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THE COMPLETE GUIDE TO **IT SKILLS**

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Looking to the future

The IT skills landscape is constantly changing, meaning a guide like this is tricky to put together. However, there are some industry-wide trends that we are seeing regarding certain roles and skills which can help accelerate your career trajectory.

As the enterprise IT world moves towards the cloud these skills continue to prove most valuable to organizations, especially when it comes to securing these environments, and as data proliferates people who can make sense of that information are also worth their weight in gold.

Here we break down some of those key trends, from increasingly popular skills and roles, to an essay on

whether it's time for businesses to take responsibility for the well-documented 'skills gap'. Then we dive into three specific roles for you, explaining the skills required to get into areas like blockchain, data science and, more traditionally, network engineering.

Here's our guide to the UK IT hiring landscape in 2018 and how you can best take advantage of it. **Scott Carey**

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Top IT job hiring trends

A look back at another strong year for the IT industry and what the future may bring for IT professionals

There have been two defining macroeconomic factors on the UK IT hiring landscape in 2018: the General Data Protection Regulation (GDPR) and the looming spectre of Brexit.

In terms of GDPR demand for big data skills and professionals has surged, as companies look to avoid costly mistakes and the subsequent fines in this new data arena. These roles have seen demand increase by 78 percent in the past 12 months (Q1 2017 – Q1 2018), according to the May 2018 Tech Cities Job Watch report from IT recruitment specialists Experis.

The research puts this jump down to the General Data Protection Regulation (GDPR), with Martin Ewings, director of specialist markets saying: “A number of regulatory hurdles this year – including the much talked about GDPR – coupled with the growing Internet of Things trend, are putting pressure on businesses to better manage, process, secure and leverage their data.

This has seen contractor demand rise 128 percent in the same period, and permanent role demand increase 68 percent for big data skills.

That being said, wages in these skill areas appear to have stalled, with permanent salaries only growing 0.1 percent in the past year and contractor day rates are down 5 percent for the same period.

As Dave Hannah, Experis UK brand leader, writes in his foreword for the Q1 Job Watch report: “When demand for certain skill sets grows, most people would expect the wages to be pushed up, as a result of increased competition. However, this isn’t the case where Big Data roles are concerned this quarter.”

Then, when it comes to Brexit, the surprising findings have shown that the upcoming exit from the European Union has not dented confidence in the sector.

In fact, the annual Job Market Report by technology career site Dice showed that 78 percent of the 1,100 tech professionals surveyed were positive about their career prospects for the year ahead.

A massive 62 percent of permanent IT staff expect their salary to rise in the year ahead, and 59 percent of contractors expect the same.

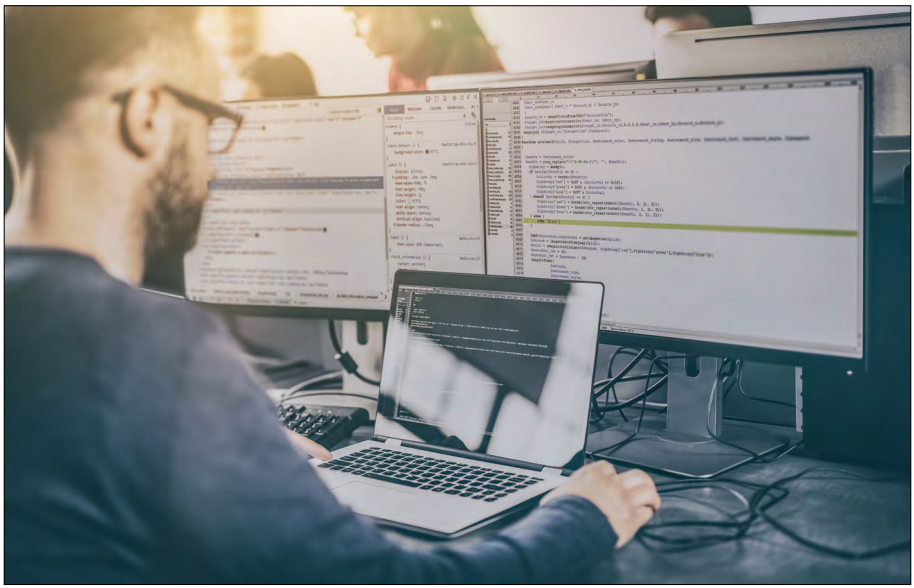
This is reflected by the CompTIA IT Industry Business Confidence Index, which was released in January. This forecasts a growth of 5 percent globally for the IT

industry, which is close to the highest rating the index has charted heading into the first quarter of a year.

However, Hired's 2018 Global State of Salaries report found there has been a 7 percent decline in hiring candidates from outside the UK on its platform.

Tech workers from abroad are also being paid nearly more than £12,000 more than their UK-native colleagues.

In a more general sense IT jobs on the whole in the UK continue to rise. The February 2018 Tech Cities Job Watch report showed that demand for IT workers rose 35 percent compared to Q4 of 2016. **Scott Carey**



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Most in-demand IT skills

IT recruitment specialists reveal which skills are in most demand

The IT labour market continues to boom, but the growing demand has left many employers struggling to fill vacancies. In the fast-changing technology sector, popular skills can quickly become outdated as new ones emerge to replace them, and the developments often leave a shortage of sufficiently qualified staff.

The struggles of employers can be gains for the candidates, as they're now in the driving seat if they choose the right route. We reviewed the latest reports from IT recruitment specialists Harvey Nash, Experis, Robert Half Technology and developer platform Stack

Overflow to find out which skill sets are most in demand for enterprise IT professionals right now.

Kubernetes

Data in the IT Jobs Watch survey suggests the demand for Kubernetes skills is almost eight times what it was two years ago, with UK recruiters noting that skills for the container orchestration tool have leaped 729 places to enter the top 250 desired skills for the first time.

Research by CyberArk found that Kubernetes skills are more likely to appear in job ads than those for 'DevOps engineers' or 'developers'. Over the past two years, Kubernetes skills have increased 752 percent in the IT Jobs Watch survey.

DevOps security lead at CyberArk Josh Kirkwood says that Kubernetes has "become a massive money word". "These figures show that DevOps teams are seeking more skills to help them manage and deploy applications at scale," he adds.

"However, there is a very real danger that the rush to achieve IT and business advantages will outpace awareness of the security risks."

The median salary for the six months leading up to 19 June 2018 for jobs that contained 'Kubernetes' in the description was a respectable £65,000.

Big data analytics

Big Data analytics remained the most in-demand skill for the third consecutive year by the end of 2017, according to the Harvey Nash CIO Survey. The number of organizations that suffer from a shortage in it has increased by 8 percent since 2016 to 42 percent in 2017. It was the most in-demand skill for large and small

employers, 49- and 41 percent of whom respectively said they were suffering from its lack.

It also retained its spot as the best-paid skill in the Experis Tech Cities Job Watch for the second quarter of 2017, with an average permanent salary of £68,799, more than £10,000 higher than cloud, the second most highly-paid discipline. Its prominence is due to the complex requirements and hefty fines in the impending General Data Protection Regulation (GDPR) legislation and the huge business benefits that data analytics can provide.

Cloud

The cost-effective business benefits offered by cloud services have put skills with the technology in high demand. Employees who possess them now earn an average permanent salary of £58,359 according to Experis, an increase of more than £300 on the previous quarter, although the average day rate for contractors has slipped from £493 to £482. This was still an increase on this time last year of 3.79 percent. Cloud and web development were the only disciplines to experience an increase in this time frame.

“Organizations are moving to cloud-based services as opposed to the traditional client-server environments, and owning and building everything themselves,” says Geoff Smith, the managing director of Experis UK and Ireland. “There’s a huge cost drive which is promoting everybody to utilise cloud services.”

The speed to provision, scalability, cost, and stability of cloud are driving its growth, which is also aligned to that of security skills, as companies put their information into another organization’s hands, which then becomes responsible for hosting and managing it.

Enterprise architecture

The demand for enterprise architecture skills increased by 26 percent in 2017 according to the Harvey Nash survey, the biggest growth of any technology skill for the year. It was the second most in-demand skill in the survey overall, with 34 percent of respondents saying they suffered from a shortage of it. For medium-sized businesses, it was tied for top spot with big data analytics at 48 percent.

The research shows that some declines in popularity are only temporary. Three years ago architecture was experiencing a big drop in demand that led many to think its days were over. Among the reasons for its comeback is the increasing complexity of digital portfolios.

Security

Security skills remain the third best-paid discipline in the Tech Cities report, as evolving threats, new data protection needs, and a growing list of high-profile victims of high-profile breaches force companies to shell out on security specialists. In the Harvey Nash CIO Survey, 28 percent of respondents said their organization was lacking in security skills.

The average annual salary of £58,725 is almost £10,000 lower than that of big data experts, which may be partly the result of changing definitions and a degree of overlap with other skills.

“The lines between Big Data and IT Security are blurring, creating the need for Big Data professionals to quickly upskill in new areas in order to meet GDPR requirements,” says Smith.

Research by Robert Half Technology also shows security skills are still in high demand. The recruitment

agency surveyed 100 financial services executives, 52 percent of whom said they were finding it challenging to find skilled security professionals, the highest percentage of any IT skill set.

"There's a real lack of talent to meet the demands within IT and information security challenges that customers are having," reveals the company's UK director Neil Owen. "This could be from security engineers through to penetration testers, through to identity access management consultants through to security architects. Across the board, we're seeing people needing IT security skills."

Mobile

Mobile is another discipline where Experis noticed a jump in demand. The result is an average salary of £52,053 across the UK, and average contractor day rates of £409.

"The last three or four years, everybody's realizing that your interaction points from a customer perspective is largely on the mobile," says Smith. "Even in our space, people don't apply for jobs in a shut window anymore, or even for the newspaper. They're searching and applying on their mobile. Everybody's recognizing that is your interface now as a company, there's a hell of a lot of development work. That's probably one of our consistently in-demand areas."

Web development

According to Stack Overflow, there are 970,185 developers in the UK and Ireland. The company's Developer Ecosystem report for the second quarter of 2017 revealed that the developer skill most sought

by employers was JavaScript, at 19 percent. This was followed by Java (14 percent), C# (13 percent), Python (9 percent), and Amazon Web Services (7 percent).

The fastest growing technical keywords in posted jobs between January and April 2017 were 'Agile' (+4.5 percent), 'Scala' (+3.5 percent), 'Docker' (+3 percent), 'Testing' (+2.7 percent), and 'Jenkins' (+2.3 percent)

Developers were one of the most in-demand positions in the Robert Half UK Salary Guide 2017. They can now expect a salary of between £44,500 and £69,500, a growth of 2.9 percent.

Skills in Tableau, QlikView and Power BI are all in high-demand for front-end development, as are the three components of Microsoft's SQL Server: Integration Services (SSIS), Analysis Services (SSAS), and Reporting Services (SSRS).

Clients of Robert Half are increasingly seeking employees who can adapt to the rapid rate at which the most-used programming languages are changing.

"We are also seeing a lot of demand for candidates with a broad blend of skills across multiple technologies," says Owen. "As opposed to being an expert in Java or an expert in PHP we're seeing many customers are looking for a blend of multiple programming languages."

The average permanent salary for web developers has slipped slightly according to the Tech Cities report, from £41,990 in the previous quarter to £41,578 in this one. The average day rate for contractors also dropped from £38 to £332, although it had increased by 0.91 percent since this time last year.

The shortage in development skills was a particular problem for small businesses in the Harvey Nash CIO survey, 26 percent of whom said they were

suffering from a lack of it, although the shortage had dropped overall from being reported by 27 percent of respondents in each of the previous two years to 25 percent in 2017. **Tom Macaulay**

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Is it time for businesses to take responsibility?

If the digital skills gap is in fact nearing its crisis moment, why aren't the companies so terrified of it doing more to solve the problem?

Apprenticeships, coding academies, incubators, upskilling, open source – all of these are cited by academia, business and government as ways to plug the impending digital skills gap that, if we are to believe those who most frequently bemoan it, threatens to transmute into a gaping maw and swallow the UK's economy whole.

Uncertainties surrounding Britain's exit from the European Union has left both workers and businesses

worried that the anti-immigration 'hostile environment', combined with the closed-border of a 'hard Brexit', will widen that skills gap further.

The British government estimates the number of people who don't know 'one basic digital skill' at a staggering 11.5 million. For businesses, roles related to technology are mostly are an employees' market, with many companies failing to attract and retain talent.

Meanwhile, millions are in precarious work, unemployed or under-employed; which leads us to ask: why are companies struggling to hire for well-paid roles when there must be so many people in this country aching for a chance to retrain in tech?

With the government failing to step in – is it time that businesses took on more responsibility for filling the skills gap?

What is the skills gap anyway?

The term 'skills gap' refers to the fact that businesses are having a hard time finding and then retaining talent in technology, specifically when it comes to coding, data science, network engineering, cloud and cybersecurity skills.

This isn't a new problem. A search on the *Financial Times* (**fave.co/2MXqSOF**) returns one of the earliest references to the technology skills gap dating back to 2005, the same year that YouTube launched.

Since then there has been much ink spilled warning of a looming crisis, and yet here we are – 13 years later – and the problem has only worsened if anything. The digital skills gap is inherently a challenge: with technology growing exponentially, the rate of change tends to outpace education.

On the government and education side there has been a gradual shift away from arts and humanities in favour of career-based subjects which attempt to usher young people in the direction of science, technology, engineering and mathematics – the STEM subjects (science, technology, engineering, and mathematics).

The debate over whether that is an effective strategy is for a different article (and almost certainly a different publication), but even with this nudging towards science, engineering and technology, there are still plenty of doom-and-gloom predictions from the big consultancies like Deloitte, and technology companies such as IBM.

Industry 4.0

Hidden in its 2016 'Digital Democracy Manifesto', the Labour Party proposed a country-wide training programme to involve as many people as possible in coding, with a particular slant on open source. The 'coding for everyone' initiative would train both children and adults in learning to code software as well as build hardware.

As we wrote at the time, this chimed across party lines, as the Conservative government has spent years now talking up 'Industry 4.0' – a term loosely describing highly connected and automated industrial manufacturing, an area of industry that will be defined by people who can code, rather than directly operate, the machines of the future. The past handful of budgets have at the very least paid lip service to the skills gap, with present chancellor Philip Hammond going a step further and introducing the new 'T-Level' technical qualifications.

And at the World Economic Forum at Davos this year, prime minister Theresa May announced an 'Institute of

Coding' – a consortium of "60 universities, businesses and industry experts set to receive £20 million to tackle the UK's digital skills gap".

Even more significantly, a £1 billion artificial intelligence kitty in partnership with Imperial College London, including new PhDs in AI, hopes to "keep the UK at the forefront of innovation and build the UK's status as an AI research hotspot". Another partnership between UCL and Cisco for a joint artificial intelligence centre has similar goals.

The problem of now

Time will tell if these and other measures are successful. But even if they ultimately are, by the time these students are graduates, the gap will only have widened. There is a more immediate problem to be solved.

CA technologies' CEO Mike Gregoire recently said in an interview with Fortune that "a shortage of skilled tech talent won't solve itself, and companies can't wait for government to act". He added that government tends to move slowly, and now is the time for cross-company collaboration to solve a problem that they are all facing.

"Business leaders do need to take responsibility and work together to train people for jobs in the future digital economy," agrees Salesforce EMEA area vice president Adam Spearing. "No individual company, government or politician can solve a societal challenge of this scale on their own, we must take collective action."

But is the skills gap really a problem? What does it mean for technology workers? At the moment, there are job markets in technology that favour employees – certified, qualified and competent developers often have their pick of jobs rather than competing heavily per role.

Is the skills gap actually about the health of these companies, which are having to pay more money to win over the best workers – and scrambling over themselves to offer perks, concessions, and projecting the image of a progressive place to work?

It is somewhat difficult to swallow the official line of many of these companies that plugging the skills gap is somehow a moral obligation which corporations owe to society. Nevertheless – it appears there's agreement from all corners of the political, corporate and academic spectrum that something must be done.

The end of box-ticking

Some recruiting and training experts are calling for a complete rethinking of the hiring process, to avoid the box-ticking HR-standard that leads to the vicious cycle for young workers of 'no experience, no job, no job, no experience'. This might include an emphasis on personality and soft skills, creative thinking and adaptability, over formal qualifications (apologies to T-Level students).

"Organizations need to embrace new hiring approaches based on demonstrable skills rather than the dependence that an individual must hold a certain certification or degree," James Hadley, founder of learning platform provider Immersive Labs tells us.

"Looking to the future, I truly believe the most important matter in hiring a candidate will be down to the individual's ability to quickly learn new skills and then apply them.

"The organizations who will come out on top will be the ones who adapt their hiring techniques while also offering all staff, new and old, across all departments,

the support and facilities to upskill in new areas to facilitate internal mobility."

Salesforce's Adam Spearing says to accompany this there needs to be a "fundamental transformation of what we consider to be education".

"Given the pace at which the world of work is changing and will continue to change, graduation needs to be seen as the start of something rather than the end point," he adds.

Continuous delivery is essential to releasing software: a program's life cycle doesn't end when it's released, but it is continuously evolved with bugs ironed out as the product matures. Similarly, lifelong learning should be encouraged to keep up with the rate of change in technology, especially given how prone to obsolescence everything can be, with technological disruption often arising unseen from unexpected corners.

"Developing a future workforce that is fourth industrial revolution-ready requires a clear commitment from education institutions, the government, and businesses to provide ongoing lifelong training in digital skills which are accessible to all," says Spearing.

"Not only should this include investing in smart technology into schools and universities, but also by opening up access to education and recognizing new models of learning, allowing everyone to develop a more diverse range of skilled talent."

Data analytics firm Qlik's head of data literacy Jordan Morrow warns that there is a growing gap in data skills that cannot be solved by traditional hiring or promotion mechanisms, and this will only be exacerbated with the rise of automation. Businesses need to look again across their entire structures, and consider upskilling

workers in every department, playing to their individual talents and needs.

"We are in the midst of an extreme data literacy deficiency, and organizations need to upskill employees fast to achieve a sustainable level of growth in the next five to ten years," Morrow explains. "Data is the new basis for business growth to derive insights, work more efficiently and get a step up on competitors. Our recent research found only 24 percent of business decision makers are data literate, meaning they don't have full confidence in their ability to read, work with, analyse and argue with data. This not only prevents them from thriving in their own job roles but hampers their ability to drive data-led cultural change across the business."

Morrow argues that companies need to be making the most of enthusiasm among the workforce about data, and appoint "data champions" to promote data literacy. He adds that organizations are "made up of very different people, parts and pieces", so this needs to be "done on multiple levels with the different data personalities across the business needing tailored support. Strong mentoring and stewardship will help create the right culture where anyone can thrive".

Open source

Open source could provide another way forward. There are plenty of free resources out there that are accessible for every would-be learner.

On a micro scale this has proved popular for hundreds of Key Stage Three students, who have for two years now competed in an open source coding competition sponsored by Red Hat where they were challenged to design apps for charities of their choice.

Software defined mainframe firm LzLabs' CMO Dale Vecchio argues that the dwindling pool of experts in specialist areas like mainframe engineering has shifted from a "shortage to a crisis", as the people that understand these legacy systems are – simply put – retiring. He says that education in this area is at this point "too little too late" and that open source, realistically, offers the best way out.

"The resources will be gone long before new ones can be trained to provide equivalent capability," Vecchio says. "Organizations have been complacent for too long, and it's their responsibility to transition from proprietary, legacy platforms to open systems and the cloud.

"Organizations that do not make this move are in danger of rendering their core IT infrastructure inoperable by a modern workforce. Those that do however, then open their business up to the far wider talent pool of developers within the ever growing open source community. The difference between searching in vain for skilled mainframe developers and being able to pick from some of the freshest innovative open source talent is night and day and is an imperative move for business to stay competitive."

Brexit brain drain

Principal consultant at Cornerstone, Peter Gold, says that Brexit is already impacting companies trying to fill roles. "We only anticipate that this challenge will keep growing," he says. "It's critical companies educate their staff and plug skills gaps themselves with their own talent."

One country that has experienced brain drain is Romania – and its attempt to foster a thriving tech

culture could proffer some clues for Britain. Ever since the 1990s, says cybersecurity company Bitdefender's HR manager, Carmen Buruiana, there has been a "war for talent" in the technology market. The Romanian government joined with the technology industry to develop a plan to slow down emigration of the country's brightest, and retain talented staff at companies at home.

"One of the most effective measures was income tax exemption for software developers, which resulted in the increase of IT investment," reveals Buruiana. "Since then, the Romanian tech market has developed continuously due to foreign investment and local initiative.

Despite this, a scarcity of skilled professionals remains in the country, with only half of job openings tending to be filled. Buruiana says that Bitdefender has come to the conclusion that the private sector "has to play a crucial role in the educational process and take responsibility for it – considering that growth and innovation are the premises for the private sector and these can only be accomplished with very well-trained professionals, Bitdefender has developed several partnerships with Romanian technical universities".

These include academic courses in security designed by the company, as well as Masters' degrees developed with the University of Math and Informatics in Bucharest and the Technical University in Cluj-Napoca. Buriana adds that the company also encourages its employees to follow PhD programmes and teach courses in technical and maths universities themselves.

Looking beyond the corporate walled garden

A non-profit organization called TechVets recently signed a partnership with Britain's Ministry of Defence to

connect veterans to training schemes in cybersecurity skills. Crucial Academy is another cybersecurity training facility that offers courses, for free, to ex-military personnel. And Amazon Web Services' AWS re:Start Military also seeks to provide qualifications to people with its training and job placement programmes, aimed at educating young adults as well as military veterans.

These kinds of schemes, along with training, investment, apprenticeship, and graduate programmes ranging from companies such as Cisco to Accenture to Salesforce and Capgemini – often fill fast, and with significant investment in the millions – proves not only that there is a willingness for companies to take a chance on training people who might not have formal qualifications but the willingness for people outside of the tech bubble to learn these new skills.

If businesses are serious about tackling this they need to look way beyond their walled gardens – and beyond these unilateral measures with universities or governments. They are a good start but ultimately they are disparate. What about country-wide training and awareness programmes, or a centralized portal that collects all these siloed schemes and makes them accessible to everyone through a single platform? They could collate apprenticeship programmes, free online resources, non-profits, affordable programmes – everything – in a single place. They could be accompanied by national advertising campaigns that highlight outcome-based benefits of digital and data literacy. If the skills gap is serious as the transnationals say, why not advertise to plug it?

And as open source technologies only continue to grow, from networking to cloud, software and hardware,

this could prove an inexpensive but relevant way for people to train independently and at their own pace, with a wealth of free courses available online for people to access: if only people were made aware and supported by every possible stakeholder – that this is not an untenable, but a realistic career, and that the barrier to entry need not be so high. **Tamlin Magee**

Credit: iStock

How to get a job as a blockchain developer

Interested in working with blockchain systems? Here's what you need to know to make it as a developer

In the past year, the price of bitcoin has fluctuated massively – jumping to a massive $20,000 last December. But whatever the current state of bitcoin is, interest in the underlying blockchain technology continues to grow outside of the crypto world.

Blockchain refers to a list of records or 'blocks' that are linked to one another and secured by cryptography. This takes the form of a distributed ledger that can be shared across many parties to create a system of

record with no single point of failure. One major use for blockchain is to authenticate cryptocurrency payments, but the common consensus is that blockchain systems can be adapted in a much wider range of processes.

And as businesses and even public sector bodies realize the potential of blockchain-based systems, demand for expertise to create pilot projects and launch products has grown swiftly.

Skills

There a variety of blockchain related roles that businesses are hiring for. For some, this means taking on leading experts with experience of creating and running distributed ledger systems in production.

But often a large corporate will build a team around a core of blockchain experts. In this case, all that is needed, in addition to strong software development or engineering skills, is a solid understanding of the principles around blockchain systems.

Of course, blockchain is just one piece of a typical technology stack. Engineers that specialize in networking or security, for instance, play a vital part alongside those with core software development skills. An awareness of modern technology tools such as microservice architectures is a plus, too.

Qualifications

Obvious, perhaps, but the first thing a developer needs is a background in computer science or engineering. From there it's possible to do further training courses in blockchain specifically, but these are scarce given how new the technology is. Experience in a back-end developer role is crucial and in addition to strong

back-end skills, blockchain developers need to have at least the fundamentals of cryptography.

Once a developer has those core pillars they can begin to learn more about the different blockchain platforms at which point it becomes more systematic, according to Gavin Pacini from Deloitte's EMEA Blockchain Lab.

There are a few options in terms of programming languages for blockchain, but Pacini tells us that a lot of the APIs and SDKs which are developed for blockchain are in JavaScript or more specifically, node.js.

"The reason is that it's a relatively new platform and pretty quick to set up and people in the blockchain industry are trying to stay on that track, they don't want to use older technologies," he says.

However, Polyglot software engineers – those able to code in a number of languages – seem to be preferred. Knowledge of Java and C++ appear as a requisite in many job listings, for instance.

Earnings

As with any emerging technology, the low supply and growing demand for expertise means that many businesses are willing to pay a premium.

The rate of pay for blockchain specialists varies considerably. Start-ups will typically pay somewhere between £40,000 to £60,000 for someone without experience and then look to give them training. In some instances, they may offer equity in the company too.

For large corporates such as banks, this can be significantly higher, ranging from £70,000 for a developer with five years experience or more, up to £150,000 in some cases.

From a business perspective, accessing skills can be a significant challenge. Some estimate that – in the UK specifically – there are in the region of 250 developers who truly 'get' blockchain. Attracting potential employees from this small pool of experts is tough. Many of those who first got to grips with blockchain in the form of bitcoin's open, permissionless ledger, may have been attracted by the cryptocurrency's libertarian ethos. So switching to building private ledgers for a multinational bank may not be their aim. Furthermore, considering that blockchain technology remains fairly niche, even getting into contact with the right people can be tough.

Responsibilities

Most blockchain development roles expect developers to be responsible for research, design and testing of blockchain systems. However, these blockchain developers are expected to take ownership of a lot more as well. Seeing as they will have experience, or at least knowledge, of cryptography and common algorithms and data structures, you'll most likely be in charge of large codebases and peer-to-peer (P2P) networks.

You'll have ongoing projects, which will mean breaking down existing code and frameworks, and rebuilding them, as well as evaluating existing and proposed blockchain structures.

Additionally, most companies rely on the blockchain developer to design different blockchain technologies and implement them in their internal platforms, as well as maintaining the environments they are being built in.

Lots of companies are also looking for their blockchain developers to offer some business insights and logic. The blockchain developer will be responsible

for integrations and will be asked for evaluations based on business metrics as well as IT-related ones.

From the job descriptions we've looked at, most roles will offer some form of training and ask that the candidates have knowledge in source control and agile tools, experience with large-scale, secured, distributed systems and have an interest in the way money can virtually travel through secure systems.

How to become a blockchain developer

We spoke with Niamh O'Connell and Gavin Pacini from Deloitte's EMEA Blockchain Lab, to gather their advice on becoming a blockchain developer.

Keep up with industry trends

In such a new and dynamic landscape, it's important for developers to take responsibility for their own learning, particularly if they want to accelerate their career. Reach out to people in your network who can help you build your portfolio and attend events with speakers who you find interesting.

Pacini suggests using Reddit to keep up to date with relevant industry discussions and GitHub, a website for software development projects, to learn from your peers and share code. "Developing your own skills and knowledge is important. We're lucky that the blockchain lab in Deloitte operates as a start-up environment, so it's easier to share information, but in other environments it's good to look to the online platforms," he adds.

Be agile

If you're looking to work in blockchain you need to be adaptable and willing to get stuck in. Given the

new nature of the blockchain space, there's not always documentation to rely on and developers need to be comfortable looking to open source code and learning on the job.

"It's not an established platform, so it's a real learning curve. We've had cases where we've had to dig through the source code of open source projects, which normally isn't required when using existing technologies, but with blockchain we don't have a choice. Tracks are being laid in front of us and our job is to make the best use of that," Pacini explains.

O'Connell predicts that from the business perspective too, self-education will become more and more prominent with non-techies beginning to learn the basics of code. "It's adapt or die," she argues, "even the more traditional industries are beginning to expand their tech abilities to stay relevant."

Consider the business case

O'Connell believes that having an understanding of the business case as well as the technology is extremely important when working with blockchain. One of the challenges of her role in the lab has been to educate clients on the unique properties of the technology and analyse whether it would be a good fit for the business.

"Blockchain was getting a lot of hype, particularly last year, and this meant that people were keen to use it without understanding how it should be used in comparison to a traditional database," she says. "We found that clients were coming to us with use cases that they wanted to explore and after running workshops we found that blockchain actually didn't make specific sense for their business."

Have a genuine interest

As with most other things in life, the more you put in the more you get out. Pacini says if you want to succeed as a blockchain developer, it's important to have a genuine interest in the field. Not only will you be more motivated to work harder and be willing to continue learning outside your working hours, you'll also be more likely to excel at it. "My previous experience was in payment authentication and working on payment systems mainly in the back end, but I had a personal interest in blockchain...When I joined Deloitte in the blockchain lab it was an extension to the back end for me really, which made it easier to adapt," he recalls.

Who is hiring?

First, let's take a look at where the demand for jobs is coming from. There are indications that increased hiring is occurring in a variety of sectors and industry verticals.

Some are more advanced in their blockchain strategies than others, with banks including Barclays and BBVA investigating the technology, while others have an understanding but are just testing the waters.

Blockchain start-ups and consortiums: Start-ups hiring in this space are numerous – from those providing the foundation building blocks of the technology, such as Ethereum and Eris, to companies specializing in business applications, including Everledger. Also, groups such as New York-based R3, which is creating blockchain standards in the financial sector.

Large tech firms: IBM and Microsoft have been creating products to support blockchain development with

'blockchain-as-a-service' tools built into their existing cloud portfolios. Others that have joined the open source Hyperledger project include Intel and Fujitsu.

Banks and other private sector firms: Barclays has been particularly active in the blockchain space, alongside UBS, Santander and BBVA. Also, Dutch lender ABN Amro is investigating blockchain use. It is not just the banks either. Visa and Thomson Reuters have also been on the lookout for specialists, while Airbnb hired a team of blockchain and bitcoin developers in 2016.

Government: A report published by the government's former chief science advisor, Sir Mark Walport, highlighted the potential in government and conversations have begun in the public sector around how blockchain can be used. A variety of use cases have been discussed, such as tracking student loan payments.

Professional services firms: All of the big consulting firms are at some stage of building out blockchain teams to advise their clients on what is expected to be a hugely transformative technology. Deloitte acquired blockchain start-up Rubix, PwC recruited a team from Bitnet and is continuing to expand, Capgemini planned to have 100 specialists by the end 2016 and KPMG has been hiring too. **CIO staff**

Credit: iStock

How to get a job as a data scientist

Practical tips to achieving a successful career as a data scientist

With the rise of big data comes the need for more highly skilled people to mine and interpret that data for businesses. This is the role of a data scientist, the job that Harvard Business Review called “the sexiest job of the 21st century” back in 2012. As technology continues to develop at a rapid rate, we’re seeing a number of key changes in how we work and what it means to be employed.

The quicker tech evolves, the quicker the skills needed to work with that tech become obsolete. This

means a renewed focus on a candidate's potential to learn and self-educate rather than just their existing qualifications and strengths.

One job that has greatly grown in prominence in recent years is that of the data scientist, a role Glassdoor has named the best job in the US for three consecutive years. Generally, data scientists are highly skilled, can work in a number of different industries, have high earning potential and report high levels of job satisfaction in their roles. For example, UK data scientists earn an average of £50,000 per year. And, according to a report by IBM, demand for data scientists will increase 28 percent by 2020.

What is a data scientist?

The role of a data scientist is to analyse and interpret large digital data sets and derive actionable insights from the findings. This is different to a data engineer, whose primary role is to store and prepare that data, so someone with expertise setting up and maintaining large databases. The skills required of a data engineer tend to be more technical, with knowledge of Hadoop, SQL and NoSQL databases.

Qualifications and skills

As with most emerging tech roles, there's no prescribed career path or specific required qualification. Most data scientists will have a background in maths, engineering or computer science with excellent knowledge of programming. Statistics and probability are two fundamentals of mathematics which are key to the role and are necessary for analysing and interpreting data, predicting patterns, making hypotheses, and so on.

Technical skills

Data visualization is an important component of a data scientist's role. Presenting complex ideas and findings in a coherent and effective way is crucial, bearing in mind that business leaders and decision makers won't always be of a technical mindset.

Tools such as Tableau and Plotly are useful to showcase large data sets to the relevant stakeholders in the business and make the information easier to process. They also allow for team collaboration and interaction with the data. GitHub and Kaggle are great resources for building technical experience by working on open source projects and competitions.

Data scientists need to know how to extract the most value from machine learning as it becomes more prominent in multiple sectors. This involves pairing algorithms with the right tools to build efficient and replicable processes based on your business goals.

Key traits and soft skills

It's not all about tech prowess, a data scientist also needs to be an accomplished problem solver and communicator. The ability to clearly articulate findings and suggestions is a core skill here, don't undervalue it.

An analytical mindset is a must, as is a curiosity about why things work in a certain way. As well as that you need to be flexible and adaptable so you can effectively incorporate new learnings and processes into your role. Data scientists require an always-on learning mentality and a genuine flair for investigation and innovation. Immersing yourself in the tech community helps to grow your career as a data scientist, learning from industry experts and peers.

Attend meetups, conferences and events and join online groups and discussions to make valuable like-minded connections.

Machine learning

One skill that is of growing importance in data science circles, and within the enterprise, is machine learning.

"Machine learning is a no-brainer to me. That is the true heart of data science," says Mike Ferguson, an analyst at Intelligent Business Strategies.

"People want to have a pattern detection and a view into the future, so the traditional career in reporting is no longer enough, which is a key reason machine learning is critical. The days of taking data out of a database and doing the analysis somewhere else is done, the data is too big."

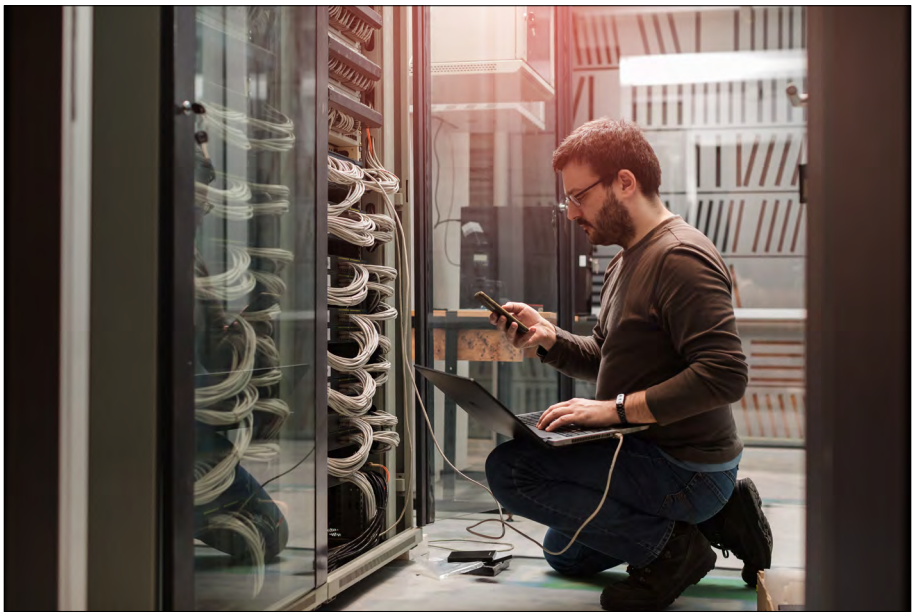
Employer perspective

Nuno Castro, director of data science at Expedia tells us that a great data scientist must be "persistent, highly energetic and motivated".

His advice for any prospective candidates is to: "Follow lots of other data scientists on social media – Twitter – read blogs, learn a new data science technology, practice on Kaggle or possibly enrol in an intensive data science course.

"After you've done that, try to get a data science internship. Make sure that you'll be working on a cool end-to-end data science project or a deep dive on a specific piece with a measurable output, e.g. a new algorithm that you can A/B test, rather than just doing what everyone else doesn't want to do, e.g. unit tests, though you will still learn."

From a technical perspective, Castro says it is better to learn using open source technologies and skills, like Java, Hadoop and SparkML. This way “when the next technology buzzword arrives you will be ready. If you spend your days working with a proprietary technology with its own programming language and workflow, how transferable is that and how will that add value to your CV?” **Aoife Geary**



Credit: iStock

How to become a network engineer

Managing the flow of data is vital and the network engineer role is key to this. We look at how to get started on the road to success

Network engineers, also known as network architects, build out and manage network infrastructures to ensure they are fully optimized and functional. While IT or network technicians focus on the day-to-day running of networks, engineers are more focused on the overall design and implementation of these systems. They must have an understanding of the hardware and software that enable a network to function.

The role can vary significantly. It can range from more day-to-day maintenance of small business networks, all the way up to helping architect the cutting-edge hyperscale data centres run by the Internet giants such as Facebook or Google.

Most would agree it is a high pressure and, at times, stressful job, involving a fair bit of fire-fighting to resolve issues, preventing outages that could impact the wider business. It is a fast-evolving role too. Advances in technology such as Software Defined Networking (SDN) and Network Functions Virtualization (NFV), alongside new delivery approaches such as DevOps, means there are a range of new skills needed to succeed in a career as a network engineer.

Salary expectations and career progression

There are various ways to start a career. A common route is to begin on a service desk at a corporate firm or organization, progressing from first line/second line/third line support or engineer roles before specializing in network management network operations. Joining a consultancy is another path many take.

The average salary for a junior network engineering position is £27,000 in the UK with senior positions earning £42,800. While more starter roles requiring training on the job – such as first and second line support – may offer a salary in the region of £19,000 a year. For example a network engineer – with responsibilities including installing and configuring network systems, investigating faults or administering firewall protection – is likely to earn between £35,000 to £55,000. Meanwhile those in charge of architecture – a more senior role involving planning of network

systems across a business – are likely to be paid between £50,000 to £70,000, according to Robert Half figures. This all depends on the size, sector, and type of business, as well as the size and scope of the projects engineers will be working on.

In terms of region, London is unsurprisingly where many of the highest paid network engineers are employed, alongside Edinburgh and Leeds.

Education and qualifications

Most network engineering roles will require a minimum of a Bachelor's degree in computer science, engineering or information systems. Depending on the company, some roles will require a Masters in computer science or similar. An aptitude for maths fundamentals such as statistics and probability will be beneficial for this role, though a degree in maths isn't necessarily a prerequisite.

Aside from formal or university qualifications, there are a number of industry certifications that will help professionals accelerate their career in network engineering. Companies such as Microsoft, Juniper, Google and Cisco offer certified courses, which are a great way to grow your skills.

The Cisco courses CCNA (Cisco Certified Network Associate) and CCNP (Cisco Certified Network Professional Level) are among the most popular and recognized accreditations and cover the theory of computer networking as well as practical assignments. Knowledge of ITIL concepts and foundations is also becoming more sought after in a network engineer.

Udemy offers free online 'taster' courses, which help IT professionals determine the best path to take when choosing a career pivot or upskilling opportunity.

If you're unsure of what area of engineering you would be best suited to, this is a good place to start.

Apprenticeships are another possible route to take to get into network engineering. Although they are currently less common than a formal education track, they can provide excellent on-the-job training in industries that require specific practical skills.

Key skills

Network engineers need a strong technical background but specific knowledge of LANs and WANs is crucial to the role. An understanding of cybersecurity and the evolving sophistication of cyberthreats has become increasingly more prominent in the role of the network engineer as well as programming skills such as Linux.

In addition to tech expertise, network engineers require a number of soft skills, such as communication and time management. It's often the case where engineers will need to be able to create buy-in from stakeholders on certain projects, and so need to be good at getting their point across while fielding questions from those who may not have much technical knowledge.

Network engineers also need to be adept at identifying and solving problems as this is core to their day-to-day duties. Being adaptable and able to learn on the job are also extremely attractive qualities to have in this role. A large part of a network engineer's day can be fighting fires so being able to change tack and reprioritize can be really valuable.

Gaining relevant experience in IT is crucial to your professional development. Often, network engineers come from technical support positions and progress into a network engineering role. **Aoife Geary**