IET Supplement: Data Centre Skills

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Emma Fryer, September 2019

Data centres provide the core digital infrastructure that underpins our modern economy; all sectors – business, government and academia - rely on data centres to transmit, receive, store, process and manage digital data securely and efficiently. As individuals we rely on data centres when we work, interact with government and, increasingly, socialise. But the data centre is not just a modern utility; it supports a complex, dynamic and highly successful ecosystem of businesses[1]. Collectively these have made the UK a globally important hub for the provision of digital services: the UK punches well above its weight and enjoys a significant trade surplus in digital exports.

In terms of its skills needs, the data centre sector has complex requirements. This is because it is not a single sector, but rather a composite of different industries: construction, IT, communications, facilities management, engineering – to name just a few. As a result, the sector has technical skills needs across multiple disciplines, from network design to air conditioning; from energy management to generator maintenance. More importantly, data centres need people who are multi-disciplined themselves, because the data centre is where these specialist technical areas have to work together, not in isolation. The core requirements are also changing, from pure mechanical and electrical engineering skills to a broader range of technical competences covering areas like IT and connectivity.

The sector is also growing – fast – to support our increasing dependence on internet-enabled applications and activities ranging from government services to social media and the associated explosion in digital data that we are experiencing as a result. A general movement to new delivery models like cloud, which concentrate storage and functionality in purpose-built facilities rather than in end user devices, is also leading to data centre expansion and new deployments. The cloud may sound intangible but it is underpinned by advanced physical infrastructure and it is dependent on specialised technical staff at every operational level. This growth trend looks set to continue with the advent of big data, the internet-of-things, digital transformation, autonomous vehicles, machine learning and artificial intelligence. The demand for efficient, resilient data centre facilities is growing at a rate previously unseen.

This leaves the industry in a paradoxical position: on the one hand, the sector is a market-leading, global success story and offers exceptional career opportunities, especially for individuals with technical or engineering backgrounds. Having enjoyed consistent growth even during recessions, data centres provide the kind of job security that many other sectors only dream of. There is excellent career progression in an environment needing a full suite of roles ranging from technician to consulting engineer and beyond. Working in a data centre provides engineers with multiple routes to Chartered status and salaries are very competitive because technical staff are in high

[1] See: Data Centres: Engines of Growth

demand. Talking to data centre professionals, however, reveals that they also value the more nuanced benefits, such as the variety of experience, the choice of discipline or sub-discipline and the career mobility: data centres provide engineers and technical staff with an unequalled array of transferable skills that equip them for a broad range of technical and management roles.

On the other hand, data centres are often overlooked by people with exactly the right qualifications and attributes to succeed in the industry. Why? Is it the complex requirements? The obscure language we use to describe roles? We know ex-military personnel who were intimidated by the terminology and acronyms so that is certainly a possibility. Or is it the low profile of the sector? Have you heard of Equinix? Digital Realty? Interxion? Telehouse? Probably not but they, among others, provide our core digital infrastructure. Data centres have tended to stay under the radar for reasons of security and resilience, but the downside is that not enough people know the sector exists, what it does and what it can offer as a place to work.

The inevitable result is an acute skills shortage, both short-term and long-term. Operators cannot meet current skills needs with domestic talent and must look overseas, so at least one in five key technical roles is filled by non-British staff, who provide welcome expertise in areas like connectivity, acquisition, engineering, facility management, operations and construction design.

What are our skills shortages?

Short term skills shortages are apparent: even a cursory look at vacancies reveals the gaps and operators also report a long list of underlying skills and capabilities that are hard to find (see boxes). They struggle particularly to source individuals with experience in critical environments and engineers with computer science backgrounds or with a wide breadth of skills.

Roles often reported by operators as "hard to fill" include:

- Design engineer
- Network architect
- Network engineer
- Electrical engineer
- Mechanical / facilities engineer
- Operations manager
- Energy manager
- Shift manager / site technician
- Technical sales manager
- Technical procurement manager
- Cloud support engineer
- Customer operations manager
- Digital solutions architect

Operators report that technical skills in short supply relate to data centre functions like:

- Power system management
- Mechanical refrigeration
- Cooling infrastructure management
- Air flow management / fluid dynamics
- Switching and routing
- Hardware virtualisation
- Cabling and network management
- IT hardware engineering
- IT software engineering
- Critical systems experience
- Cloud transformation
- End-to-end infrastructure
- Technical project management

Brexit is likely to make this worse and has already had a major impact of the willingness of technical staff to come to the UK, so the pipeline has been eroded well ahead of any leaving date. Once we leave, we could face very severe obstacles to accessing talent from abroad.

But it doesn't have to be like this: in theory Brexit is an unprecedented opportunity to rethink our migration policy and design a new smart migration system around the free movement of skills. The current system is broken. We have the chance to modernise, to access a wider pool of international talent, to overhaul the restrictive Tier system and to protect existing non-UK employees.

Addressing long term skills shortages is also a non-trivial task. Policy and academia already struggle to keep up with ever-changing skills requirements and will be further challenged by the relentless pace of technology development Observers stress the need to develop our domestic talent instead of relying on migration, but this is easier said than done. UK Government is clearly committed to improving the level of STEM (science, technology, engineering and maths) skills and doing a better job of matching the skills that emerge from further education with those actually needed by industry. However, the number of STEM students in the pipeline is still too small and this is reduced further because the sector is not appealing enough to women. More worrying, it is widely acknowledged that 80 per cent of the engineers currently working in the sector will be retired in 20 years. So one important element of our skills strategy will be to find some means of retaining their invaluable "tribal" knowledge so that it does not have to be relearned.

What are we doing about it?

Operators have choices. They can increase salaries (and risk a bidding war), develop their own staff (and risk poaching), relax recruitment criteria (and increase training costs), outsource (and risk losing control) or ask existing staff to cover the gap (and risk losing them). Many are taking a strategic view and doing all these things: if everyone invests in staff development, then issues of poaching diminish. Larger operators are implementing in-house schemes, and others are working more proactively with training providers, industry associations and suppliers.

At techUK we are trying to ensure the sector is strategic in approach and we are working with operators and external stakeholders in three main areas:

- Supporting career progression, where activities include developing bespoke apprenticeship standards[2], clarifying career paths within the sector, encouraging students to retain STEM subjects[3] and improving the level of professional registration[4].

- Representing operators to Government where we continue to lobby for coherent migration policy. We have highlighted the impacts of Brexit on skills[5], submitted evidence to Select Committees and worked with DCMS and the Migration Advisory Committee on the post Brexit skills and migration needs of the tech sector.

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[2] Trailblazer Apprenticeships Explained
[3] Keeping your options open (Oh my God I forgot to study maths!)
[4] https://www.techuk.org/images/Professionalism_project_description.pdf
[5] See: Silver Linings: Implications of Brexit for the UK Data Centre Sector, our subsequent update and Global Tech Talent Powering Global Britain: Navigating Post-Brexit Migration Options

- Promoting the sector as a career destination of choice[6]. We are working with third parties on outreach to education, raising awareness of the sector's critical role, helping operators to recruit and retain more women[7] and promoting role models[8].

Most importantly, we explain why the sector is such a great place to work. And it is: our data centres underpin every aspect of digital living; business processes, government services and social interactions. Data centres are where science fiction meets reality: they enable space travel, artificial intelligence and machine-to-machine communications. They drive investment in communications infrastructure and enable smart grid. Data centres stimulate technological development and R&D and provide the processing power for bioinformatics and medical research. Data centres help us model and understand our planet and its atmosphere, from weather forecasting to long term climate change. They are the heart of the digital economy.

To find out more please contact:

Emma Fryer
Associate Director, techUK
Tel: 01609 772 137
Mob: 07595 410 653
emma.fryer@techuk.org

Lucas Banach
Programme Assistant
Tel: 020 7331 2006
Lucas.banach@techuk.org

[6] Why work in a data centre?
[7] So You Want To Employ More Women?
[8] See our Sector Superheroes