

Industry Report

SKILLS: MEETING DEMAND



New Civil Engineer

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HOW THE INDUSTRY CAN RESPOND TO THE SKILLS CHALLENGE

The focus on the UK's infrastructure can sometimes be a binary discussion on whether or not we are spending enough to meet future needs. While the right levels of investment are central to new roads, railways or other big ticket spend, we must never forget the role of people in the successful delivery of infrastructure projects.

This report looks at how we can recruit more people into engineering given that the UK is not currently producing enough civil engineers for infrastructure projects let alone for any new programmes.

In addition, it examines how new types of skills from across different sectors can enter the industry to meet project needs today and in the future. Innovation is happening in recruitment, but all firms and universities could do more to nurture the next generation of talent.

The message we want you to take away is not one of doom and gloom. The sector is not in crisis. Instead we have a fantastic opportunity to grow our skills base and get more people into the industry.

The key to broadening our talent base is finding new ways to recruit underrepresented groups. Here at Costain, for example, we are hiring ex-military officers and alongside us other firms are developing returner schemes for former engineers, working on attracting more women into the industry and recruiting increasing numbers of people from non-traditional degrees.

We hope that you find this report informative and it spurs creative thinking in your own organisation about how you approach recruitment. Investing in infrastructure is critical to the success of the country and the challenge is clear: we must all come together and seize the moment to inject new blood into the engineering sector.

● *Darren James, infrastructure managing director, Costain*



The *National Infrastructure Pipeline* published in March 2016 identified over £483bn of planned investment in infrastructure across the public and private sectors. And this total could go even higher, since new chancellor Philip Hammond indicated that more money could be ploughed into infrastructure projects to boost the economy in the wake of the Brexit vote.

This is, of course, extremely welcome news for everyone working in infrastructure design and delivery. But it also gives the industry a huge problem: who is going to do all the design? Who is going to commission and manage the projects? And who is going to physically build them?

The infrastructure sector is already short of people with the required skills, and this is likely to get worse in the next 10 years unless more people can be attracted into the industry. Last year the Treasury published the *National Infrastructure Plan for Skills*, which said the predicted pipeline “creates a demand for over 250,000 construction workers by 2020”. This figure covers every role from operative to client, but the report highlights civil engineering in particular.



Many who have not trained as civil engineers have skills acquired in other sectors that the industry now needs

“Civil engineers are essential to the delivery of infrastructure projects, both at a national and local level,” it says, before going on to point out that over 20% of civil engineers are set to retire in the next 15 years, and the numbers entering the profession are not enough to fill that gap – never mind cope with increasing levels of demand.

Skills shortages are expected to be particularly acute in the transport sector, which is responsible for around one third of the pipeline of work. In August 2015, the government appointed Crossrail chairman Terry Morgan to develop a specific skills strategy to help the transport industry ensure a continuous pipeline of skilled workers. Morgan’s strategy, published in January 2016, identified a shortage of over 14,400 people to fill engineering and technical roles in the road and rail sectors alone, a further 7,950 required for construction management, and 2,700 more people for client and project leadership roles.

The government’s go-to response to skills shortages – and one to which the industry is responding well – is to increase the number of apprenticeships, and to use major projects to attract new entrants to the industry. Morgan has said the “skills agenda” should be considered at the start of every

Key fact

250,000
Number of
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“ We haven’t even begun to tap into the sort of people that would love to join this industry

major project, pointing to the success of initiatives like the Tunnelling and Underground Construction Academy (TUCA) set up alongside Crossrail, and two new high speed rail technology colleges launched to service High Speed 2.

But one thing the National Infrastructure Plan for Skills does highlight is that modern infrastructure procurement, design and delivery requires different skills to those of the past. And this, says Costain infrastructure managing director Darren James, gives the industry an opportunity to rethink the skills it needs and to find new ways of tapping into them. James believes that the discussion around the skills challenge assumes it is a “crisis” and a “problem”. He says he has seen brilliant examples – at Costain and some of its clients – of novel approaches to the skills shortage, turning the challenge into opportunity rather than a crisis. “It only turns into a crisis if people don’t do the right thing to meet the challenge” he says.

James says there are many people who may not have trained in civil engineering that have exactly the right skills to work in the modern infrastructure sector. “The use of technology is an important aspect of what we’re doing,” he suggests. “We haven’t even begun to tap into the sort of people that would love to join this industry. There are adjacent skills sets, adjacent attitudes and aptitudes that we could harness. There’s absolutely, in my mind, no shortage of potential skills.”

Infrastructure & Projects Authority senior advisor Keith Waller, who co-authored the National Infrastructure Plan for Skills, agrees. “We need the industry to be different from what it is at the moment,” he says. “The way we currently operate in construction is non-sustainable. If you go back 30 or 40 years, most of the built environment was put together by traditional civil engineering trades. That proportion is decreasing significantly, so we need to focus on how we get the right skills, and from there, focus on how we drive up productivity in delivery; how we improve performance; and ask what role do individuals and organisations play in improving the skilled productive workforce to deliver those outcomes.”

Waller has previously argued that there are plenty of chartered engineers in the UK to do the jobs that chartered engineers are required to do. What the industry needs are more people with the right skills for the broad range of jobs that the modern infrastructure sector encompasses.

James is adamant that there are enough people available to meet the skills challenge if employers acknowledge that a different mix of skills is now required, and put some effort into finding and training people to achieve that balance. “Instead of people whinging and worrying, there are things you can be doing – like setting up skills academies and colleges, employing ex-military personnel, taking on more apprentices, employing young offenders, looking at people from different backgrounds and increasing the number of graduates going into the industry,” he says. “If we tap into every source we know, we will meet any skills challenges. But it won’t happen by waiting for it to come to you.”

BREAKING TRADITION

VOCATIONAL QUALIFICATIONS ARE NO LONGER ESSENTIAL

BY MARGO COLE

The skills shortages identified in last year's *National Infrastructure Plan for Skills* pose two important questions for the industry: do we need more civil engineers? Or do we need people with different skills?

The answer is probably a combination of both: we need more people with traditional engineering skills and we need some people with different skills – particularly the ability to understand big data.

Crucially, according to many industry employers, we also need engineers with new skills. As MWH Europe Africa design director Ian Davies says: “We are finding more and more need for the “new engineer” – the engineer who is more motivated to find solutions to infrastructure problems than to design and build new infrastructure.”

Most of the larger consultants and contractors still put a lot of resources into graduate recruitment, competing to attract civil engineering graduates from the top universities. This has long been the dominant route by which young people have entered the industry, but it relies on sufficient numbers studying the right subjects at A-level and then choosing civil engineering out of all the numerate degree options they have available.

The *National Infrastructure Plan for Skills* acknowledges this. “While the number of students and graduates entering the profession is increasing, it is not occurring at a fast enough rate to fill the gap left by the retirees or to respond to increasing levels of demand,” it says.

The report identifies the fact that more entrants with science, technology, engineering and maths (STEM)-related skills will be needed to deliver the predicted scale of infrastructure investment over the next 20 years, and highlights the government's intentions – set out alongside

Key stat

150
Number of apprentices recruited by Arup in the last four years



Apprenticeships: Sometimes the best way into the profession for those who find university education unappealing

“While the number of students and graduates entering the profession is increasing, it is not occurring at a fast enough rate to fill the gap left by the retirees

2015's Budget – to improve skills delivery and pathways in schools, further and higher education. They include simplifying and streamlining the number of qualifications, improving careers advice and increasing the quantity and quality of apprenticeships.

Across the industry, employers are taking matters into their own hands, with a wide range of initiatives including encouraging staff to act as STEM ambassadors in schools, starting up apprenticeship programmes, and offering summer holiday placements to school-age children.



Apprenticeships are increasingly important

MWH, for example, took on its first group of 11 apprentices in 2015, and plans to recruit similar numbers this year. The company says the apprentice scheme has enabled it to recruit people who want to become engineers, but may feel that university is not the right choice for them; who do not want to start their working lives in debt through student loans; or who do not have the financial means to study at university. MWH says the scheme has broadened its candidate base and has resulted in applications from a more diverse background.

Opus International Consultants is also promoting apprenticeships. “We see apprenticeships as a great way to recruit young people into the industry,” says UK managing director Huw Edwards, explaining that the company’s UK apprenticeships programme echoes a very successful Opus cadetship scheme in New Zealand that has recruited 300 school leavers in the last 10 years.

Atkins and Mott MacDonald also have fledgling apprenticeship schemes, while Arup’s yearly apprentice intake has grown from 20 in 2012 to almost 60 this year, compared with 269 graduates. Arup says that, although most of its graduate entrants still come from a traditional

university background, it is continuing to grow and invest in its apprentice population, and has recruited 150 apprentices in the UK over the past four years.

JBA consultancy also has a long-standing apprenticeship programme for civil engineers that starts with a part-time HNC, as well as for GIS and spatial science.

But apprenticeships are not just for the larger firms. Westlakes, for example, employs apprentices as well as graduates under structured training, and also does what it can to encourage young people to join from an earlier age. It provides work experience for students and undergraduates – typically taking on 15 to 20 students in years 9 to 13 for a week’s structured work experience every year.

Valuable work experience

The company also offers between four and six paid placements for undergraduates during the summer vacations, and has traditionally found this a good way to recruit, as many of the undergraduates come back when they leave university. But more recently, says managing director Andy Hooper, this has not tended to happen: “We find the undergraduates move to the large companies with graduate intake schemes, so it’s now switched [to] where we pick up graduates with, say, one year’s experience who just get lost within the big employers.”

He adds: “We also found it much easier to recruit graduates a few years ago, when the industry was in recession, or coming out of it, as the big employers weren’t taking on the graduates. Again, the market is different now, so we just have to adapt around it; but we still feel that the kind of training and experience we can give as an SME is much broader than the large businesses, and our graduates have the opportunity to become more immersed in the business and can make a real difference if they want to.”

Snapping up the graduates

Costain technical director Bill Hewlett says the issue of larger employers snapping up the pick of the graduate intake is just as prevalent in the contracting side as it is in consultancy. “The tradition in Britain is that if you’re going to work for a contractor you go to someone like Costain, Balfour Beatty or Bam Nuttall,” he says. “Why is that so predominant? What about the second tier? There is a huge disparity between where the pounds are spent and where the graduates go. You can look at some really great companies of smaller size, and they tend to rely on picking up a few graduates randomly. With the current skills shortage, we should be looking at how universities prepare people to work in these organisations.”

The *Transport Infrastructure Skills Strategy*, published in January, advocated more co-operation and co-ordination between “large employers within the sector who attract large numbers of applicants for apprenticeship and graduate vacancies and smaller suppliers who struggle to attract sufficient numbers of suitable candidates”.

Competition from other sectors

But civil engineering firms are not just competing with each other: graduates with good civils degrees are also highly sought after by employers in other sectors, as the *National Infrastructure Plan for Skills* identified. “Civil engineers and the competencies they possess are in great demand across the UK economy, with their transferable skills vitally important to all economic infrastructure

Tech savvy: New technology brings in people with different skillsets



sectors. These skills are also utilised in other sectors, such as manufacturing and financial services. As multiple sectors return to growth, the demand on engineering skills will continue to increase," it says.

According to the ICE, of the 3,000 civil engineering students graduating every year, 1,000 go into jobs in non-civil engineering industries. The ICE is trying to address this by launching a new "Academic Partnerships" programme, in which it works with universities to ensure students have greater access to ICE support and development.

The scheme focuses on helping students gain the soft skills necessary for working in civil engineering, rather than just course content, and also raises awareness of the benefits of ICE membership in the hope that this will encourage a greater rate of students to enter the industry after graduating. It is being piloted this year at Imperial College, London as well as Leeds, Nottingham-Trent and London South Bank universities.

One thing the government has acknowledged is that the skills required to deliver the nation's ongoing infrastructure needs may not be the same as they have been in the past. "It's not just more skilled people we need, it's also a different blend of skills," says former commercial secretary to the Treasury Lord O'Neill in the foreword to the *National*

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Key fact

3,000
Annual
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new civil
engineering
graduates

1,000
Annual
number of
new civil
engineering
graduates
going into
non-civil
engineering
jobs

Infrastructure Plan for Skills, highlighting the need for new digital and technology-based skills for the building information modelling (BIM)-enabled age, and for people who understand how to integrate technology into more traditional construction activities.

Graduate intake at the major consultants now includes a far wider range of disciplines than just civil engineering, while it is evident that a different mix of skills is now required in the teams responsible for infrastructure design and delivery. "We now need to ensure that our project teams include a blend of analytical people and people who can think in more abstract terms," explains MWH's Davies. "We need to ensure that project teams include people who understand the wider societal needs and impacts of a project and who can appreciate the project's impact on its stakeholders, most importantly the customer."

Developing internal specialisms

He says MWH has had to develop more internal specialisms than it used to have, including change and behavioural management, information management and sustainable development.

Opus has seen a similar change, according to UK sector leader Mark Valentine, who says that in the last 10 years the influence of civil engineering has grown, from the traditional design service to working in a trusted advisor role with clients like Highways England and Network Rail. Civil engineers are also using their asset management expertise to bring a fresh perspective on the whole life cycle. "The mix has changed and grown," he explains. "We use data modellers, behavioural scientists, planners [and] IT specialists."

EX-MILITARY PERSONNEL ARE READY MADE LEADERS

One potential source of new recruits to the infrastructure industry that was highlighted in the “Transport Infrastructure Skills Strategy” is the armed forces.

The Army is set to lose around 20,000 people by 2020, many of whom have skills that could be transferred to the infrastructure sector.

Many organisations are already aware of this and are actively recruiting ex-military personnel into specific management and technical roles. Costain water sector director Ross MacKenzie is a former Army major who believes a military training brings valuable skills to any business.

“When you employ an ex-Army officer, you get some discipline and rigour, as well as good communication skills up, down and sideways,” he says. “You also get execution; Army officers are very good at getting things done. I think these skills are needed in every single company; they are not role-specific.”

MacKenzie always intended to join the military, and was sponsored through school by the Royal Air Force. This was followed by a degree in mechanical engineering with maritime and offshore engineering at the University of Surrey, and offers from all three services when he graduated.

“I chose the Army because I wanted to lead people rather than work in a technical area,” he explains.

MacKenzie trained at Sandhurst and joined an infantry regiment as a commissioned officer, spending 12 years on various tours of duty that included leading troops on operations in Iraq. His career also included a posting with the Ministry of Defence working on counter terrorism operations.

“I got a lot of opportunities at a young age,” he explains. “At 22 I went straight out of Sandhurst and was in charge of a group of soldiers on the streets of Northern Ireland. You grow up quite quickly and get to a position of management very quickly in that environment.”

By the time he was 35, MacKenzie had reached the position of major, and was looking for a new challenge. “I had done some senior jobs quite early in my career, and I was starting to repeat what I had already done,” he explains. “I could see that the path of my life would be more of the same. I had been fortunate in that I had always worked at the hub of the Army, making decisions as to which units and brigades got deployed,” he continues. “I was always in very operational roles, where everything changes very rapidly.”

“Compared with that, other jobs become very boring very quickly, and I realised that I wanted to test myself in a different environment.”

MacKenzie says he woke up one morning and realised that he did not want to be an Army officer doing similar roles for the next 30 years. “I had wanted to be a soldier and a leader, and I had achieved that,” he

says. “I felt it was time to push myself and test myself in different arenas.”

By the time he left the army MacKenzie was in responsible for 35,000 people across 39 different units. But he left with no idea what to do next. “I thought about usual routes – working in the City or banking, but I didn’t want to wear a suit and go to London every day,” he says.

“I applied for a job with the England rugby team, and had offers from Gloucester Rugby and from Barclays, but then I was talking to a guy in my regiment who worked for a consultant that was doing some work for Costain. He thought it would be something that would suit me

“He arranged a meeting, and the Costain guys said there was space for somebody like me in their business because I offered something different.”

MacKenzie joined Costain in 2008 as logistics manager at Gatwick Airport, a role he says “morphed” into helping the client plan for its development department to separate from BAA ahead of the sale of the airport. When that project came to an end he went into Costain’s rail business as a bid manager in the rail business, then onto the firm’s Crossrail team at Bond Street as a project manager.

In 2011, MacKenzie was appointed as customer director for the rail business, and has helped to successfully deliver extraordinary business growth.

“When I joined Costain I wanted to run a bit of the business,” he explains. “It’s the leadership aspect I was more interested in. Costain has a lot of engineers who know the detail of the problem.”

“I bring something different: I want a dynamic environment; I want to challenge things – and I do know how to get things built quite quickly. I could come in and be a bit disruptive.”

Since he joined, the company has employed more ex-military personnel, including two from MacKenzie’s regiment. He says that ex-soldiers are ideally suited for roles like logistics managers and safety advisors, while former officers have the right skills for leadership positions.

“If they’ve got to a rank within the Army, there’s a reason they’ve got there,” he explains. “For example, if you are a soldier who wants to be a corporal, it takes a lot of grit and determination.”

“There are some people in the Army who would have done quite quiet jobs. They may have done them very well, but they haven’t done more dynamic things. But if you find someone who joined without any qualifications and became an infantry corporal, they would be leading a group of eight people in their early 20s. I think we can give them the skills to put those management and leadership skills to work on a project.”

MacKenzie believes a mix of engineering and ex-military personnel is ideal. “A project team needs to be diverse and have a blend of different people, otherwise you’re never going to come up with different solutions,” he says.



Ex-military personnel bring strong management skills to construction

“ We need to ensure that project teams include people who understand the wider societal needs and impacts of a project and who can appreciate the project’s impact on its stakeholders, most importantly the customer

Valentine cites the example of a recent commission by the Welsh Government to look at the future of transport in Wales, in which Opus’s team included experts from across the global business. Among them were behavioural scientists, to ensure the team was able to consider the customer just as much as the infrastructure.

This emphasis on the skills required to understand customer needs is something being felt throughout the infrastructure sector. Arcadis business director for Highways Ian Bell says: “In the last 10 years we have become more closely aware of [a] customer and stakeholder focus to our project delivery. This has led to us developing the skills within our teams to be able to deal with increasing levels of information and deliver greater understanding of the physical, sustainable and socio-economic impacts that our projects bring.”

He adds: “In parallel to developing our more traditional engineering skills, we have also broadened our approach to design. This involves more integrated processes involving GIS, mapping, data analysis, and particularly 3D design skills.

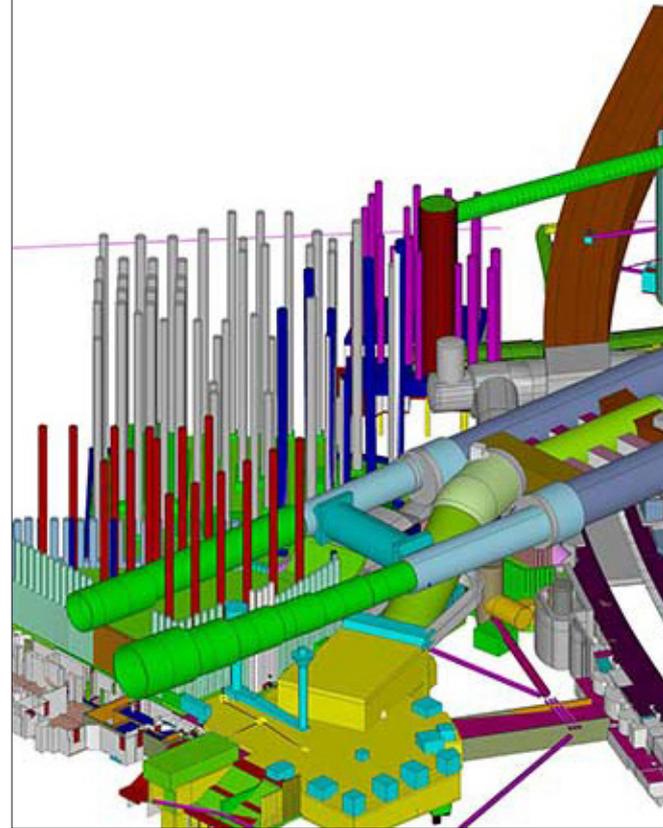
BIM’s influence

“The overriding change in all of this is around the benefits brought into play with the introduction of BIM, which is more focused on controlling and managing design processes, along with the better management of data and resources throughout the whole lifecycle of a project. We are continually reviewing the upskilling of our teams, and have diversified our staff into some of these wider work areas, as well as recruiting on the basis of needing these much wider skills.”

Mott MacDonald group strategy manager Simon Harrison agrees. “With BIM becoming business as usual, this is driving change in project teams; as has alliancing and collaborative behaviour over this time. Demand for our social and behavioural scientists, software experts and data analysts, has grown substantially,” he says. “All sectors have changed, but perhaps in slightly different ways. In some sectors it’s mostly about new services for end users, and/or better use of assets, whereas in others it’s more about cost-efficiency. There is an emerging common thread about better outcomes for ultimate end-users.”

These new roles are being filled by retraining/reskilling existing staff and recruiting people with the required expertise. And while the majority of people recruited into the industry still have civil engineering degrees, some firms are taking a more pragmatic attitude. “We do not set out to recruit graduates for particular positions, but we just keep

BIM: Driving change in the composition of project teams



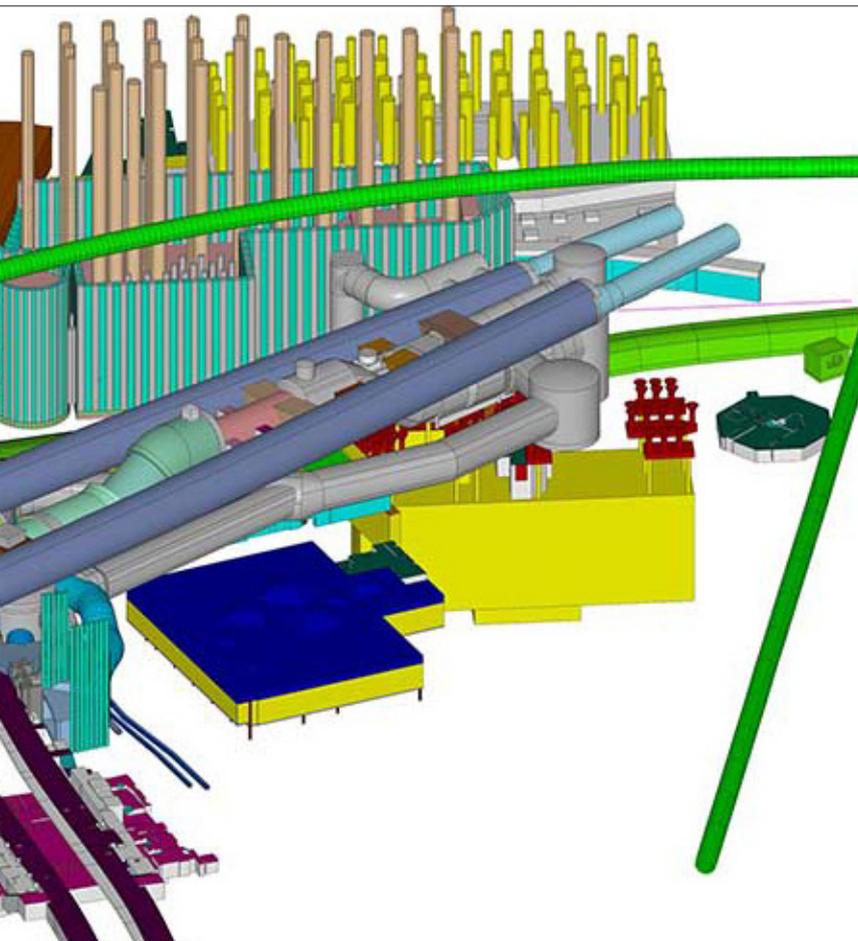
our eyes out for people who we think will fit our business,” explains tunnelling consultant London Bridge Associates director David Sharrocks. “The academic background is of interest, but it is not the only thing that matters.

Vocational and non-vocational

“It is not surprising that we have taken on a number of people from the Warwick University MSc Course in tunnelling and underground space, but we have taken on others who have shown us that they have skills and interests that align with us,” he adds. Last year’s recruits at London Bridge included one with a degree in economics and politics. “We do not look hard anywhere, but we make it possible for good people of varying backgrounds to find us,” says Sharrocks.

Meanwhile other firms have realised that former military personnel offer something of an untapped resource that can bring useful skills into a business (see box). Costain infrastructure managing director Darren James says: “Service

“ We do not look hard anywhere, but we make it possible for good people of varying backgrounds to find us



personnel have always been a source of people we've tapped into, and quite a few of our senior people are ex-military. They often come with strong leadership traits."

Westlakes Andy Hooper adds: "As an SME we tend to be pretty open minded and very opportunistic, so if someone comes along that we think will be a good fit for the business then we are happy to take them on, find them a role within the business and provide them with the support needed." As well as employing apprentices, the company is currently training a former soldier as a technician. But, Hooper adds, "we do [still] find the industry very conservative, and based on qualifications and experience, rather than ability, and [with] quite a narrow view on skills".

The dire predictions about skills shortages tend to ignore the fact that a large percentage of the potential workforce is currently poorly represented in the infrastructure sector. Women make up only 10% of the ICE membership, and construction is the STEM industry with the worst record for employing women.

The problem seems to start at school, as only 15% of engineering graduates are female, despite the fact that when girls enter STEM subjects at GCSE level they continue to do better than boys.

The need for gender diversity

Perhaps surprisingly the *National Infrastructure Plan for Skills* has little to say about gender diversity, whereas the *Transport Infrastructure Skills Strategy* is honest in its

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appraisal of that sector's all round lack of diversity.

"Transport is not as diverse as it could or should be," says the report, identifying the low representation of women in the industry, the relatively poor data that employers have on disability within the workforce, and the need to tackle homophobia and its effect on productivity.

"We will increase the diversity of the transport workforce with a strong focus on encouraging more women and black, Asian and minority ethnic (BAME) people to work in transport," says the report, recommending that at least 20% of new entrants to engineering and technical apprenticeships in the sector be women by 2020; and that there should be a 20% increase on the number of BAME candidates undertaking apprenticeships by 2020.

The report also suggests that the sector should do more to encourage people who leave the industry temporarily – for example to have a family – to return; and do more to encourage those who might come to the sector through different, non-traditional routes.

Tideway has proved that a properly focused "returners" programme can be very successful in bringing people back into the industry after they have taken a break.

Tideway head of HR Julie Thornton describes returners as "a huge untapped resource", and says the organisation's programme is "all about trying to focus on the skills, not the gaps". "Typically when people go to interviews after a long break, they find it a very negative experience, because employers and recruitment companies just see the gaps," she told *New Civil Engineer* earlier this year (*Tideway Major Project Report*, July).

Tideway's programme consists of 12 weeks of paid work and training, including "back to work" skills and one to one coaching. After that the returners can apply for full time posts. The first programme attracted 105 applicants for just seven places, indicating that there really is an untapped pool of talent that might otherwise be lost to the sector altogether.

The industry could also be snapping up people who are dissatisfied with the sector they currently work in, according to the *Transport Skills Strategy*. "Not everyone makes the right career choices first time," says the report, quoting research by the London School of Business and Finance that claims 47% of UK workers would like to change their current career. Infrastructure employers with an open approach – adopting a "degree blind" attitude, as advocated by Kapsch TrafficCom UK managing director Sharon Kindleysides – might be able to attract a wide range of people from all walks of life into the sector as a second career.

TAILORED LEARNING

HOW UNIVERSITIES CAN TURN OUT THE GRADUATES EMPLOYERS WANT

BY MARGO COLE

In addition to traditional design and management skills, today's industry needs engineers who are comfortable dealing with large amounts of digital data; experts in integrating technology into construction; and people who can operate comfortably in collaborative and customer-focused environments.

But if this is what the industry requires, are the universities doing enough to prepare their civil engineering graduates for the modern world?

"As a practicing engineer running a construction business, what I'm looking for is people who have got the right grounding so we can develop them rapidly," explains Costain technical director Bill Hewlett, who is on the industry advisory panel at Cambridge University. "Universities should focus on what universities can do best – not what the industry can do.

"Universities are extremely good at some things and not others," he adds. "They should focus on what they're good at: they need to get people prepared to learn fast in an industrial setting. I don't expect a fully rounded product, but I do expect them to have learnt what they should have

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learnt, and be able to learn the rest fast.

"As an engineer, I'm looking for engineering sense: traditional stuff like how structures stand up, and what makes materials strong."

So what about issues like team working and collaboration? "There is a place for some formalised teaching in groups and behaviour, but the role of the university is to look at that academically rather than practically," says Hewlett. "But it is useful to have some teaching of the underlying principles of collaboration. The way in which teaching – and particularly coursework – is delivered should involve teamwork, and some analysis of how the team has worked.

"It's about self-awareness and opening minds to the fact that there are different sorts of people, and a team needs a variety of people."

What Hewlett would like to see is more students doing



Graduates: Developing a more industry-specific grounding

summer placements or a year in industry as part of their course. "I know it makes it a long course, but when they've done a year out they come back as much more mature people, and they are much more self-aware and clearer about things like time management," he says. "It contextualises the teaching."

Merlin Entertainments project manager and *New Civil Engineer* graduate of the year Michelle Hicks is on the industry advisory panel for the University of Surrey, which offers a year in industry option on its BSc and MSc civil engineering degree courses. "I think the experience of industry is done particularly well at Surrey," she says.

Around one third of civil engineering students are on scholarships matched to a specific company, so they do structured work experience in the summer vacations as well as the one year placement.

"By the time you graduate, you have had 18 months' experience with the same company, so you can get stuck in

“ Having the industry advisory board really helped the university understand that and to make changes to the curriculum.

straight away when you graduate,” she explains.

The industry advisory board at Surrey is made up of alumni, who between them represent small and large consultants, contractors and clients. The members also have a wide range of experience, from recent graduates like Hicks – who joined as a student member when she was still studying – to those with over 20 years in the industry. The board's role is to help the university ensure its courses are relevant to the needs of the industry.

“The big one for us has been building information modelling (BIM) – how you incorporate that into the curriculum,” she explains.

“We felt it was really important for students to understand that BIM is a process, not just a model, and that it is applicable on every type of project, whether it is a building project or water treatment or railways. Having the industry advisory board really helped the university understand that and to make changes to the curriculum.

“The department realises it's invaluable to get updates as to how the industry is now, and to change the courses to reflect that,” Hicks adds.

She believes it is useful for civil engineering courses to have a “light touch” on issues like finance, law and project management. “It's about starting to get your head around it,” she explains. “Just having that little bit of understanding gives you a bit of a boost as you move through the company.”

And Hicks agrees with Hewlett that collaboration and team working can be integrated into the teaching. “We did a lot of group work on the course,” she says.

“The reason behind that is that engineers work in teams. It can have its frustrations when you are at university, but that's the way a team works in real life, so I think it's vital that you do that.”

Another important element of the Surrey course, Hicks says, was learning how to coordinate across different engineering disciplines. “We did a multi-disciplinary design project in the final year, working with chemical and mechanical engineers, and it was amazing to see what they can do.”

Costain infrastructure managing director Darren James is also on Surrey's industry advisor board, and says it provides “challenging feedback” that the course is relevant. “Generally it's about looking at what the requirements are going to be in terms of skills,” he says. “The role of undergraduate and postgraduate programmes is to produce the resource pool that's going to ensure we meet the country's infrastructure needs.

“Universities should be always looking at what they need to provide the engineers of the future. And then the professional institutions have a role to provide the further learning and professional development. Both have the responsibility for producing the skills the UK needs.”

New Civil Engineer

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