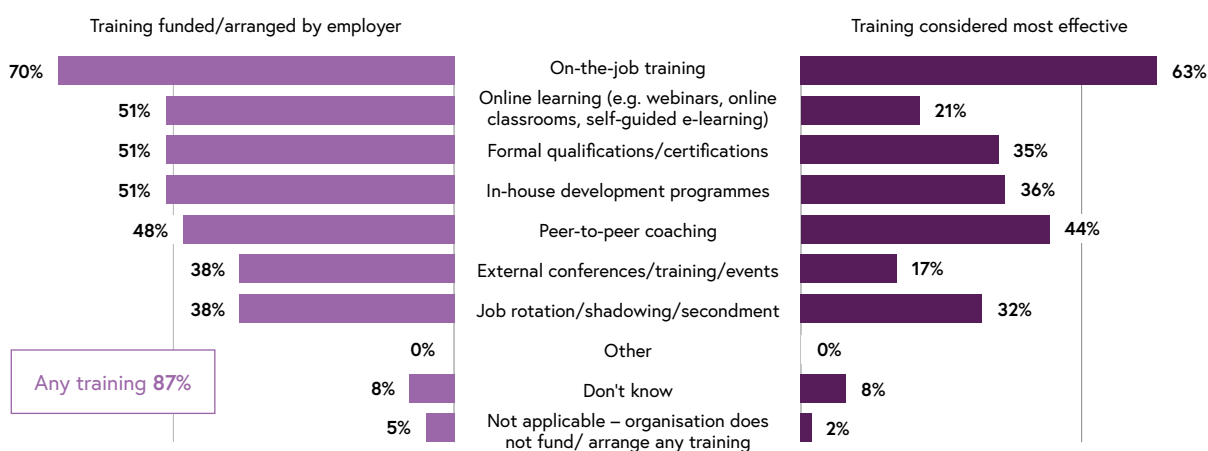
Q: In which, if any, of the following ways does your organisation identify skills shortages within the internal engineering/ technical workforce? Base: All respondents (1,235)

What technical training is provided?

Almost all engineering employers do fund or arrange some form of training to support their employees' technical skills (87%). The most common form of training offered is on-the-job training (70%), followed by in-house development programmes (51%), online learning (51%), and formal qualifications (51%). Although half of engineering employers say they fund/ offer online learning (51%), only one in five personally think this is one of the most effective ways of gaining/ improving technical skills (21%). Broadly, most employers think on-the-job training is an effective way to gain/ improve technical skills (63%). Peer-to-peer coaching is considered effective by many employers (44%) and is offered by just under half (48%).

Large engineering employers are more likely than SMEs to offer online learning (60% vs 40%). However, there is no difference by organisation size for whether they consider online learning an effective method (22% large, 19% SME).

Those in large organisations are more likely than SMEs to offer in-house development (61% vs 39%) or job rotation (46% vs 29%). They are also more likely to consider these effective pathways for technical skills – 39% in large employers think in-house development programmes are one of the most effective methods (vs 33% SME) and 35% think the same of job rotations (vs 28% SME).

Figure 13: Type of training funded/ arranged and considered most effective for technical skills

Q: Which, if any, of the following types of training does your organisation currently arrange or fund for employees to improve/ gain new technical skills?/ Which, if any, of the following types of training do you personally think are the most effective ways for someone to improve/ gain new technical skills? Base: All respondents (1,235)

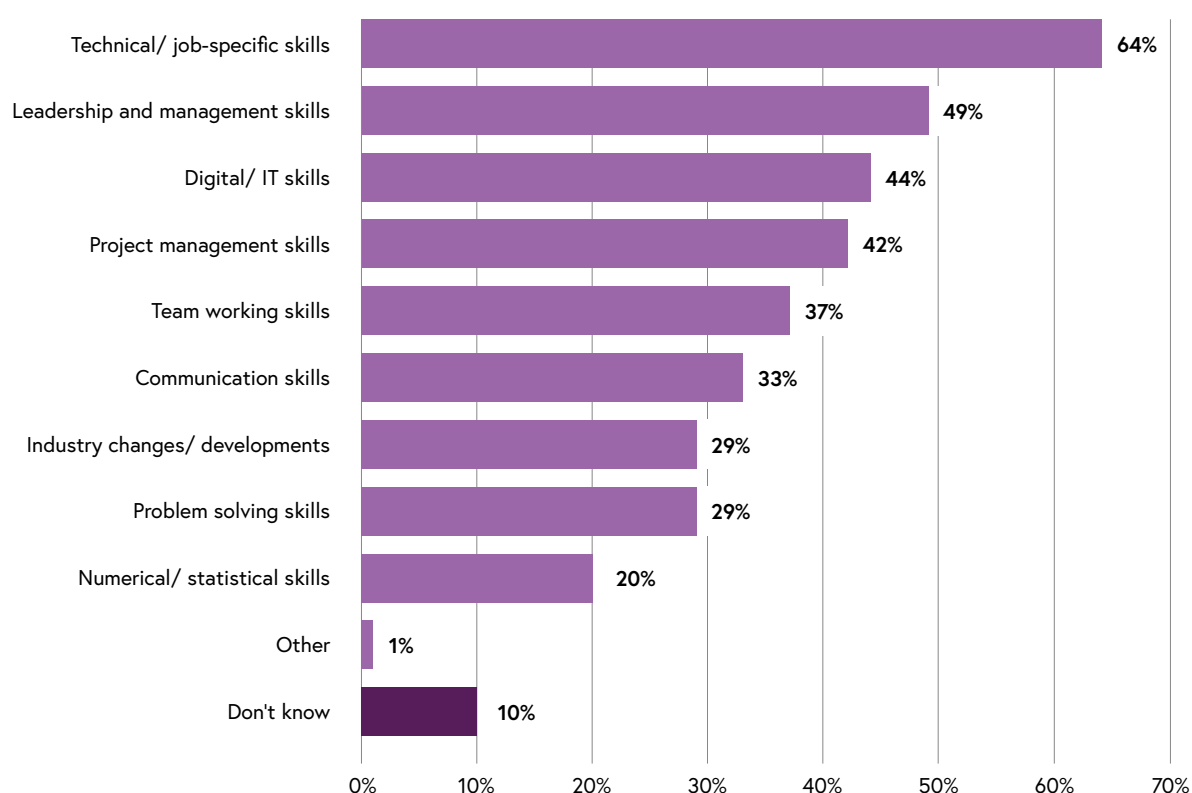
Among organisations who fund/ arrange training, almost two-thirds say the training is for technical/ job-specific skills (64%). There is no variation by organisation size for those who provide technical skills training (66% large vs 62% SME) - but for all other skills areas, large organisations are more likely to offer training than SMEs.

Over two-fifths organise training on digital/ IT skills (44%), rising to 58% of large engineering employers (vs 27% of SMEs). Six in 10 in the IT/ communications

sector say they offer training on digital/ IT skills (60%). They are also the most likely sector to offer training on communication skills (41%) and numerical/ statistical skills (26%).

Project management skills are offered by around two-fifths (42%), rising to over half of large organisations (55%) and those in the construction industry (52%). Employers in the construction industry are also the most likely to provide training on technical/ job specific skills (70%) and industry developments (33%).

Figure 14: Areas of training funded/ arranged



Q: Which, if any, of the following areas of training does your organisation currently arrange/ fund?

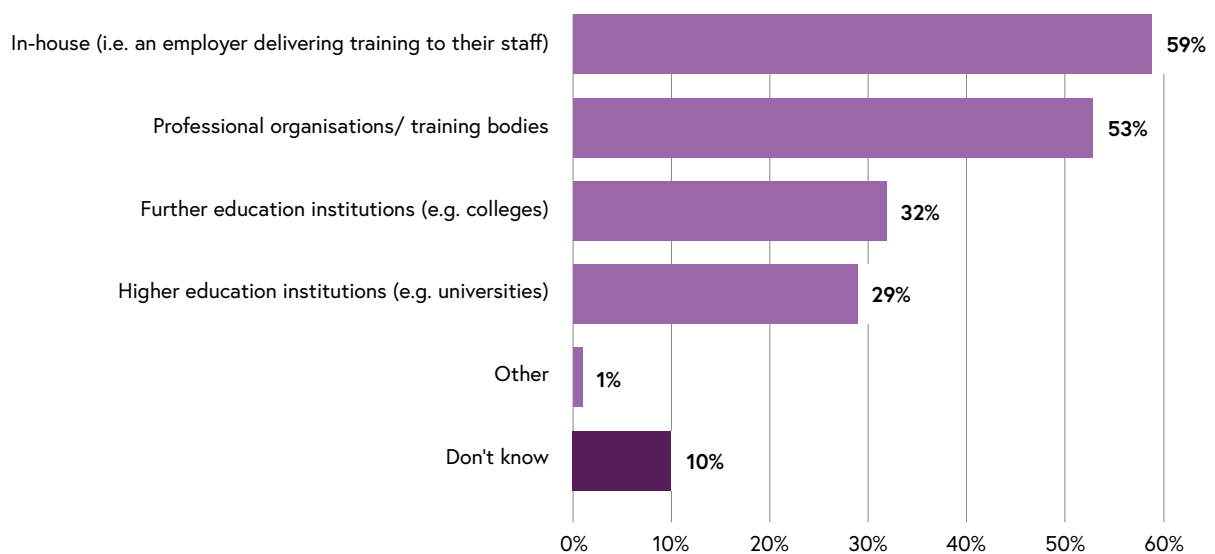
Base: All who arrange/ fund training (1,080)

Who should provide technical training?

Most engineering employers think they are themselves best placed to deliver technical training (59%), followed by professional organisations (53%). Only around three in 10 think further education institutions (32%) or higher education institutions (29%) are best placed to deliver technical training.

There is little variation across organisation size, but those in the transport industry are the most likely to say in-house training is best (68%). Those in the construction industry are the most likely to think professional bodies (60%), further education (38%) or higher education (36%) are well placed for technical skills training.

Figure 15: Organisations best placed to deliver training on technical skills



Q: Which, if any, of the following do you think are best placed to deliver training on technical skills?
Base: All respondents (1,235)



8. The future of digital skills



Key findings



Skills in emerging technologies are expected to be more important in the near future than they are now, such as **artificial intelligence (36%)**, **extended reality (22%)** and **quantum engineering / computing (22%)**.



In terms of skills gaps in the near future – 31% of employers say that **artificial intelligence / machine learning** will be important to sector growth. However, 50% of these employers say they don't have the necessary skills in this area.



Three-quarters say their engineering / technical staff can apply existing skillsets to new situations, and would be able to adapt to new technologies (74%).

What encourages an agile mindset?

Overall, most engineering employers would say their engineering/ technical staff are agile (74%) – meaning they can apply existing skillsets to new situations, adapting to new technologies. Over half think their technical staff are fairly agile (56%), with around a fifth thinking they are very agile (18%).

Those in large employers are less likely than SMEs to think their staff are agile (78% vs 70%). Those in the electrical/ electronics sector are the most likely to say their staff are agile (87%).

Engineering employers were also asked what encourages an agile mindset in technical staff, either in their organisation or elsewhere. Some employers emphasised the importance of having the autonomy to try new things or ensuring they are exposed to a variety of challenges, as this provides an opportunity to practice problem solving skills in a safe environment. Other employers also noted that an agile mindset arises from an organisation's overall culture of learning, with leadership recognising particular skills and providing appropriate training/ progression.

Figure 16: What engineering employers think encourages an agile mindset

What technologies should engineers know?

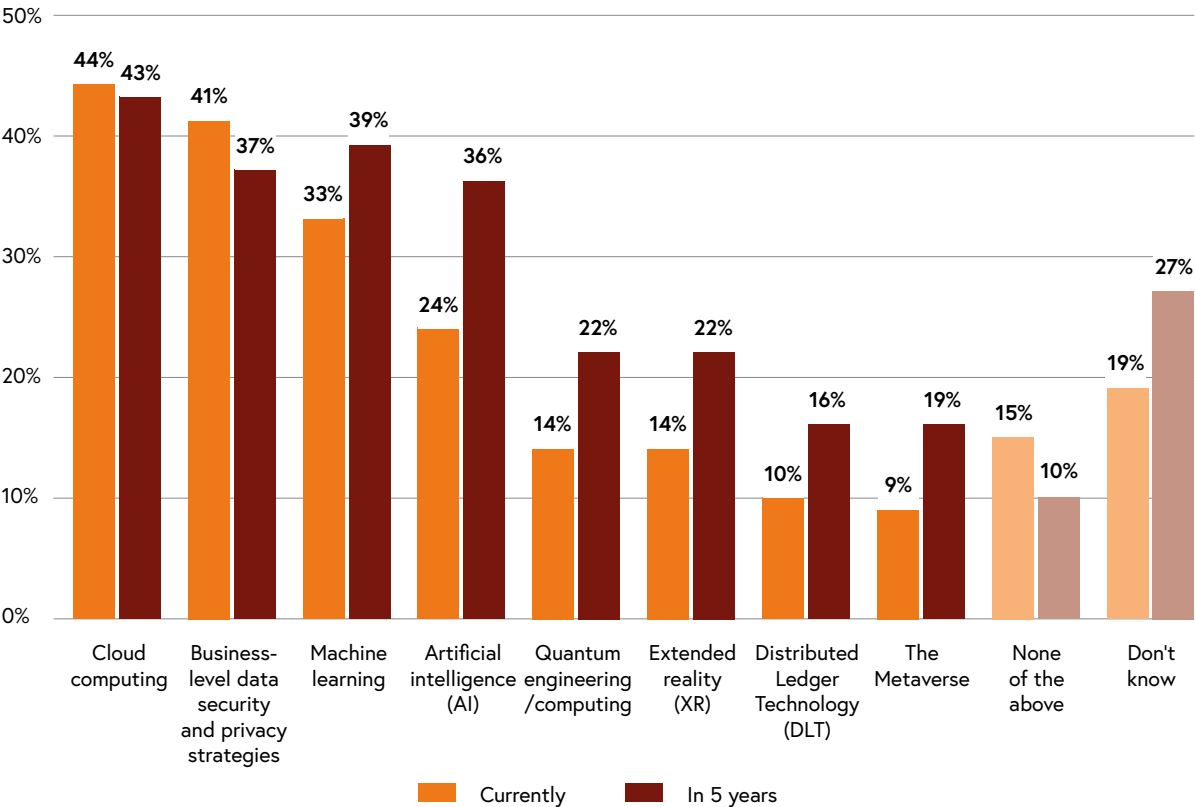
The technologies which employers are most likely to say their engineers should currently be able to use are cloud computing (44%) and business-level data security/ privacy strategies (41%). There is no significant difference for these two when compared with what employers think their staff should be able to use in five years' time (43% and 37% respectively). These two technologies are fairly widespread and have a clear and well understood business use, but it could be the case that employers expect other technologies to become more important, which is why there is no increase in their perceived importance in the next five years.

There is a significant increase in the proportion saying their engineers should currently understand/ be able to work with currently and in five years' time, for AI (24% to 36%), extended reality (14% to 22%), quantum engineering/ computing (14% to 22%), the Metaverse (9% to 19%), distributed ledger technology (10% to 16%) and machine learning (33% to 39%). The increases here show that employers recognise these will become important skills in the future. There was a significant reduction in those saying engineers in their organisation should not have to understand any of the technologies listed currently (15%) compared to five years' time (10%).

Among different sized organisations, employers in large organisations are the most likely to say that their engineering staff should be able to understand and work with any of the technologies listed (72%), compared to SME organisations combined (58%). This trends down with organisation size; with medium (61%), small (59%) and micro-employers being the least likely to say their staff need to be able to understand

and work with any of those technologies (46%). This pattern continues to the technologies they think their engineering staff will need in the future, with large organisations significantly more likely to say their engineering staff will need to understand and be able to work with all the technologies, compared to smaller organisations.

Figure 17: Which of the following do you think engineers in your organisation should currently understand/understand in five years' time?



Q: Which of the following do you think engineers in your organisation should currently understand and be able to work with? / Which of the following do you think engineers in your organisation should understand and be able to work with in five years' time (i.e. in 2027)?
Base: All respondents (1,235)

What technologies do senior leaders understand?

Of the technologies listed, a majority of employers report that senior leaders in their organisation understand business level data security and privacy strategies (63%), this is followed by cloud computing (61%). These are also the two areas which employers see as the most important for staff in their organisation to understand currently and in the future. Employers report lower levels of understanding among senior

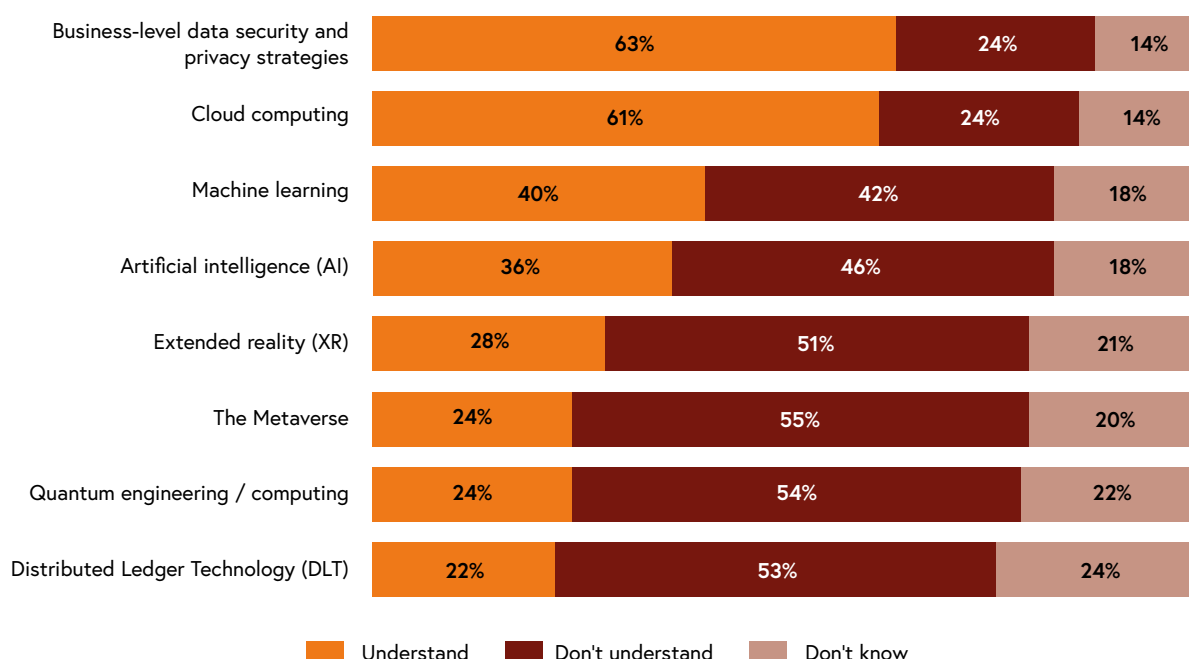
leaders for the Metaverse (24%), quantum engineering/computing (24%) and distributed ledger technology (22%). The 'don't know' score also trends up as perceived levels of senior leadership understanding goes down. This could be that as the technologies become less widespread, the employers themselves are not aware of senior leaderships' understanding, due to them not being used or discussed within the organisation.

Across the different sectors there are different levels of perceived understanding by senior leadership of different technologies. Employers in IT/communications perceive that senior leadership in their organisation have better levels of understanding of technologies, with the lowest levels of understanding being quantum engineering/ computing and distributed ledger technology (both 43%), almost twice as much as the total level of reported senior leadership understanding. This is likely due to the nature of the industry, where it is important to be on the cutting edge of technological advancement. Sectors which report lower levels of senior leadership understanding are electronics and manufacturing. The two lowest levels of understanding, as reported by employers, are also quantum engineering/ computing (19% understand for electronics, 16% for manufacturing) and distributed

ledger technology (11% for electronics and 15% for manufacturing), these are both below the total sample for senior leadership understanding.

There are also some key differences between the perceived understanding of senior leadership in SME and large employers. Extended reality has the largest gap with large employers reporting 33% and SME 23%, a 10% difference. Business-level data security has the next largest gap, with large 67% and SME 58%, this is followed by machine learning (large 43%, SME 37%) and AI (large 39%, SME 33%), which both had a smaller but still significant difference between perceived understanding. The suggestion is that larger businesses are more likely to be using these technologies, so it is more important that senior leaders have and demonstrate knowledge of them.

Figure 18: Senior leadership understanding of digital skills



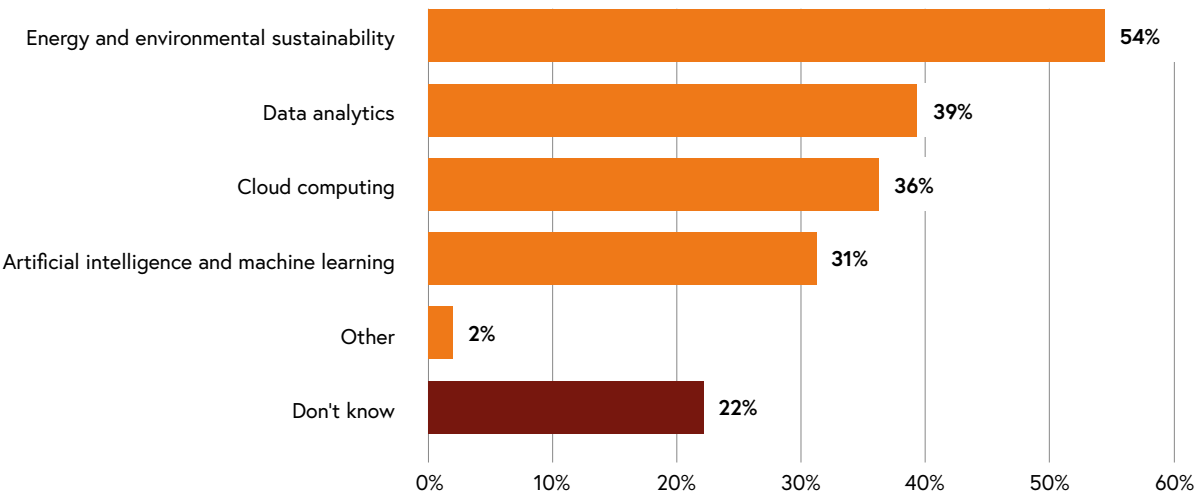
Q: To what extent, if at all, would you say senior leaders in your organisation understand the following? Base: All respondents (1,235)

What skills areas will be important for growth?

A majority (54%) of employers in the UK believe that skills in energy and environmental sustainability will be important in the next five years. This is particularly the case for employers working in electronics (65%) and construction (61%). For employers in IT/communications, cloud computing skills are expected by the highest proportion to be important in the next

five years, with 61% reporting this compared to 44% for skills in energy and environmental sustainability. Those in IT/communications are also more likely to think that artificial intelligence and machine learning skills (53%) and data analytics skills (52%) are going to be important in the next five years, compared to the total (31% and 39% respectively).

Figure 19: Skills anticipated to be important in the next five years

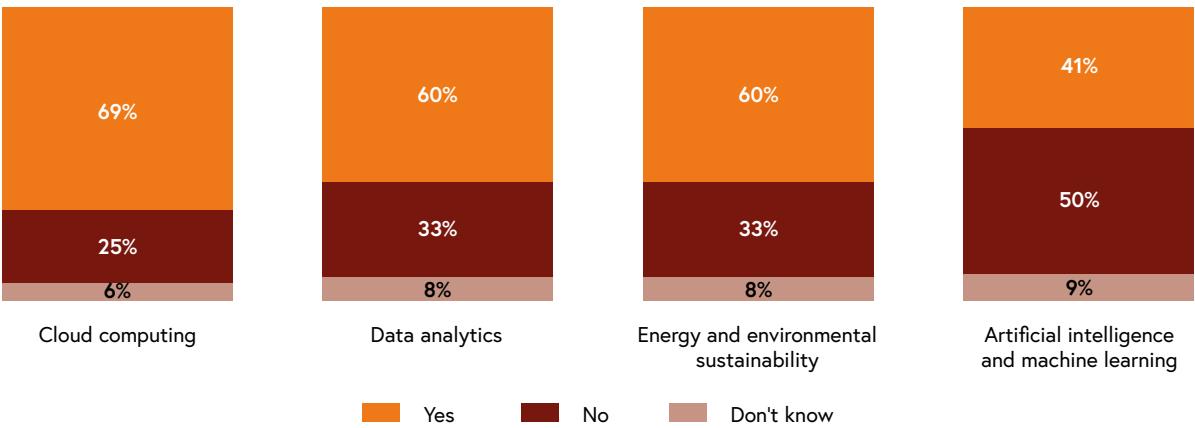


Q: Which, if any, of the following skills areas do you anticipate being important areas for growth for your sector in the next five years? Base: All (1,235)

We asked employers whether their organisation had the necessary skills in these areas. A majority (69%) said they do have the necessary skills in cloud computing, which had only just over one third of employers saying that skills in this area will be important in the next five years. Whereas 60% said they have the necessary skills in energy and environmental protection, which was believed by over half to be an important area for skills in the next five years. This demonstrates that there is a slight lack of preparedness where the skills are considered to be the most vital, while other areas are being prepared for despite their perceived lesser importance. The different sectors report different levels of skill

for different areas. Construction reported energy and environmental sustainability as an important area for skills in the next five years, and 65% of employers in the construction sector said they have the necessary skills in this area. For IT/ communications, a lower proportion of employers reported this to be an important area in the future, and 56% said they do have the skills in this area. However, employers in IT/ communications reported that they have skills in cloud computing (84%), data analytics (79%) and artificial intelligence and machine learning (59%); which closely corresponds to the areas which were felt to be of importance in the future for this sector.

Figure 20: Whether organisation has necessary skills in each area

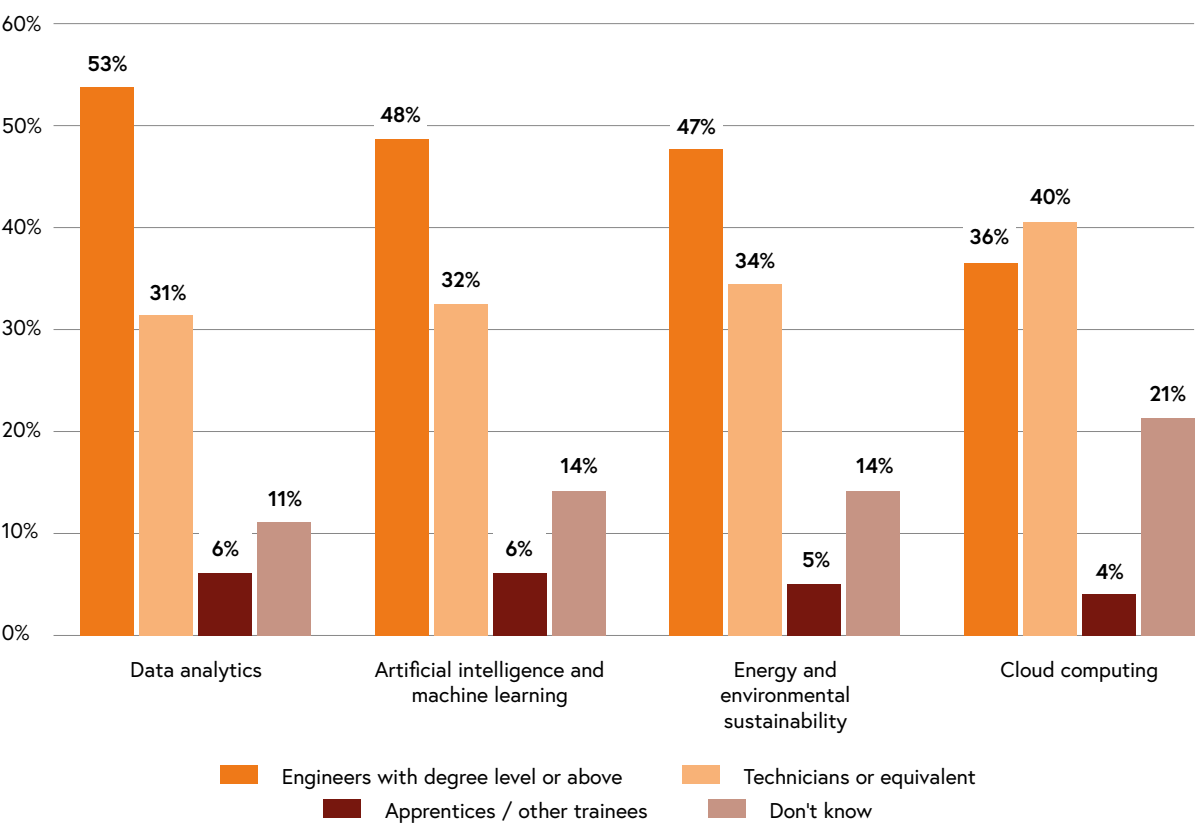


Q: And do you think your organisation currently has the necessary skills in these areas? Base: All who expect digital skills to become more important (398-675)

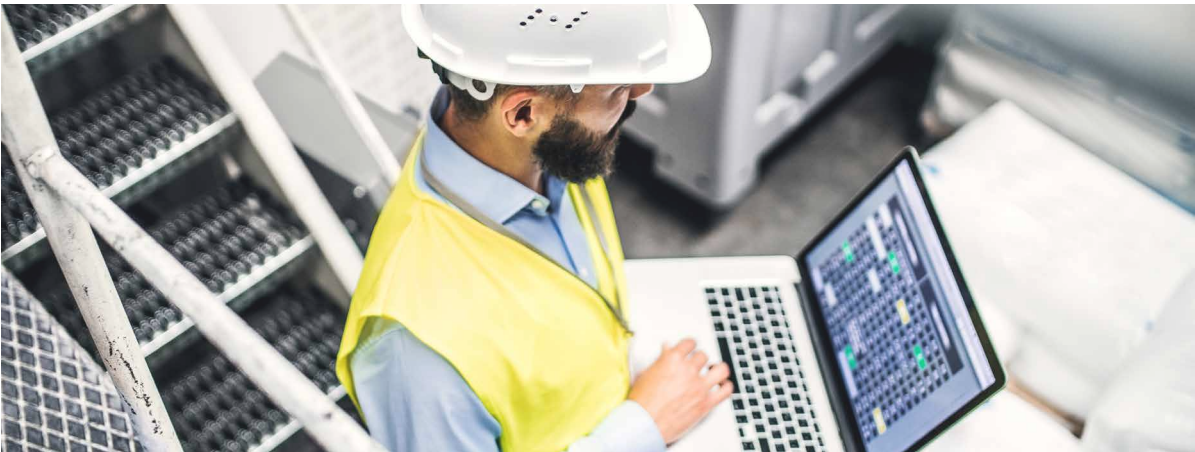
For those who reported they did not have the necessary skills in their organisation, they were asked what level of skill they would need. Employers were most likely to report needing engineers with degree level or above for all skills. The exception is cloud

computing, where it was reported they would need technicians or equivalent (40%) at the same level or more than engineers with degree level or above (36%), thus demonstrating that the skills they are missing in cloud computing are more practical and process driven.

Figure 21. Skill level required for each area



Q: What level of skill does your organisation need in these areas?
Base: All are lacking skills in their organisation (112-218)



9. Strategies to gain digital skills



Key findings



Half of engineering employers have a strategy in place for embedding digital skills with their workplace (51%). SMEs are less likely to have a strategy in place for this (41%). For 92% of those with a digital skills strategy, they will need additional skills to deliver it.



Employers state that the biggest impact the government could make is to support them as they reskill the existing workforce (58%), offer more funding for apprenticeships (39%), and support schools and colleges to offer better careers advice (33%).

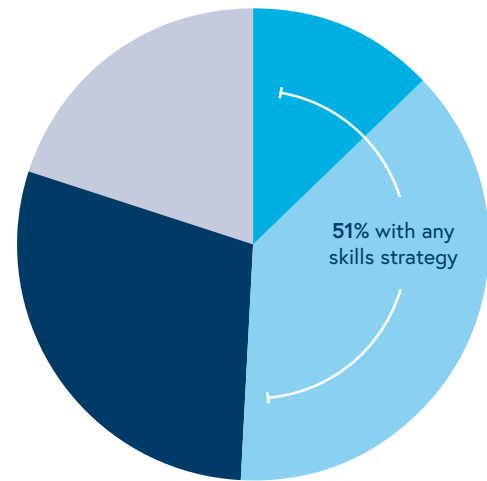
Is there a strategy to embed digital skills?

Half of engineering employers claim to have a strategy for embedding new technologies and the relevant digital skills (51%). Two fifths (38%) integrate the learnings into wider business strategy, while the other 13% have standalone procedures in place. IT/communications employers are most likely to have a

standalone strategy in place for this process (25%), perhaps unsurprisingly due to the necessity of digital skills in this industry. Large employers are more likely to incorporate learnings into their wider business strategies (47%), while SMEs are most likely to have no formal strategy for embedding these changes (41%).

Figure 22: Strategies for embedding digital skills

■ We have a standalone strategy for this	13%
■ This is integrated into a wider business strategy	38%
■ Neither - we do not include this in any formal strategy	29%
■ Don't know	20%

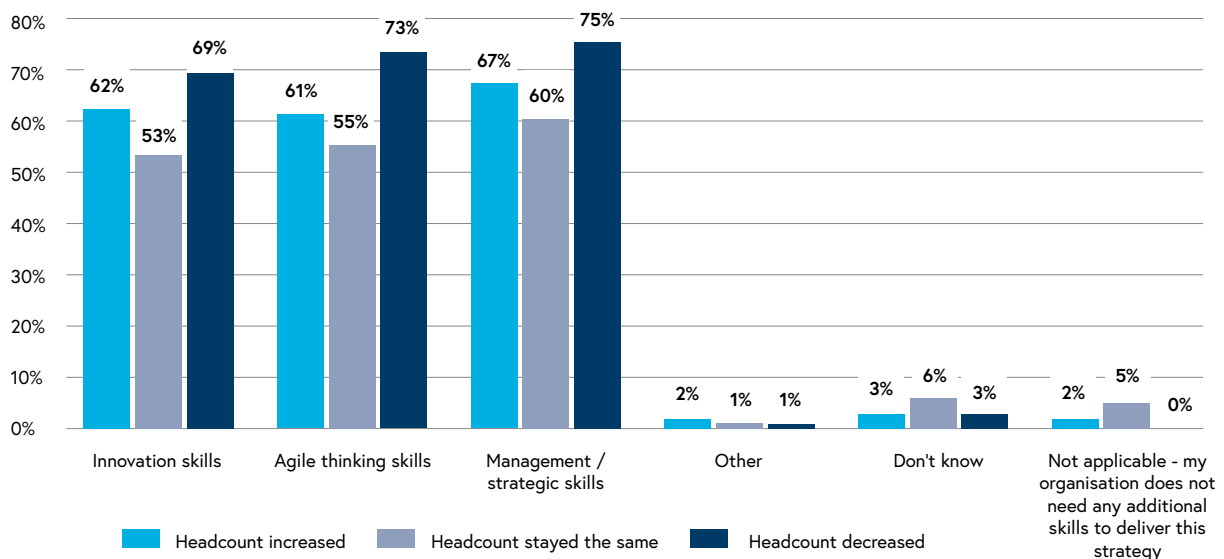


Q: Thinking about embedding new technologies and their corresponding digital skills in your organisation... Which, if either, of the following best applies to your organisation?
Base: All respondents (1,235)

Of the employers with a skills strategy in place, two-thirds think improved management skills will be essential to delivering their strategy (65%). Six in ten agree improved agile thinking skills will be needed (61%) or felt that better innovation skills will be necessary (60%).

Those with a decreased engineering headcount are more likely to think all three types of additional skills

were needed, than those employers whose headcount was consistent. They are significantly more likely to require agile thinking skills in their workplace than employers with both growing and consistent headcounts. Larger employers are more likely to prioritise innovation (65%) and agile thinking skills (67%) than SMEs (52%, 50% respectively).

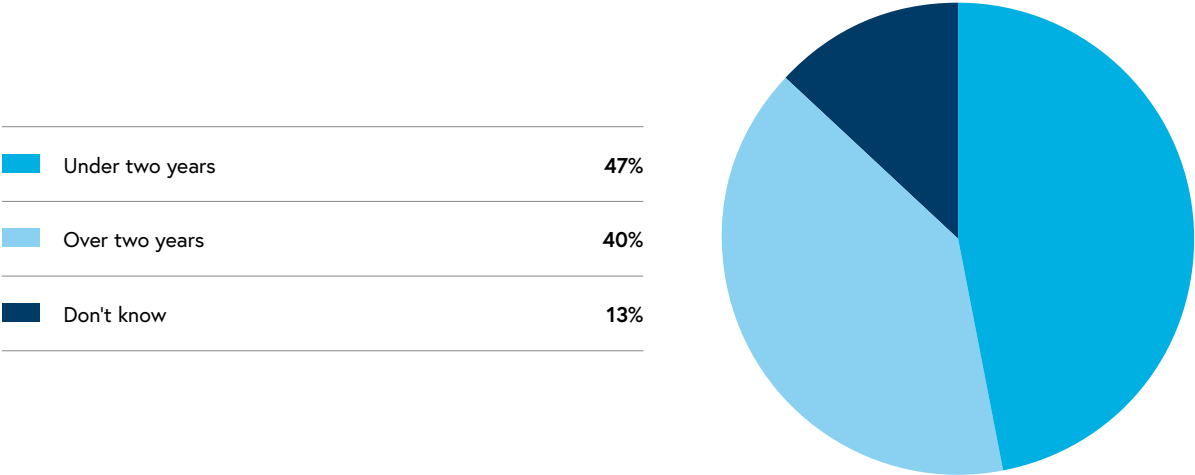
Figure 23: Additional skills needed to deliver strategy

Q: You said your organisation has a strategy to embed new technologies and their corresponding digital skills in your organisation... What additional skills, if any, do you think your organisation will need to deliver this strategy? *Base: All with a digital skills strategy; increased headcount (299); headcount stayed the same (225); headcount decreased (100)*

Opinion on the timeframe for implementing strategies to embed new technologies and accompanying digital skills is fairly divided. Almost half (47%) of engineering employers surveyed thought their strategy is due to be delivered within two years, while two-fifths (40%)

anticipated delivering in over two years, although generally this was within the next ten years. Employers in IT/ communications saw the most urgency in implementing their strategies, with 61% reporting planning to deliver within two years.

Figure 24: Expected timescale for implementing digital skills strategy



Q: You said your organisation has a strategy to embed new technologies and their corresponding digital skills in your organisation... What is the time horizon for this strategy (i.e. when is your strategy due to deliver)? *Base: All with a digital skills strategy (647)*

The risks of not carrying out skills strategies were keenly felt and keeping up with competitors in the market was a key theme. Many engineering employers citing falling behind competitors who may have more advanced knowledge or product development, failing to meet customer demands or to provide the level of

service needed was also a concern. Lower productivity was also mentioned in the context of not making use of newer technologies or more efficient processes that would help employers to maintain standards in their work and improve existing offerings.



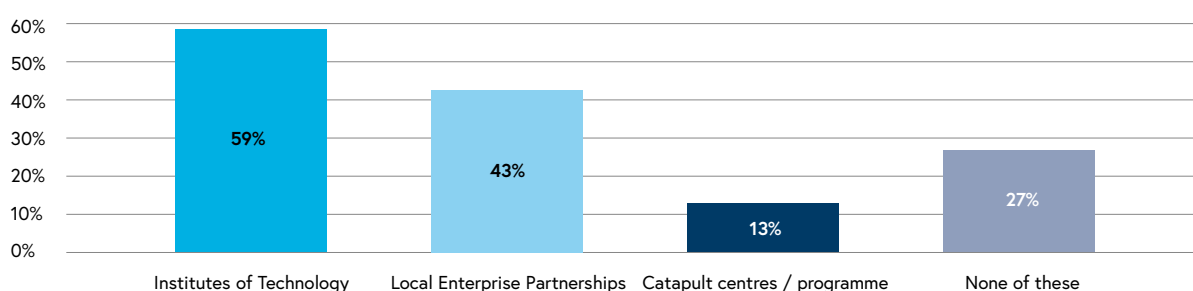
Figure 25: Impact of not achieving skills strategy

Q: You said your organisation has a strategy to embed new technologies and their corresponding digital skills in your organisation... What would be the impact of ****not**** delivering on the strategy? *Base: All with a digital skills strategy (647)*

Do employers engage with innovation programmes?

Looking at innovation and entrepreneurship programmes, who may provide pathways for getting digital skills into employers, Institutes of Technology (IoT) have a clear lead on awareness (59%) - ahead

of local enterprise partnerships (43%) and Catapult centres (13%). However, their awareness is low in the IT/ communications sector (50%) and organisations employing fewer than 5 engineers (51%).

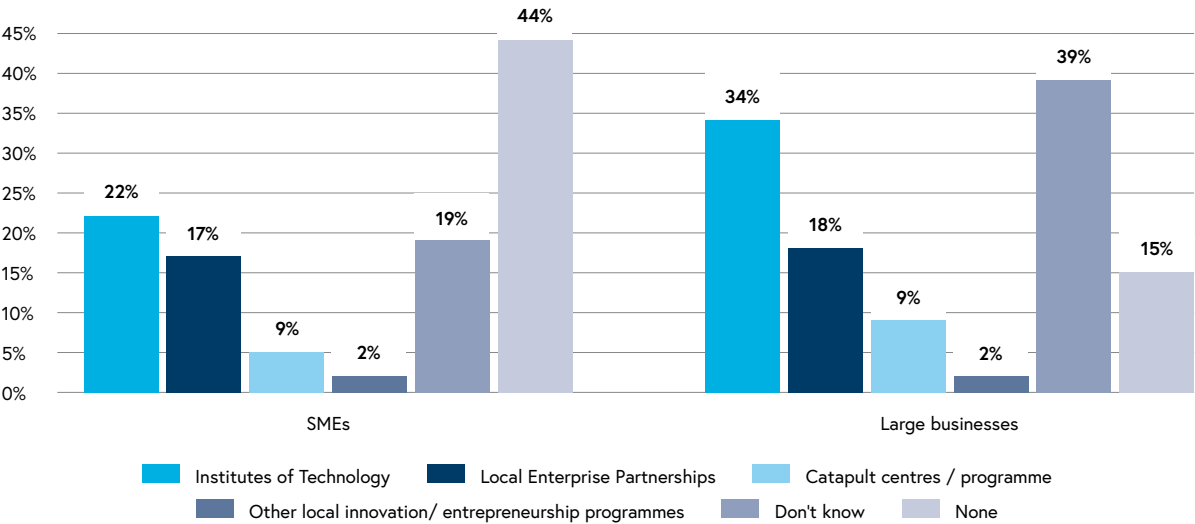
Figure 26: Organisation awareness

Q: Before taking this survey, which of the following were you aware of? *Base: All respondents (1,235)*

Institutes of Technology (IoTs) also lead on providing programmes that organisations interact with (28%), while 18% interacted with Local Enterprise Partnerships, and 7% interacting with Catapult centres/programmes.

Large employers are more likely to interact with IoTs (34%) , and with Catapult centres/programmes (9%) than SMEs (22% and 2% respectively) and 44% of SMEs do not interact with any training programmes.

Figure 27. Training programmes interacted with



Q: Which, if any, of the following innovation/ entrepreneurship programmes does your organization interact with? Base: All respondents (1,235)

What do employers want?

Although engagement with training programmes was generally low, the employers surveyed had interest in improving digital skills amongst engineering and technical staff – many around providing education and funding to raise the status of the profession in

the UK and facilitating more agile working within the profession. Access to training was also thought to be hugely important, a theme that carried through much of the research.

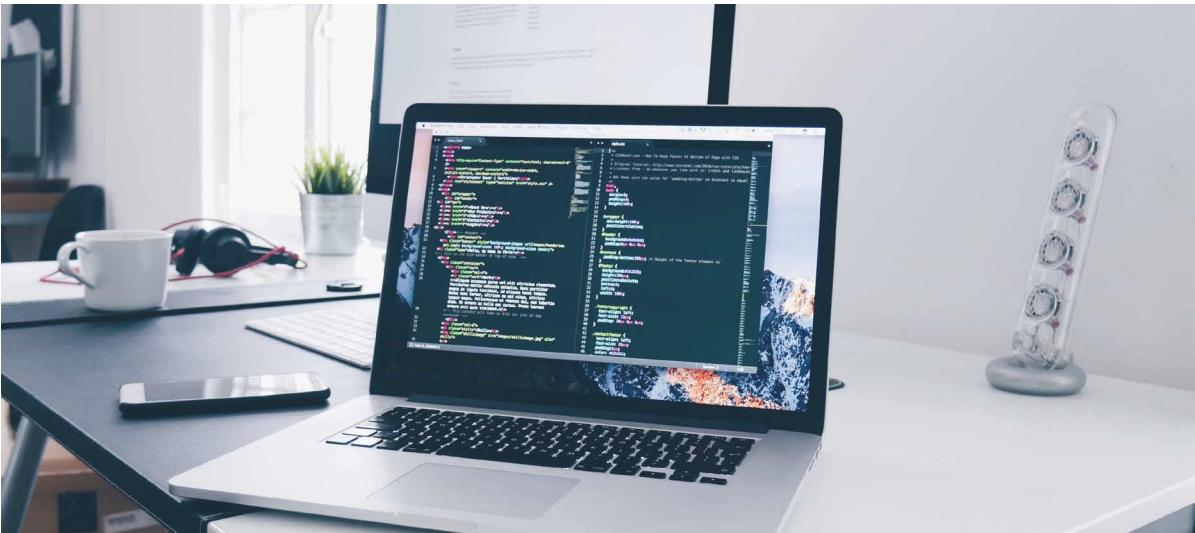
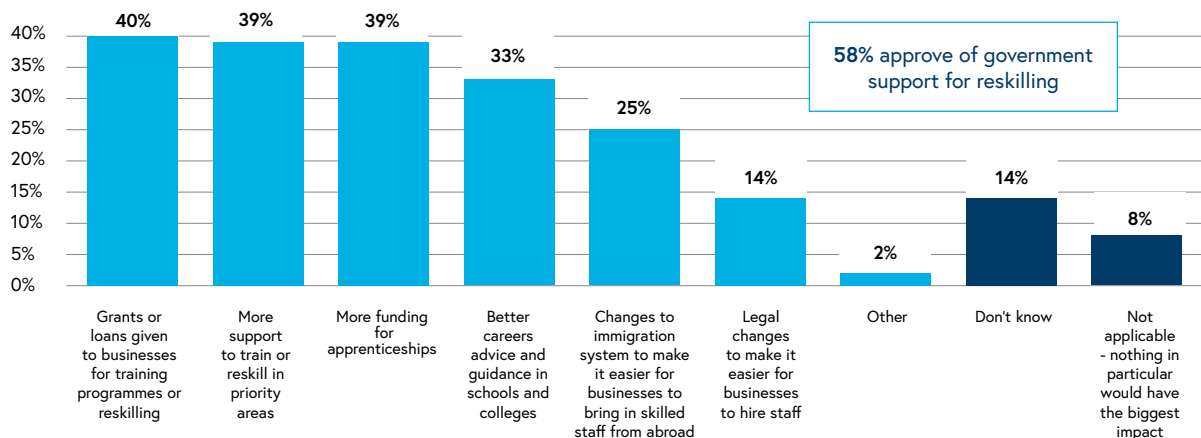


Figure 28: Suggestions for improving digital skills

Q: If you could have one thing to improve digital skills within engineers/ technical staff in the future, what would that be? Base: All with a digital skills strategy (647)

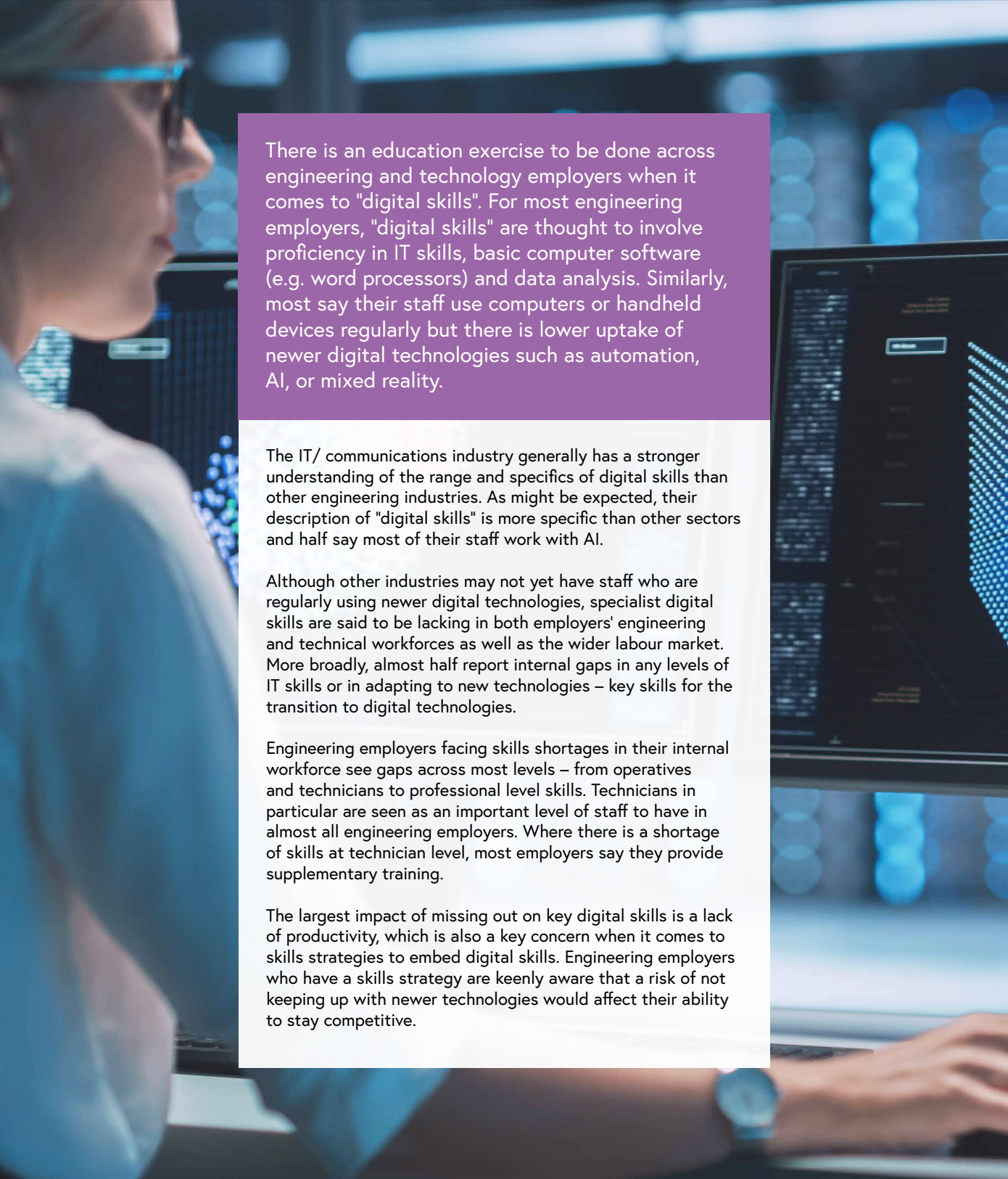
When asked about actions the government could take to have the greatest impact on their organisation's ability to meet its digital skill needs, grants or loans towards training and reskilling were most commonly seen as being effective (40%), followed by support to train or reskill in priority areas (39%) and more funding for apprenticeships (39%). SMEs were most

likely to prioritise grants or loans (44%) whereas larger employers prioritised funding for apprenticeships (41%). IT/ communications employers were most likely to believe allowing immigration of skilled workers would benefit their organisation (32%), something that was a lower priority overall (25%).

Figure 29: Potential government action to facilitate meeting digital skills needs

Q: Which of these actions from the government would have the biggest impact on your business's ability to meet its digital skills needs? Base: All respondents (1,235)

10. Conclusions

A woman with blonde hair and glasses is seen in profile, looking at a computer monitor. She is wearing a light blue shirt. The background is a server room with blue lighting and server racks. The text is overlaid on a purple rectangular box.


There is an education exercise to be done across engineering and technology employers when it comes to "digital skills". For most engineering employers, "digital skills" are thought to involve proficiency in IT skills, basic computer software (e.g. word processors) and data analysis. Similarly, most say their staff use computers or handheld devices regularly but there is lower uptake of newer digital technologies such as automation, AI, or mixed reality.

The IT/ communications industry generally has a stronger understanding of the range and specifics of digital skills than other engineering industries. As might be expected, their description of "digital skills" is more specific than other sectors and half say most of their staff work with AI.

Although other industries may not yet have staff who are regularly using newer digital technologies, specialist digital skills are said to be lacking in both employers' engineering and technical workforces as well as the wider labour market. More broadly, almost half report internal gaps in any levels of IT skills or in adapting to new technologies – key skills for the transition to digital technologies.

Engineering employers facing skills shortages in their internal workforce see gaps across most levels – from operatives and technicians to professional level skills. Technicians in particular are seen as an important level of staff to have in almost all engineering employers. Where there is a shortage of skills at technician level, most employers say they provide supplementary training.

The largest impact of missing out on key digital skills is a lack of productivity, which is also a key concern when it comes to skills strategies to embed digital skills. Engineering employers who have a skills strategy are keenly aware that a risk of not keeping up with newer technologies would affect their ability to stay competitive.



Almost half with a digital skills strategy say it is due to deliver in less than two years – getting the digital skills in now, before they 'fall behind'. Nearly all engineering employers are providing some form of training to support their employees' technical skills. Most look inward for this training; providing it on-the-job or as part of an in-house development programme. However, half do think a professional organisation/ training body would be well placed to deliver technical training. Those in SMEs are the least likely to have their own employer arrange/ fund training, so there is particular potential for external training on digital skills for smaller engineering employers.

There are also differences by organisation size in their expectations of engineering skills – large organisations are more likely than SMEs to expect engineers to be able to work with any of the digital technologies asked about. Senior leaders in large organisations also tend to be more well-informed about digital technologies than those in SMEs, reinforcing the opportunity for more education and support for smaller organisations.

Overall, cloud computing and data security are well-established areas of expected knowledge for engineers, while other skills with other technologies such as AI, extended reality, and quantum engineering are expected to be more important in five years' time than they are now. Engineering employers' understanding of their future skills needs also tends to focus on what is immediately or obviously relevant for their industry – for example, employers in the construction industry are anticipating environmental skills to be important in the near future, while IT/ communications employers are focussed on future needs in cloud computing, AI, and data analytic skills.

Despite this awareness of future growth areas and skills needs, engagement with various innovation initiatives could be improved. Around one in three engineering employers have engaged with an Institute of Technology, but a similar proportion have not interacted with any innovation programme. Perhaps due to this, the second-most popular government activity (after additional funding) to improve digital skills is simply improved support/ training for priority areas.

11. About the IET



We are the IET – a charitable engineering institution with over **158,000 members** in **150 countries** – working to engineer a better world.

Our mission is to inspire, inform and influence the global engineering community to advance technology and innovation for the benefit of society.

As a diverse home across engineering and technology, we share knowledge that helps make better sense of the world in order to solve the challenges that matter. It is why we are uniquely placed to champion engineering.

We bring together engineers, technicians and practitioners from industry and business, from academia and research, and from government and the third sector. We are member-led, independent and impartial.

We cover engineering across industries from design and production, digital and energy to healthcare, transport and the built environment. Passionate about healthcare, we bring together expert practitioners from the healthcare industry, academia and third sector.

We champion engineers and technicians working in the sector by offering networking, volunteering and thought leadership opportunities. Together, we campaign on issues of the day around digital skills and provide policy input to government.

Your specialist knowledge can inspire others and make a difference. To find out more contact policy@theiet.org

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