



Big Data Analytics

Assessment of Demand for Labour and Skills 2013-2020

October 2014



THE
POWER
TO KNOW.



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About the Tech Partnership

The **Tech Partnership** is a growing network of employers, collaborating to create the skills to accelerate the growth of the digital economy. It is recognised by government as the Industrial Partnership for the digital economy. It acts for the good of the sector by inspiring young people about technology, accelerating the flow of talented people of all backgrounds into technology careers, and helping companies to develop the technology skills they need for the future. For further information please visit us at: www.thetechpartnership.com



About SAS

SAS is the leader in business analytics software and services, and the largest independent vendor in the business intelligence market. Through innovative solutions, SAS helps customers at more than 70,000 sites improve performance and deliver value by making better decisions faster. Since 1976 SAS has been giving customers around the world THE POWER TO KNOW®. For further information please visit us at: www.sas.com/uk





Big Data is the 'new oil'

Analytics talent will refine that oil to power UK information economy

SAS perspective

Big data is often called the 'new oil' that will fuel our economy in the coming decades, and data analytics the tools needed to refine that oil and release the powerful insight held within. But, to deliver on big data's potential, you also need refiners: people with the skills to use those tools to turn insight into decisive action. With the right tools and the right people, the value of big data will flow.

But demand for big data refiners is already outstripping supply, and the people needed to mine big data are becoming as precious and scarce as oil itself. If companies do not take action to remedy this, they will have to work hard and spend high to find and keep people to help them compete in the information economy.

This report highlights this urgent need. The results of our survey reveal a tenfold increase in demand for big data staff in the past five years, with vacancies rising from 1,800 in 2008 to 21,400 in 2013 - an average annual increase of 212 per cent. Over the past year, there's been a 41 per cent increase in the number of big data jobs posted - in contrast to demand for IT and data warehouse/business intelligence staff, which have fallen by 9 per cent and 6 per cent respectively.



The variety of positions advertised and skills required showed the diverse nature of the emerging big data discipline. Positions for developers accounted for 41 per cent of advertised vacancies, followed by architects (10 per cent), consultants (10 per cent), analysts (7 per cent), administrators (5 per cent) and data scientists (2 per cent). Unsurprisingly, demand for technical skills was high. Applicants were likely to need experience in big data (28 per cent), business intelligence (24 per cent), data warehousing (16 per cent), ETL (13 per cent) and analytics (13 per cent). However, companies were also looking for candidates with the business acumen, interpersonal and managerial skills, and domain knowledge to apply big data insight and transform it into business strategy and action.



The scarce supply of candidates meant that more than three quarters (77 per cent) of these big data roles were considered to have been 'hard to fill' - harder than other types of professional or managerial role, e.g. finance, marketing, sales etc. data scientists were thinnest on the ground - with 47 per cent of roles being 'very hard to fill' - followed by big data managerial positions and architects. Big data recruiters also had difficulty in finding candidates with the right business, leadership and interpersonal skills to maximise the big data opportunity.

The increase in and diversity of vacancies could be seen as good news for the 'refiners' themselves. Big data professionals already command a median salary of £55,000 a year; 24 per cent higher than other IT staff and double the UK average full time wage. Advertised salaries for experienced big data specialists were highest in London and the South East, while project managers and architects attracted the most attractive rates. On the flip side, SAS' recent survey 'What Makes A Good Data Scientist?' revealed that big data employees are experiencing high levels of stress as they struggle to cope with the demands placed on them - which can often be outside their skill set or comfort zone.



With demand for big data specialists forecast to increase by 160 per cent between 2013 and 2020, adding 346,000 big data jobs, hiring and keeping skilled big data refiners could become a costly exercise. Not having the right tools and people could be a barrier to competitive advantage - not to mention economic growth - put upward pressure on big data salaries, and lead to burn-out among the precious big data specialists.

Businesses, the government and academia must therefore prioritise finding and developing these precious refiners, to ensure we have the right people, with the right skills and the right tools to mine the value in big data. SAS has committed £100m to doing just that through its academic programme alone. SAS projects include grassroots learning aids in schools, the provision of free software to university research departments, and its SAS certification programmes. Through these initiatives, SAS is helping develop the next generation of big data refiners, and ensure big data becomes the fuel of economic growth to deliver a true information economy in the UK.

Grow skills and remove the barrier to Big Data Analytics adoption



Mark Wilkinson
Managing Director
SAS UK & Ireland

Building analytical capabilities is vital if the UK is to remain competitive in the global information economy. The explosion of data, which has been likened to the new corporate oil, is set to continue at an exponential rate.

The arrival of the Internet of Things, where billions of internet-connected devices will each generate their own stream of data, only serves to underline this point. According to Cisco, by 2020 there will be 50 billion such devices. But the data is of no value unless there is the analytical capability to extract insights and business value from it.

We have been aware for some time now that a major barrier to adoption of big data analytics by organisations is a lack of skills in the marketplace.

Indeed the government is all too aware of this issue. Employers of big data analytics professionals have recently been invited to provide feedback on the knowledge and skills their staff require to assist with development of new qualifications – the National Occupational Standards (NOS) in Big Data Analytics. Also, as part of the government's Trailblazers initiative relating to apprenticeships, employer feedback has been sought on the new draft standards for data analyst and IT support roles. Each standard sets out the skills and knowledge that an apprentice will need to have gained by the end of the programme.

It's important to also recognise the situation is more complex than simply finding people with analytical skills. We recently shared the findings from our survey 'What Makes a Great Data Scientist?' which looked at the psychometric analysis of nearly 600 current data scientists. This highlighted how it's almost impossible to find one individual with all the technical and soft skills, such as communication and presentation skills, being demanded by business. What's needed in many cases is development of a data science team comprising people with complementary skills.

SAS will be continuing its support in this area, investing in the creation of skills from the classroom to the backroom to the boardroom. We support development of science, technology, engineering and maths skills by providing a free online resource (SAS® Curriculum Pathways®) to 400 schools across the UK. We also give 80 universities access to our software, equivalent to a total investment of nearly £100 million over the last 15 years. Our latest commitment is the launch of a new data science curriculum, which is a course available from the SAS Education department to students as well as existing data scientists who want to build on their current areas of expertise.

As this report makes clear, employers are having difficulties right now in hiring people with the skills needed, yet demand for these skills will continue to rise significantly up to 2020. It's imperative therefore that the government, universities and businesses continue to work together to address this issue and ensure the UK can compete on the world stage in big data analytics.



Explosion of big data challenges brings new opportunities



Karen Price
OBE, CEO
The Tech Partnership

This SAS-Tech Partnership publication is the third in a series looking at the current and forecast uptake of big data analytics, and the associated demand and supply for related labour and skills among UK employers. The insights this report offers, based on bespoke research and in-depth analysis, strengthen our understanding of this strategically and economically important area.

Over the past year, stories about big data and its potential have become staples in the media. Some praise it, for example, as a potential lifesaver in medicine, or a means of meeting our needs even before we have identified them ourselves. Others raise concerns about privacy and data protection. Among this, firms of all types and sizes are seeing the potential of big data - or even just the better exploitation of existing data - to make a significant impact on their business.

This cascade of interest is reflected in the demand for skills: the annual growth rate of 212 per cent over the past five years is extraordinary.

Such an explosion of demand produces exceptional challenges: to capitalise on the opportunities big data analytics will bring, companies must be able to attract, retain and develop appropriately qualified staff. And, as this report shows, these staff must have not only high-level technical skills, but also statistical and analytical competence, and the well-developed interpersonal attributes to champion and integrate their work within the organisation.

There is clearly much work to do. Existing IT professionals must be helped to develop the specialist big data skills that will drive their organisations' profitability, and provide them with secure and rewarding careers. Even more challenging is the need to attract new entrants from school and university. Rising salaries - an inevitable corollary of an excess of demand over supply - will exert their own pull, but beyond that, we need to shout about the value and excitement of a career in big data.

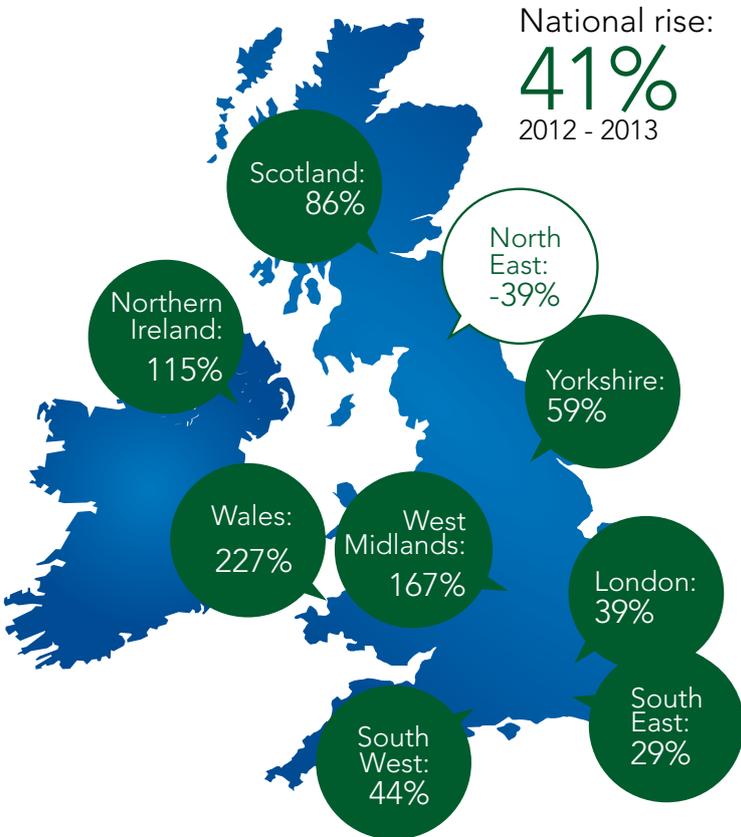
The UK has global leadership potential in big data, and the skills to achieve that are a strategic priority for UK businesses, alongside areas like cyber security, e-commerce and mobile computing.

It is of great service to the UK that SAS, as part of the Tech Partnership, is investing in market insight into the skills needed in this field. Employers are keen to work together through the Partnership, alongside government and education, to ensure the nation can continue at the forefront of big data implementation, and take advantage of the many opportunities it offers.

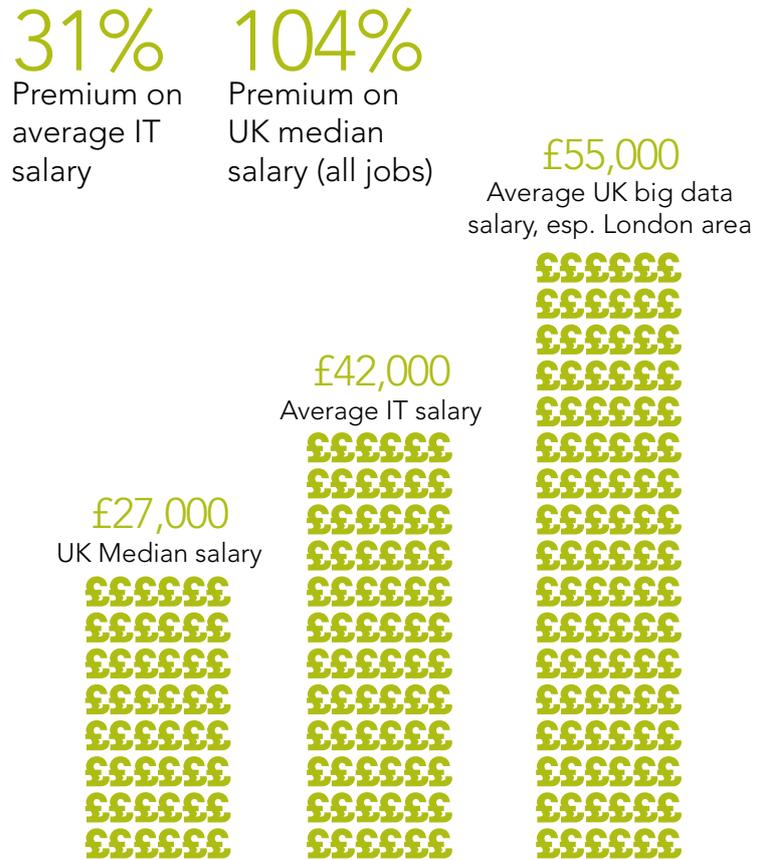


Big Data: the new oil

BIG DATA JOBS: DEMAND INCREASE ACROSS THE UK



THE SALARY PREMIUM FOR EXPERIENCED BIG DATA PROFESSIONALS IN 2014



BIG DATA SKILLS RECRUITMENT

Big data recruiters say it is difficult to find people with the required skills and experience i.e. it is not all firms, just those recruiting Big Data staff



Analytics refines this new oil to power the Digital Economy

BIG DATA JOB OPPORTUNITIES TO 2020

6,400 UK organisations with 100 staff or more will have implemented Big Data Analytics by 2020

117%
increase on 2017

222%
increase on 2013



2013



2017



2020

BIG DATA ANALYST SKILLS

A unique skill set is required to make the most of the opportunity offered by Big Data Analytics

HARD SKILLS

SOFT SKILLS



IN PARTNERSHIP



To solve the skills gap, Government, Academia and Business are working together to develop STEM programmes in schools, Trailblazer apprenticeships, university programmes and in-job training

THROUGH RESEARCH



The 2014 SAS-Tech Partnership study represents the largest study of the uptake of Big Data Analytics ever undertaken in the UK

The Tech Partnership is a large network of employees defining the skills needs for accelerating the UK digital economy



STEM SKILLS FOR SCHOOLS
SAS® Curriculum Pathways® offers free online tools for maths and science teachers and pupils.
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UNIVERSITIES

We offer over £6m p.a. of software and materials to UK and Ireland universities, including SAS® University Edition at no cost.
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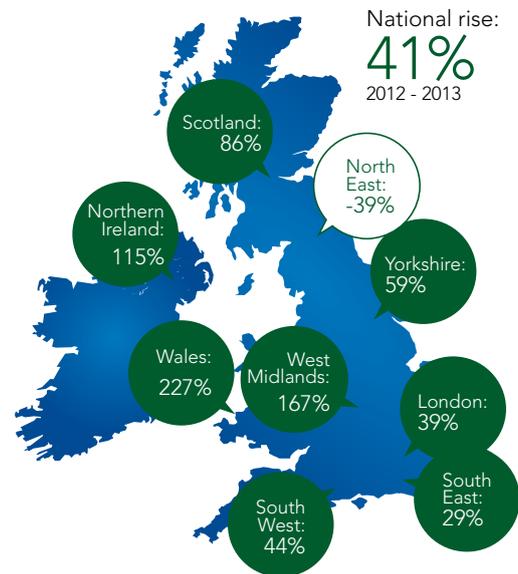
Key Findings

This is the third annual report commissioned by SAS into the big data skills gap in the UK economy. This year we have extended the forecast for demand in this area up to the year 2020, and the prospect remains largely unchanged - demand for big data skills is surging and if the skills gap is not addressed the digital economy in the UK will be severely hampered. These key findings look at current and future job vacancies, the difficulty of recruitment, remuneration trends and future demand.

Vacancy data analysis

The report assesses vacancies for a variety of existing job roles now associated with big data, e.g. data architects, and double digit demand increases for these roles continued over 2012-2013.

- Demand (advertised vacancies) for big data staff increased by 41 per cent over the 2012-2013 period to 21,000 positions in total.
- Six in 10 big data positions (63 per cent) were based in London - a much higher proportion than that recorded within the IT or data warehouse/business intelligence fields.
- Developers accounted for four in 10 big data positions advertised in 2013 (43 per cent) and the proportion of adverts for developers has almost doubled in the past five years.
- Other generic groups of big data staff accounting for a significant proportion of related demand in 2013 were architects (10 per cent), consultants (10 per cent), analysts (7 per cent) and administrators (5 per cent).
- Each of these headline groups was associated with a double digit demand increase over the 2012-2013 period with the exception of big data administrators (no change).
- Though still accounting for a small proportion of big data jobs overall (2 per cent), demand (vacancies) for data scientists has doubled in the past year to approximately 340 positions.



Survey of staffing companies

Recruitment for big data roles is of increasing concern to companies, with many roles described as 'very difficult' to fill.

- Of an estimated 2,200 big data positions advertised by respondents to the recruitment survey, more than three quarters were thought to have been difficult to fill.
- Big data positions were thought harder to fill during 2013 than any other groups of managerial/professional staff.
- Among the main role groups identified, big data architects were thought hardest to recruit and almost one third of staffing companies (32 per cent) stated that finding applicants with the appropriate skills, qualifications or experience had been 'very difficult' in 2013.
- When asked about more specific big data roles, respondents highlighted data scientists as having been the most difficult to fill during the previous year, almost one half (47 per cent) stating that it had been 'very difficult' to recruit for such positions.
- The primary IT tools needed for big data positions appeared to have been relatively easy to find among candidates for these jobs, though around one in six staffing companies (14 per cent) identified Python skills as being 'very difficult' to source.
- This was also true of the main IT process/methodological skills, and though knowledge/experience of e-commerce was thought to have been the hardest of such skills to source over the last year, less than one in 20 respondents (4 per cent) had found it 'very difficult' to find candidates with the required capability in this area.
- In general, recruiters of big data staff appeared much more likely to have experienced difficulties finding candidates with appropriate data (as opposed to IT) related skills.
- Aside from IT and/or data specific skills, big data recruiters had also experienced difficulties locating candidates with the generic skills, knowledge and experience needed, notably in this case managerial skills, business acumen and domain knowledge.



Remuneration trends

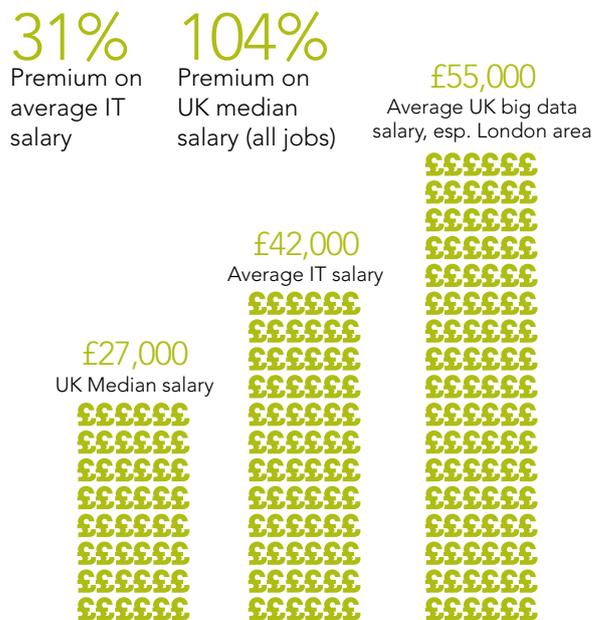
With demand outstripping supply for big data positions, a remuneration bubble has developed where salaries are well above those for IT staff as well as UK workers as a whole.

- The median advertised salary for (permanent) big data positions in 2013 was £55,000 p.a. - 24 per cent more than the median figure for IT staff and 29 per cent higher than the rate for data warehouse/business intelligence staff.
- By nation/region, advertised rates were highest in London and by role group project managers and big data architects appeared to attract the highest rates, both for permanent and contract positions.
- At £51,000 p.a., the estimated actual (median) salary for big data specialists is thought to have been almost 30 per cent higher than that for professional/managerial workers in the UK and almost double the level received by UK workers as a whole¹.

Future demand

Between 2013 and 2020 a very large increase in roles for big data specialists is expected, reflecting the growing UK digital economy and the increasing amounts of data that will be created from internet-connected devices (the 'Internet of Things').

- Between 2013 and 2020, employment in the UK is forecast to increase by 6 per cent, whilst demand for big data specialists is expected to rise by 160 per cent over the same period.
- By 2020, it is anticipated that there will be around 56,000 gross job opportunities per annum for big data specialists and that over the whole forecast period there will have been around 346,000 gross big data job opportunities created in the economy.



¹ Full-time permanent workers

1 Demand for Big Data Specialists

1.1 Overview

The exceptional growth in demand for big data specialists highlighted in our previous reports was seen to continue over the past year, with the total number of advertisements for big data jobs rising by 41 per cent between 2012 and 2013 to 21,000 positions in total. By contrast, demand for data warehouse/business intelligence staff is thought to have declined by 6 per cent over the year whilst the fall recorded for IT staff was still greater at 9 per cent.



Though growth in demand for big data staff outshines the changes witnessed in the IT and data warehouse/business intelligence (DW/BI) sectors over the past year (and demand per se within the UK), the rate of growth is following a downward trend, falling from a peak of 138 per cent between 2008 and 2009 as illustrated in the chart below:

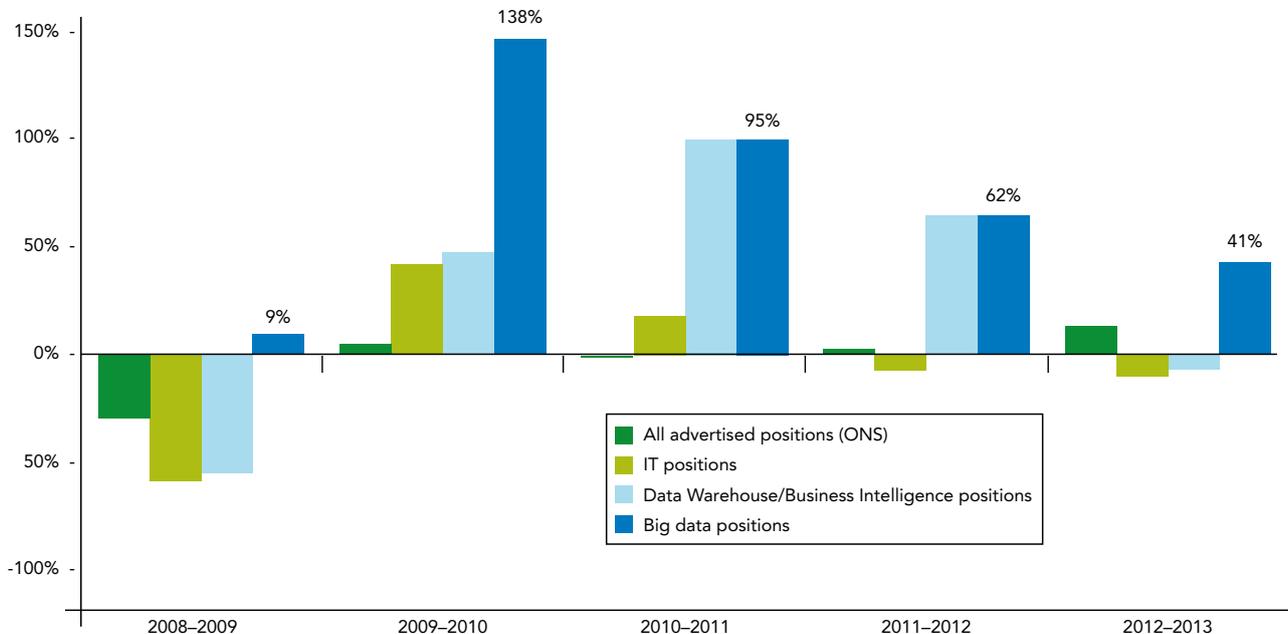


Figure 1: Annual growth/decline in demand for big data/other worker, 2008-2013

Source: Tech Partnership analysis of data provided by IT Jobs Watch/ONS

Over the past five years, demand growth for big data staff has been particularly pronounced within the permanent jobs market and the last year was no exception as advertised vacancies for permanent posts were seen to rise by 43 per cent between 2012 and 2013 compared with a figure of 34 per cent for contract jobs. By comparison, falls in demand for IT/DW/BI staff were noted in both the permanent and contract market.

Demand for big data staff
up by 41% on the
previous year

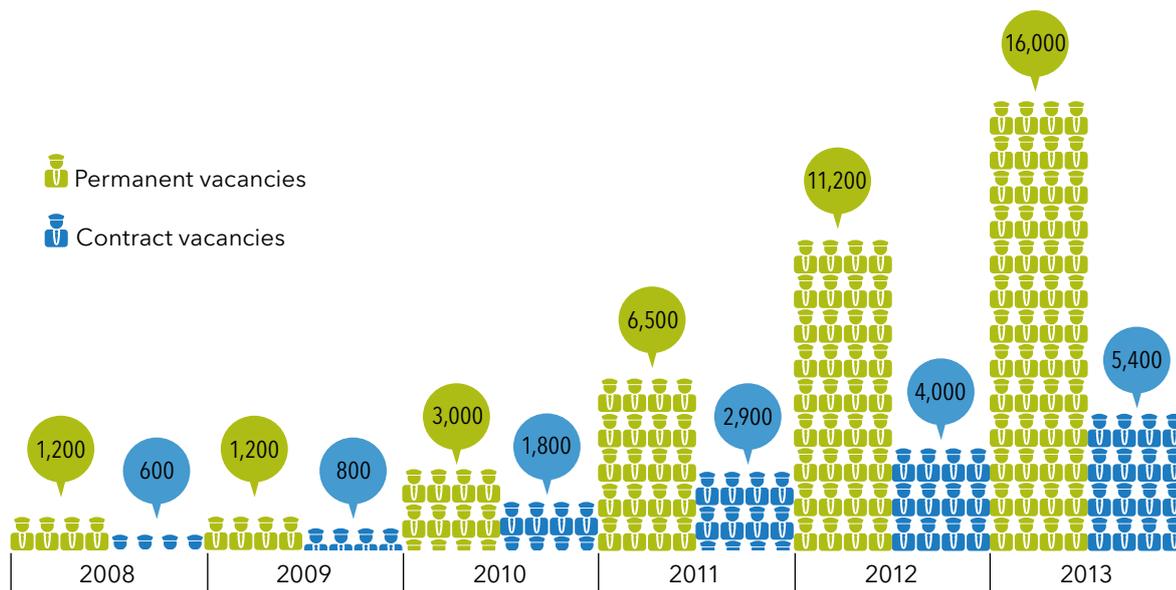


Figure 2: Demand for big data staff by contractual status, 2008–2013

Source: Tech Partnership analysis of data provided by IT Jobs Watch

As demand for permanent big data staff has surged, the proportion of big data adverts accounted for by permanent posts has also increased – rising from 66 per cent in 2008 to 74 per cent in 2012, and 75 per cent in 2013. This puts the proportion of adverts for permanent staff slightly below that within the DW/BI market (76 per cent) but far in excess of that recorded for IT positions in the UK (66 per cent).

1.2 Demand by nation/region

Unsurprisingly, given the employment distribution in the UK, the majority (96 per cent) of advertised vacancies for big data staff in 2013 were based in England, and London in particular (63 per cent), followed by the South East (12 per cent), the North West (5 per cent), and then the East of England, Yorkshire and the South West (4 per cent in each case). Among the devolved nations, Scotland accounted for 3 per cent of advertised big data vacancies whilst Wales and Northern Ireland together accounted for just 1 per cent of the total.

More than six in ten big data positions advertised are located in London

	Big Data	DW/BI	IT
North East	<1%	1%	1%
North West	5%	7%	6%
Yorkshire	4%	6%	5%
East Midlands	2%	3%	3%
West Midlands	3%	5%	5%
East of England	4%	7%	6%
London	63%	42%	44%
South East	12%	19%	20%
South West	4%	5%	5%
Wales	<1%	1%	1%
Scotland	3%	4%	4%
Northern Ireland	<1%	<1%	<1%
UK	100%	100%	100%

Table 1: Demand for big data/related staff by nation/region, 2013

Source: Tech Partnership analysis of data provided by IT Jobs Watch

A comparison of the demand distribution for big data and other staff, however, shows that though demand for related types of staff is also concentrated in London, the proportion of vacancies emanating from the capital is significantly less than that for big data positions (i.e. around four in ten DW/BI vacancies/IT vacancies as a whole).

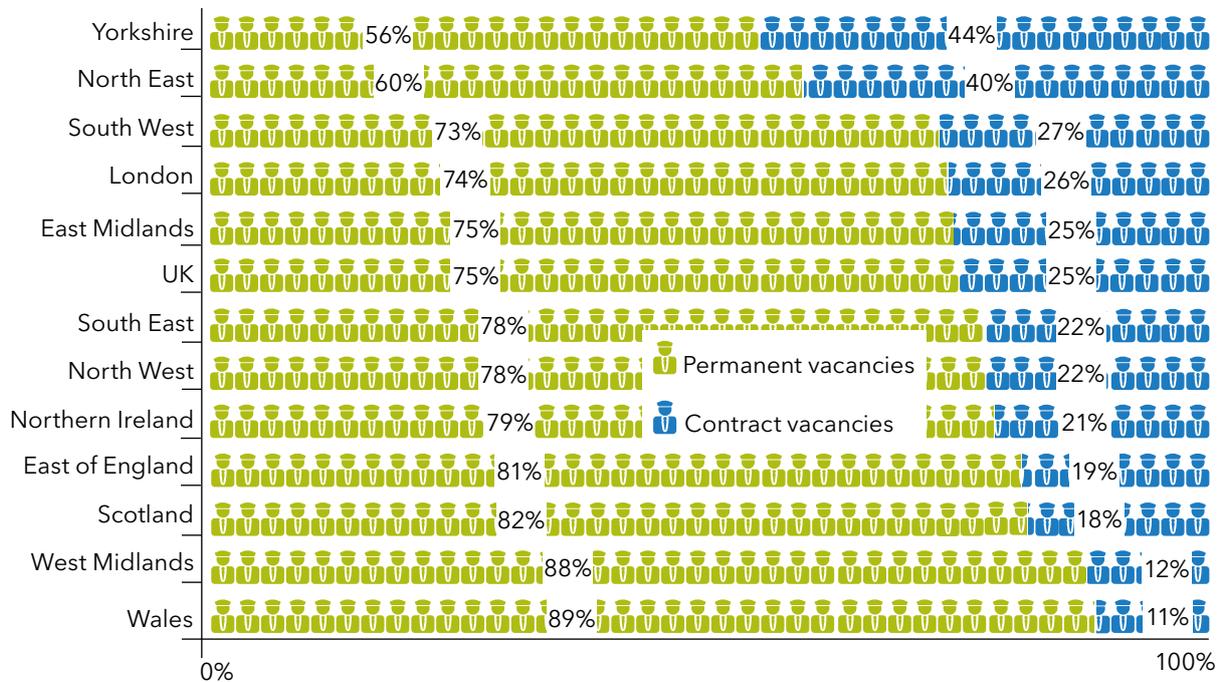


Figure 3: Demand for big data staff by nation/region and contractual status, 2013

Source: Tech Partnership analysis of data provided by IT Jobs Watch

Though accounting for a relatively small proportion of big data positions, Wales was noted as the area associated with the greatest increase in demand for big data staff (227 per cent) over the past years (albeit from a low base of just 30 vacancies). After Wales, the nations/regions characterised by the highest rate of increase were: the West Midlands (167 per cent), Northern Ireland (115 per cent though from a very low base) and the North West (113 per cent). The North East was the only region associated with a fall in demand for big data staff though, once again from a relatively low base figure.

Wales, along with the West Midlands, was also noted as having a much lower proportion of adverts for big data staff that were for contractors i.e. 11 per cent and 12 per cent respectively compared with an average of 25 per cent for the UK as a whole. Conversely, in Yorkshire and the North East, the proportion of contract opportunities appears to be notably higher than average at 44 per cent and 40 per cent.

1.3 Demand by sector

As noted in our first report on big data demand, it is not possible to provide a detailed analysis of big data jobs by industry sector due to the limited number of advertisements carrying such information. A rough indication of which sectors/functions are prime generators of demand can be obtained however by analysing general sector references and such an analysis shows financial services to be the most commonly cited sector – featuring in 20 per cent of advertisements for big data positions during 2013. After financial services the next most common sector citation was banking (5 per cent), then games (5 per cent), retail (4 per cent) and marketing (4 per cent).

Comparison with demand data for DW/BI positions shows these were also common sector references in adverts for these related posts, as was the case for IT positions advertised in the UK over the year (e.g. the analysis of data for IT jobs shows 22 per cent of adverts made reference to financial services (22 per cent), 8 per cent to banking, 5 per cent to retail, 4 per cent to marketing and 2 per cent to games).

1.4 Demand by role group

Just over four in ten (41 per cent) advertised positions for big data staff in 2013 were development focussed and this proportion was near identical for both permanent and contract positions on offer. Architects were the second most common role advertised, accounting for 10 per cent of permanent/contract vacancies, followed by consultants (also accounting for 10 per cent of both permanent and contract jobs).

Demand growth for big data positions highest in Wales over the past year



Four in ten big data positions advertised in 2013 were development roles

Development positions were also seen to be accounting for an increasing share of big data jobs – the proportion rising from 22 per cent of related adverts in 2008 to 40 per cent in 2012 and 41 per cent in the past year. The proportion of adverts that were for architects has also increased slightly (from 7 per cent in 2008) whilst consultant posts have declined as a proportion of the total, from 24 per cent in 2008 to 11 per cent in 2012 and 10 per cent as noted in the past year. Among the other role groups monitored there appeared to have been a relative decline in adverts for project managers and an increase in the proportion that were for administrators and data scientists (the proportion that were for design positions remaining largely unchanged over the past five years).

The proportion of big data demand accounted for by data scientist jobs has doubled in the past year

It is worth noting that though increasing as a proportion of all big data vacancies, data scientists still account for a relatively small proportion of the total i.e. the proportion that was for data scientists doubled between 2012 and 2013 but in real terms this was a change from 1 per cent to 2 per cent of the total number of big data jobs advertised.

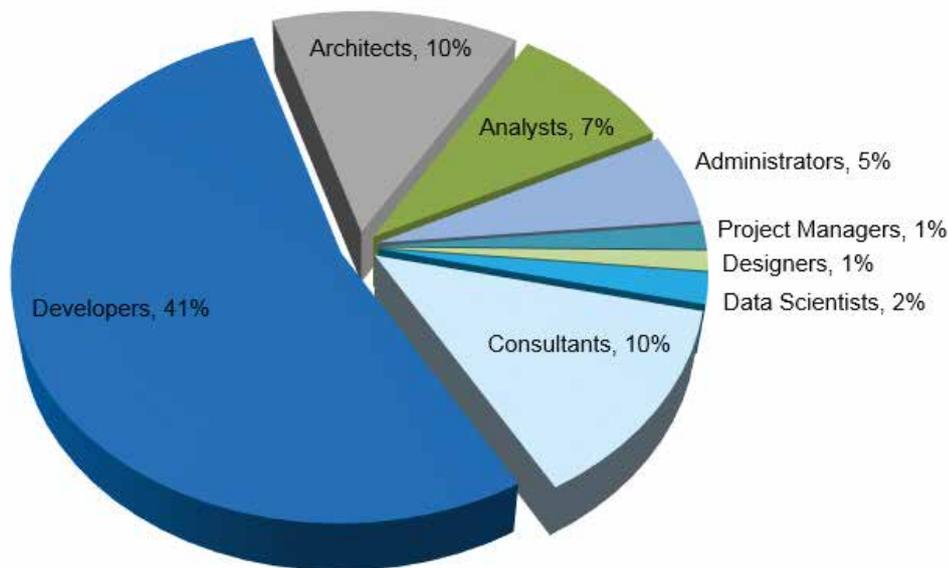


Figure 4: Demand for big data staff by role group, 2013

Source: Tech Partnership analysis of data provided by IT Jobs Watch

1.5 Data processes / methodologies

Perhaps unsurprisingly the main data (as opposed to IT) focussed process/methodological skills requirement cited in adverts for big data staff during 2013 was for knowledge/experience of big data itself (featuring in 28 per cent of all related positions) followed by business intelligence (24 per cent) and data warehouse (16 per cent).

Business intelligence was second most common process/methodological requirement for big data positions in 2013

	Citations in adverts for jobs that were:		
	Permanent	Contract	All adverts
Big Data	31%	19%	28%
Business Intelligence	24%	24%	24%
Data Warehouse	15%	18%	16%
ETL	13%	15%	13%
Analytics	13%	10%	13%
Relational Databases	9%	7%	8%
Data Modelling	7%	11%	8%
Data Management	5%	3%	4%
Data Mining	4%	3%	4%
Data Analysis	3%	3%	3%

Table 2: Top ten data processes/methodologies cited in adverts for big data staff, 2013

Source: Tech Partnership analysis of data provided by IT Jobs Watch

The proportion of adverts citing a requirement for 'big data' knowledge was up 143 per cent on the previous year and this increase was the largest recorded among the top ten data process/ methodological skills. Other notable increases among this group were for data analysis (up by 65 per cent), analytics (53 per cent), data management (44 per cent) and relational databases (43 per cent) where an increase greater than the average for big data positions as a whole was recorded.

The largest annual increases in demand for this skills group, however, were for: statistical analysis (183 per cent), and predictive modelling (146 per cent) though machine learning, big data analytics and predictive analytics were also noted for annual increases of over 100 per cent for the year (121 per cent, 110 per cent and 106 per cent respectively).

Largest increase in demand for process/ methodological skills was for statistical analysis

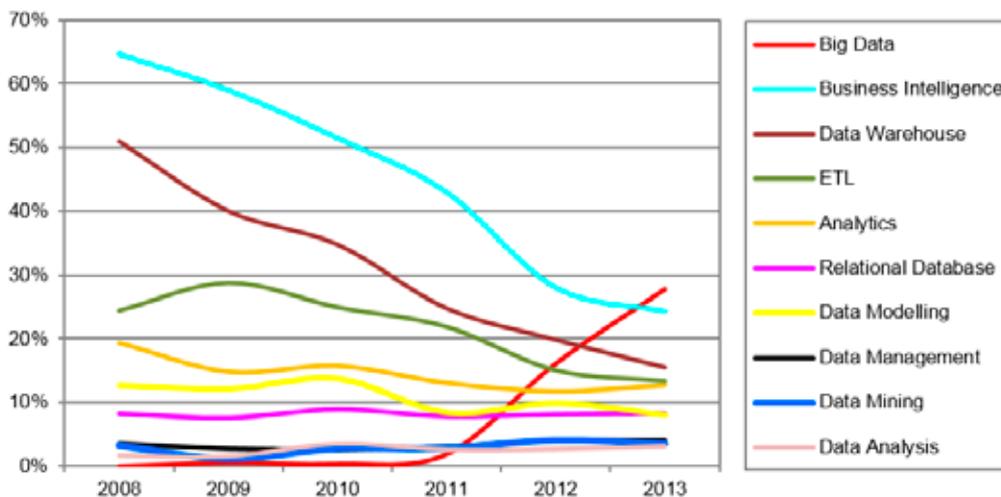


Figure 5: Proportion of adverts citing the top ten data processes/methodologies for big data jobs, 2008-2013

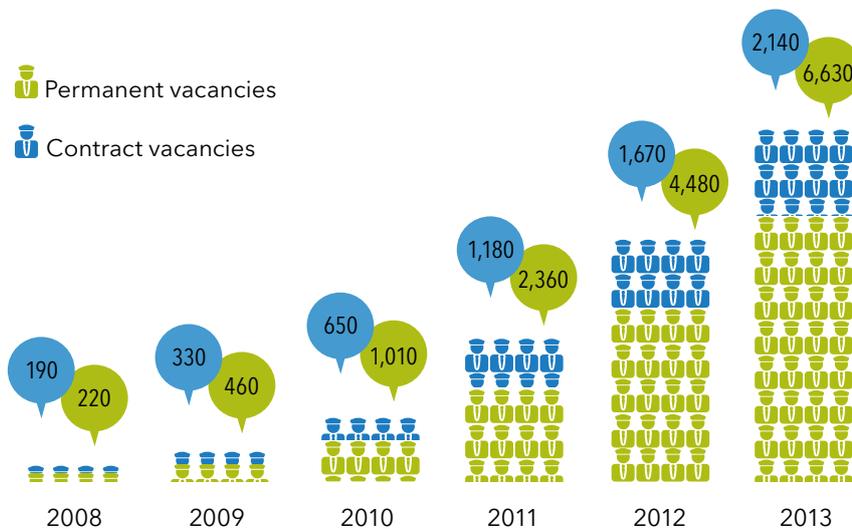
Source: Tech Partnership analysis of data provided by IT Jobs Watch

2 Demand Trends by Role

2.1 Big data developers

i) Demand trends

The number of advertisements for permanent big data developers rose by 43 per cent over the past year to 8770 vacancies in total. A still higher rate of growth was apparent within the permanent jobs market where an annual increase of 48 per cent was recorded (compared with 28 per cent for contract positions), and this has been the case during each of the past five years. As a result, the proportion of big data developer positions that were permanent has risen from just over a half (54 per cent) in 2008 to over three-quarters (76 per cent) in 2013.



Demand for developers from big data recruiters up by 43% over the past year

Year	Average number of vacancies per quarter
2008	100
2009	200
2010	410
2011	880
2012	1,540
2013	2,190

Figure 6: Annual demand for big data developers, 2008-2013

Source: Tech Partnership analysis of data provided by IT Jobs Watch

In stark comparison with the big data sector, the level of demand for developers as a whole in the UK was found to have declined by around 25 per cent over the past five years and by 8 per cent between 2012 and 2013. As a result, jobs for big data developers now constitute around 5 per cent of all development positions advertised up from less than half of one per cent in 2008.

ii) Sub-roles and specialisms

The most commonly advertised sub-roles for big data developers in 2013 were found to be: web developers, software developers, business intelligence developers, database developers, applications developers and big data developers, though all accounted for less than 10 per cent of big data developer jobs advertised.

2.2 Big data architects

i) Demand trends

There were approximately 2,200 advertisements for big data architects posted in 2013 representing an increase of 22 per cent on the number recorded in 2012 and 1560 per cent on that observed in 2008. By comparison the trend for IT architects as whole over the past five years has alternated between increasing and decreasing demand culminating in a fall of 11 per cent between 2012 and 2013 and a fall of 12 per cent over the 2008–2013 period.

Demand for big data architects up by 22% over the past year

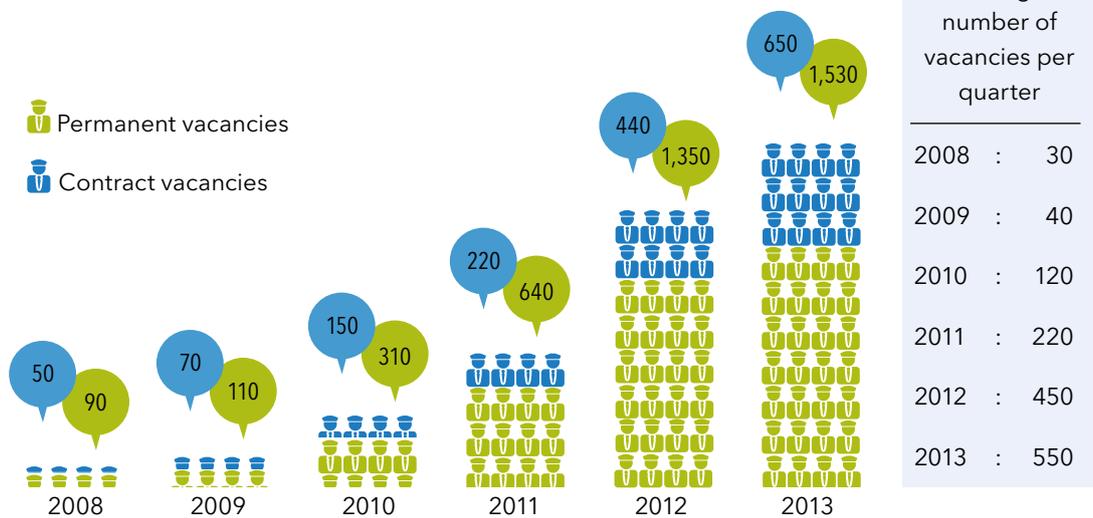


Figure 7: Annual demand for big data architects, 2008–2013

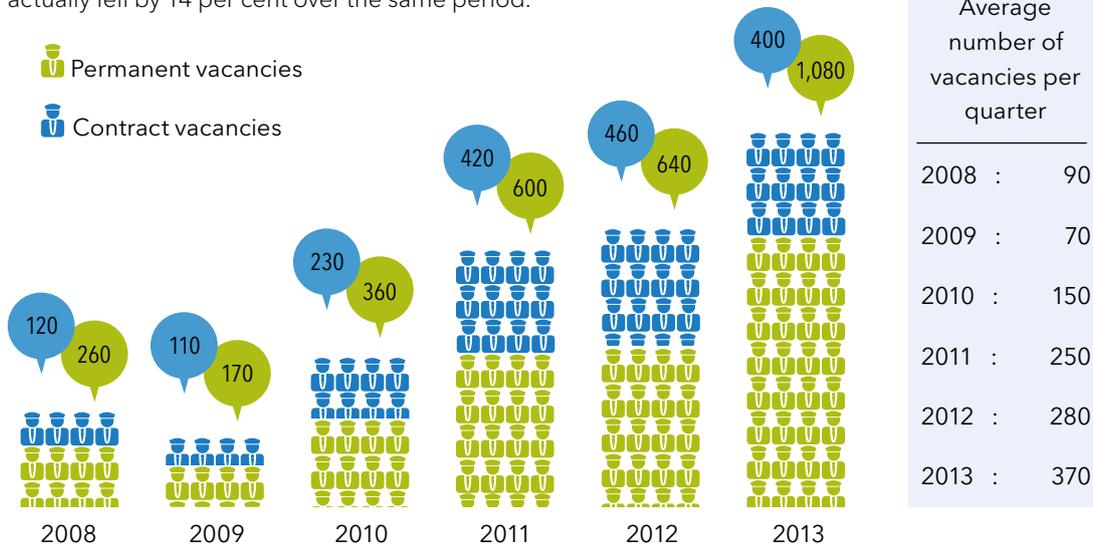
Source: Tech Partnership analysis of data provided by IT Jobs Watch

As with developers/big data staff as a whole, the largest increase in demand over the past five years was within the permanent jobs market (i.e. 1700 per cent in this case versus 1290 per cent for contract jobs) though over the past year the rate of growth in the number of contract openings posted was five times that for permanent positions (i.e. with figures of 50 per cent and 13 per cent respectively). As a result, permanent positions are now thought to account for around 70 per cent of all big data architect positions on offer, down from 76 per cent during the previous year.

2.3 Big data analysts

i) Demand trends

The number of jobs posted for analysts to work in the big data field rose by 34 per cent over the past year and by 294 per cent over the past five (to 1,480 positions in 2013). Demand growth has tended to be strongest within the permanent jobs market (increasing by 324 per cent over the five-year period compared with 230 per cent for contractors); and this was also true for the near term, as between 2012 and 2013, whilst the number of permanent big data analysts positions increased by 69 per cent, the number of contract jobs actually fell by 14 per cent over the same period.



Demand for analysts from big data recruiters has increased by 34% over the past year

Average number of vacancies per quarter	
2008 :	90
2009 :	70
2010 :	150
2011 :	250
2012 :	280
2013 :	370

Figure 8: Annual demand for big data analysts, 2008-2013

Source: Tech Partnership analysis of data provided by IT Jobs Watch

With demand for permanent staff outstripping that for contractors, the proportion of big data analyst positions advertised has increased from 68 per cent in 2008 to 73 per cent in 2013, a figure well above that for IT analysts at that time (i.e. 63 per cent). IT analysts were also subject to a decline in demand both over the previous year (down 14 per cent) and the previous five (down 44 per cent).

ii) Sub-roles and specialisms

The top five sub-roles/specialisms for analyst positions in 2013 were: business analysts (25 per cent of all big data analyst vacancies), data analysts (16 per cent), business intelligence analysts (15 per cent), support analysts (13 per cent) and analyst/ developers (12 per cent). Each of these was associated with a similar level of demand growth over the previous year (of between 19 per cent and 26 per cent over the 2012-13 period) though, over the previous five years, growth in demand for data analysts was far in excess of that for big data analysts as a whole and each of these sub-roles (i.e. 2027 per cent).

Demand for data analysts up 2027% over the past five years

2.4 Big data administrators

i) Demand trends

Big data administrators were the only group of big data staff for which an increase in demand was not recorded over the past year, as vacancy numbers remained unchanged at 970 positions. This said, it should be realised that demand for big data administrators has increased by 1700 per cent over the past five years, even as IT administrator positions have declined in number by approximately 43 per cent.

The cessation of demand growth in 2013 was a result of changes in the permanent jobs market - over the 2012-13 period permanent jobs for big data administrators exhibited a 6 per cent fall, whilst contract vacancy numbers rose by 60 per cent. Even so, permanent positions for big data administrators now account for 81 per cent of adverts for such positions - well above the norm for either big data positions as a whole or administrators within the IT field (73 per cent).

Demand for big data administrators unchanged in the last year

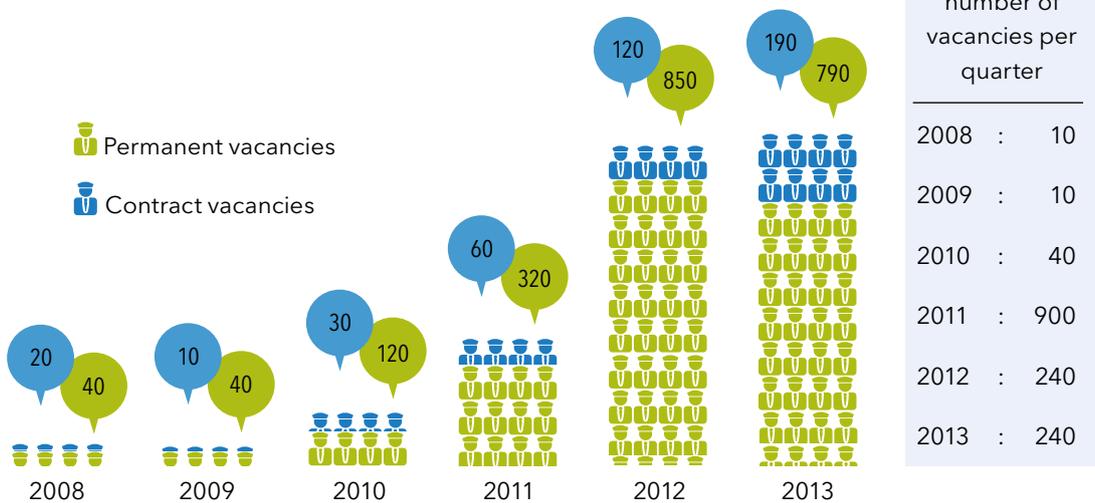


Figure 9: Annual demand for big data administrators, 2008-2013

Source: Tech Partnership analysis of data provided by IT Jobs Watch

ii) Sub-roles and specialisms

Unlike other role groups, there were few notable sub-specialisms within the administrators' group, the main ones being systems administrators (which accounted for 60 per cent of all advertised positions) and database administrators (25 per cent). Server and DevOps administrators were also identifiable within the big data vacancy dataset though in both cases the number of positions advertised in 2013 was minimal (i.e. less than 30 jobs).

2.5 Big data consultants

i) Demand trends

There were 2,150 advertisements for big data consultants in 2013, up 32 per cent on the level recorded during 2012 and 377 per cent on that observed in 2008. By comparison, advertisements for consultant positions (within the field of IT recruitment) were seen to have declined by 11 per cent over the previous year and by 48 per cent over the past five years.

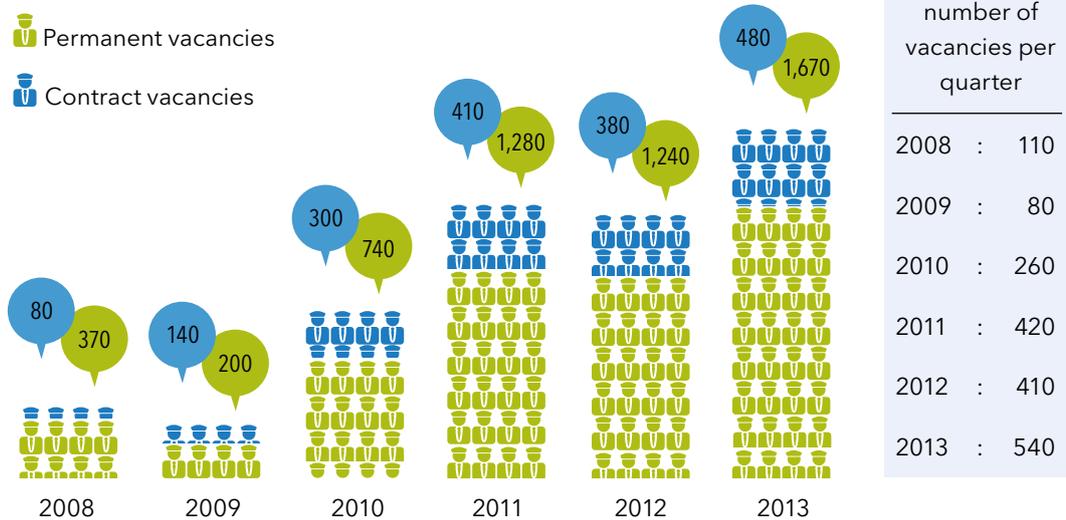


Figure 10: Annual demand for big data consultants, 2008-2013

Source: Tech Partnership analysis of data provided by IT Jobs Watch

Annual demand growth was similar in the permanent and contract sectors between 2012 and 2013 (where increases of 34 per cent and 27 per cent respectively were recorded) and permanent positions now account for 78 per cent of the total.

ii) Sub-roles and specialisms

There were few consultant sub-roles that were not vendor/technology specific (Oracle/SAS consultant, etc.) the main ones being: business intelligence consultants (accounting for 29 per cent of big data consultant positions), business consultants (14 per cent), technical consultants (8 per cent), data consultants (6 per cent) and functional consultants (4 per cent).

Demand for big data consultants up by 32% over the past year

2.6 Big data project managers

i) Demand trends

Demand for big data project managers increased by just 2 per cent between 2012 and 2013 and a decrease of 5 per cent was recorded in the number of contract positions over the year (an increase of 7 per cent was noted for permanent positions). This was a marked change in the demand pattern for such positions, however, and over the past five years an increase of 314 per cent was recorded.

Demand for big data project managers up by just 2% over the past year

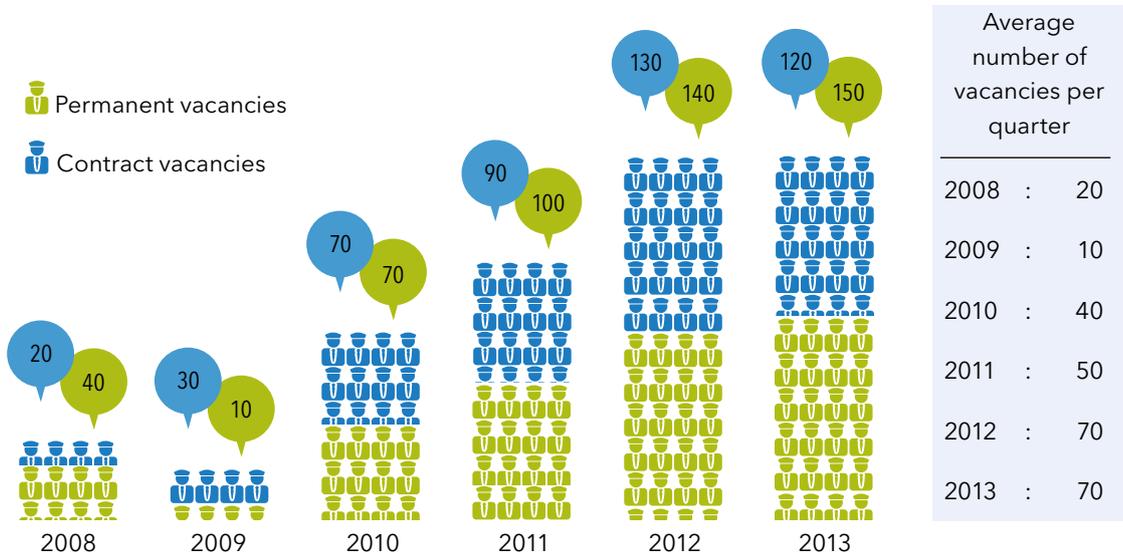


Figure 11: Annual demand for big data project managers, 2008-2013

Source: Tech Partnership analysis of data provided by IT Jobs Watch

ii) Sub-roles and specialisms

There was only one generic sub-division of the big data project manager group featuring within 30 or more of the related advertisements during 2013 - technical manager - which appeared in 15 per cent of such adverts during the year.

2.7 Big data designers

i) Demand trends

As noted in the previous section, big data designers represent one of the smaller headline groups of big data staff and accounted for around 210 vacancies in 2013. That said, demand for designers, as with other roles in this field, has risen dramatically over the past five years, with regard to contract and permanent recruitment in particular (with associated increases of 374 per cent and 1950 per cent respectively).

Demand for big data designers up by 752% over the past five years

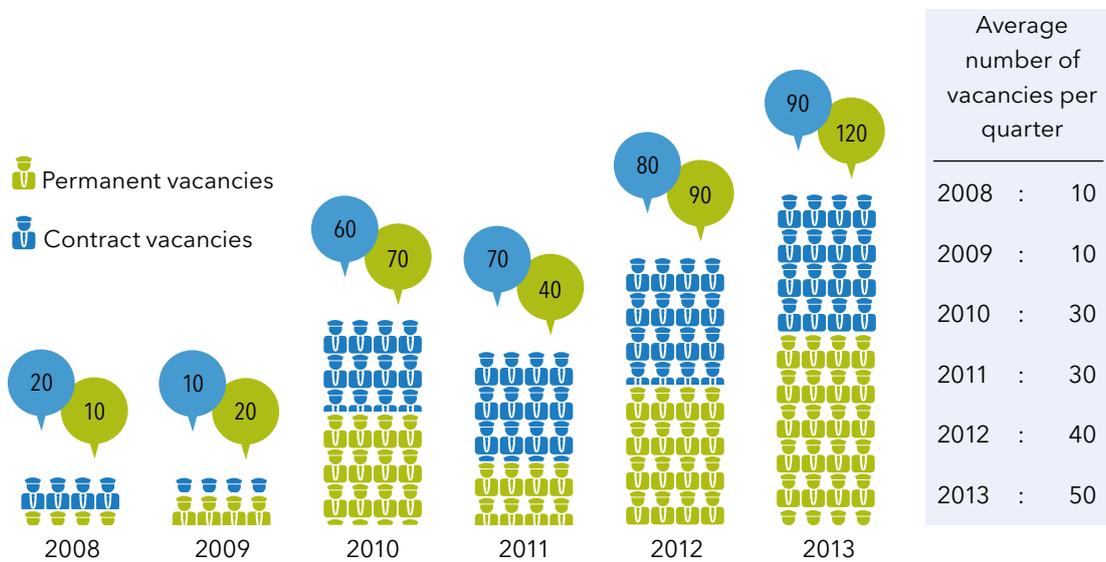


Figure 12: Annual demand for big data designers, 2008-2013

Source: Tech Partnership analysis of data provided by IT Jobs Watch

Over the past year, demand growth for these positions has been more muted at 23 per cent overall (35 per cent within the permanent recruitment sector and 10 per cent for contractors) though as with other big data positions, still far in excess of the changes exhibited within the IT sector over the year (where an increase of 5 per cent was recorded).

ii) Sub-roles and specialisms

As with project manager positions, the relatively small number of adverts for big data designers prohibits a detailed analysis by sub-role - the only one in this case appearing in more than 30 vacancies over the year being solution designer, which was cited in 28 per cent of advertised positions.

2.8 Data scientists

i) Demand trends

In total, it is estimated that there were around 340 advertisements for data scientists posted during 2013 – an increase of 259 per cent (250 vacancies) on the previous year. The increase was still greater within the permanent jobs market (up 314 per cent in this case compared with 145 per cent for contract positions), and over the year permanent positions accounted for just over-three quarters (77 per cent) of all advertised positions.

Demand for big data data scientists up by 259% on the previous year

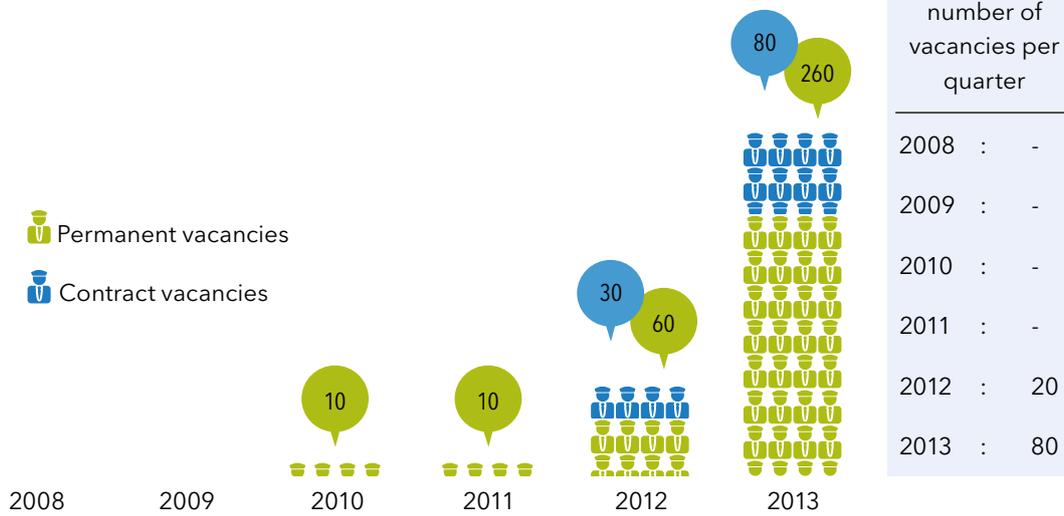


Figure 13: Annual demand for big data scientists, 2008-2013

Source: Tech Partnership analysis of data provided by IT Jobs Watch

ii) IT methodologies

Computer science (36 per cent of advertisements) was the most requested process/methodological IT skill for data scientists, after which came software engineering (12 per cent) and agile software development (8 per cent).

3 Recruiting Big Data Staff

With such a dramatic increase in demand for big data staff over the past five years, it would seem likely that employers would find it increasingly difficult to fulfil related recruitment needs, given the relatively small number of new entrants to the UK labour market and the comparatively small increase in workforce numbers over the corresponding period. Indeed, there have been many references to the problems associated with recruiting big data specialists in recent years, though many fewer attempts to identify the level or nature of such difficulties.

Big data staff more difficult to recruit than other professional/managerial staff

3.1 Recruitment issues compared

When provided with a list of professional/managerial employment groups, and asked to rate the associated ease/difficulty of finding potential candidates with the required levels of skills/ knowledge/experience over the past year (with 1 equating to 'very easy', 2 to 'fairly easy', 3 'fairly difficult' and 4 'very difficult') respondents on average gave big data a recruitment a difficulty rating of 3.2 - a level higher than all other employment groups mentioned.

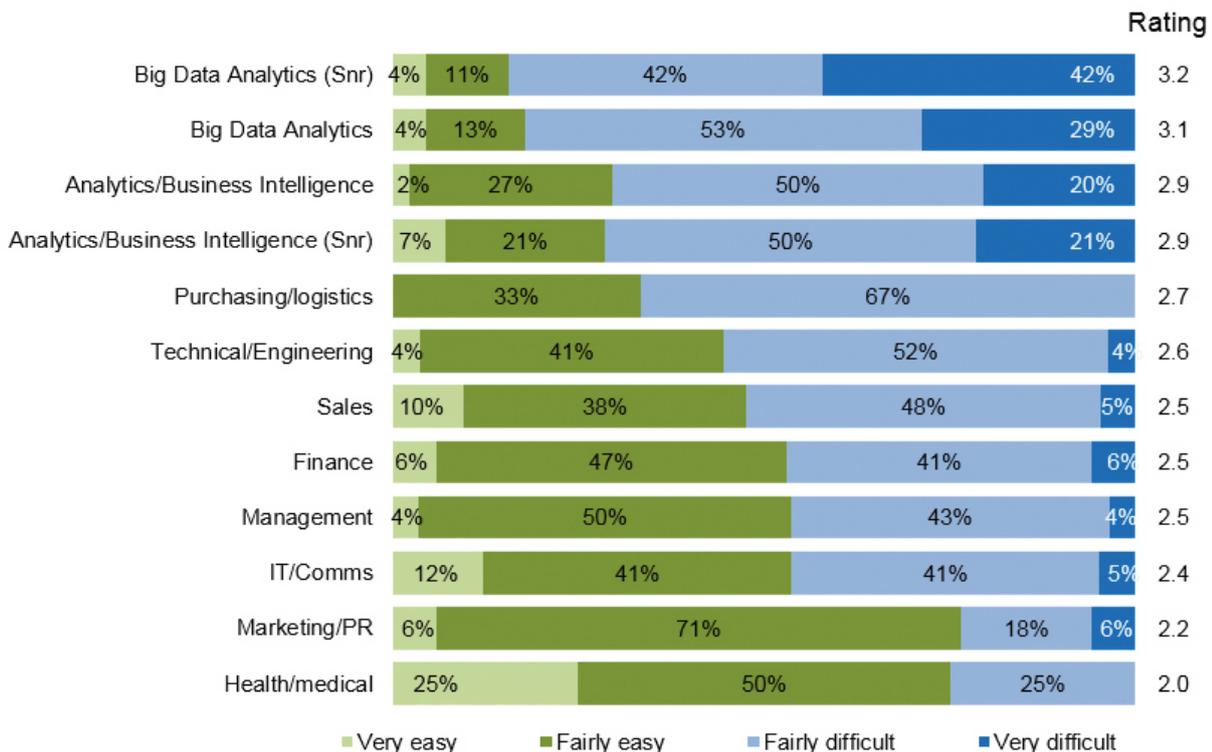


Figure 14: Ease/difficulty of recruiting big data/other professional/managerial positions

Source: The Tech Partnership

The relative difficulty of recruiting for big data (and other analytics positions) is illustrated in the chart above which shows that not only were big data staff harder to recruit per se, but also that a much larger proportion of staffing specialists (43 per cent) considered such positions as being 'very difficult' to fill during the past year (again due to difficulties finding potential candidates with the required levels of skills/knowledge/experience).

In fact, when asked to quantify their experiences of recruiting big data professional/managerial staff over the past year, respondents estimated that in total around three-quarters (77 per cent) of all such positions had been either 'very' or 'fairly' difficult to fill.

More than three-quarters of big data positions considered to have been hard to fill

3.2 Recruitment of big data staff by role group

An analysis of the ease/difficulty of recruiting key groups of big data staff² highlights big data architects as being the most difficult to recruit during the previous year with almost a third (32 per cent) of staffing companies finding it 'very difficult' to find potential candidates with the required levels of skills/knowledge/experience needed and an overall difficulty rating of 2.9 compared with 2.5 or less for all other role groups monitored.

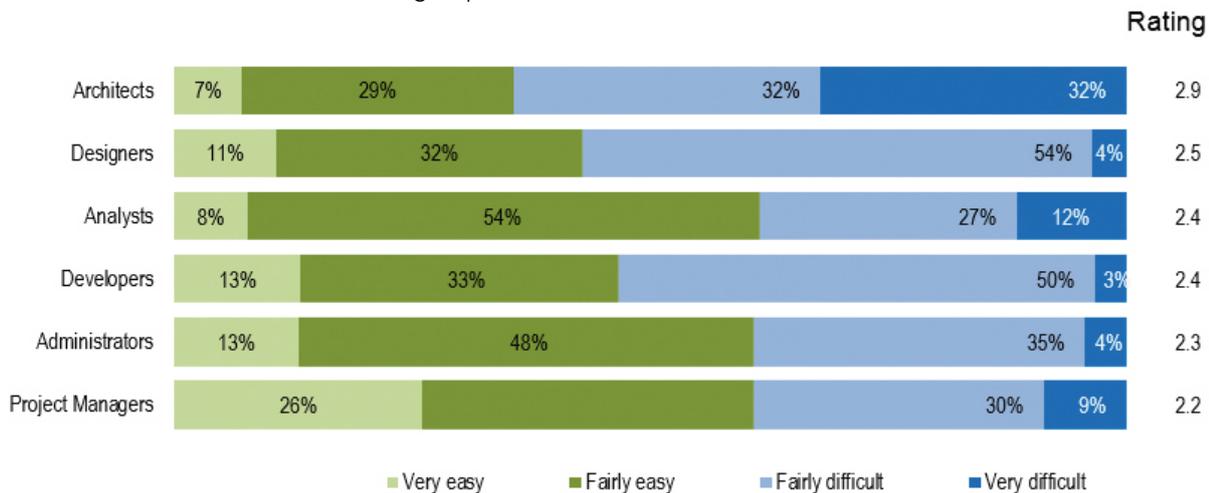


Figure 15: Ease/difficulty of recruiting for big data positions by role group

Source: The Tech Partnership

The number and diversity of different sub-roles/specialisms identified associated with these role groups prohibited the collection of data for all those identified within this/the previous demand report. As such, to provide a more detailed picture of the recruitment experiences of staffing companies by role it was elected to collect data relating to broad groups of IT and data focussed roles (i.e. those whose work is primarily focussed on the design, development, administration, and support of big data systems/software versus those focussed upon the capture, storage, transformation and interpretation of associated data content) as illustrated in figures 16/17.

Managers, strategists and developers - the IT focussed big data positions proving hardest to fill

² Using the headline role groups covered within the previous big data demand report which, in this case excluded 'consultants'

Within the first of these charts it can be seen that when recruiting IT focussed big data staff, recruiters appear to have more difficulty sourcing appropriately skilled candidates for managerial, strategic and development roles, each of which was associated with a difficulty rating of 2.8 or above and cited as being 'very difficult' to recruit for by more than 20 per cent of those responding to the survey.

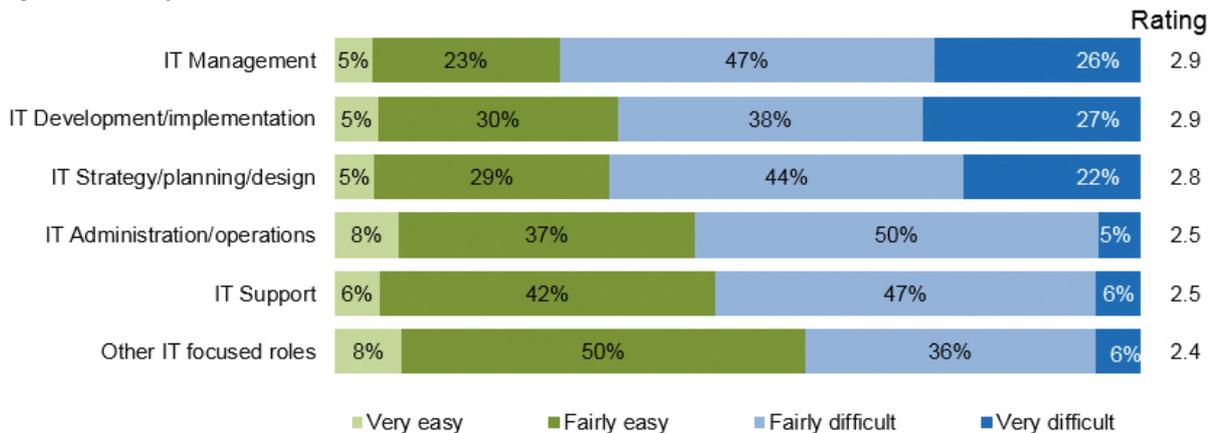


Figure 16: Ease/difficulty of recruiting for 'IT-focussed' big data positions

Source: The Tech Partnership

Among the data-focussed positions covered by our survey, data scientist roles were found to have been the most difficult to fill during 2013, with almost half (47 per cent) of staffing companies with such positions stating that they had been 'very difficult' to fill. Moreover, with a recruitment difficult rating of 3.1, data scientist roles appear to have been the most difficult positions to fill of all those for which data was collected.

Data scientist roles were the most difficult positions to fill

Aside from data scientists, (data) management roles were again identified as being among the most difficult to fill with a rating of 3.0, and just under a quarter (24 per cent) of respondents identifying such positions as being 'very difficult' to recruit (due to a lack of candidates with the required skills/qualifications/experience).

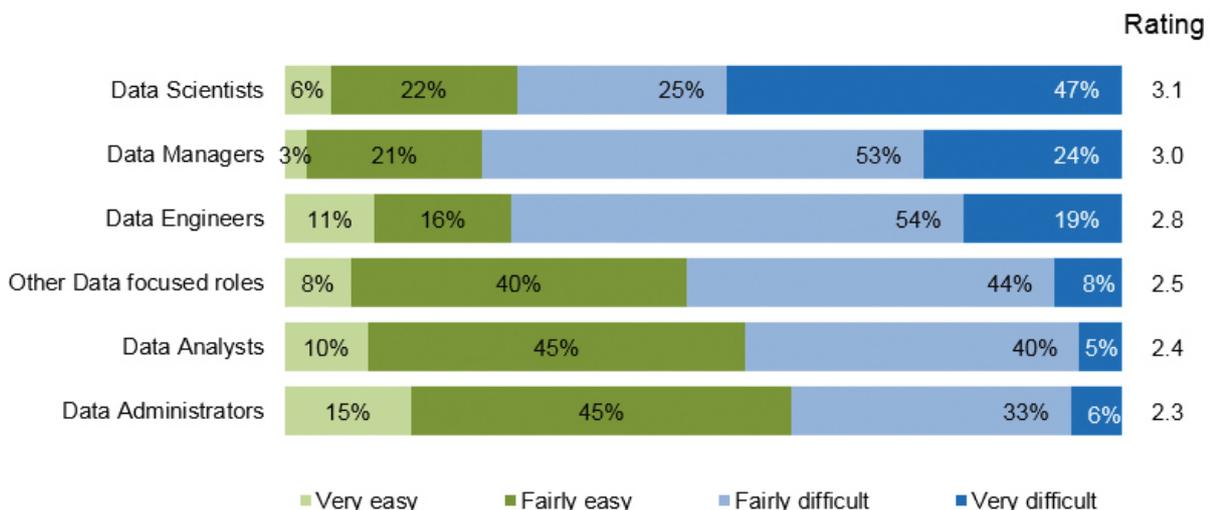


Figure 17: Ease/difficulty of recruiting for 'data-focussed' big data positions

Source: The Tech Partnership

3.3 Recruitment of big data staff by skills requirement

At the top level, the areas of skills/knowledge/experience thought most difficult to find among candidates for big data positions during the past year were managerial skills and business acumen (associated with a difficulty rating of 2.7 in each case). Sector knowledge/understanding, presentation and interpersonal skills were all thought slightly less difficult to fill, though the proportion of respondents stating that sector knowledge/understanding was 'very difficult' to find among candidates for big data posts was the highest at 18 per cent.

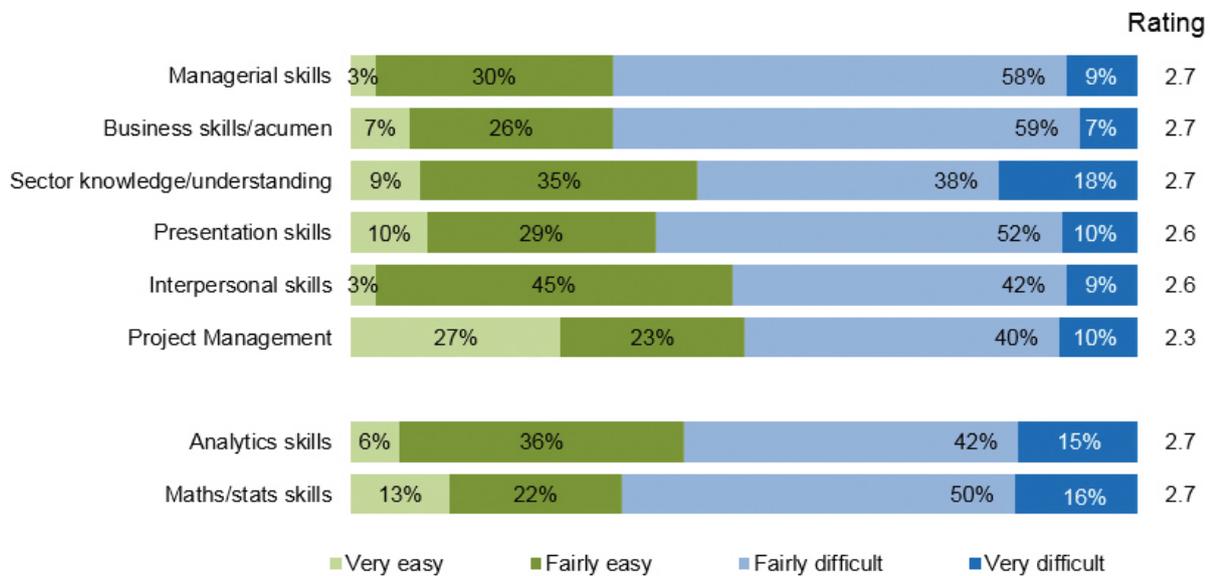


Figure 18: Ease/difficulty of recruiting big data staff with selected 'generic' skills

Source: The Tech Partnership

When asked about the relative ease/difficulty of finding candidates with the required IT/data tools and/or process/methodological knowledge/experience (again IT/data-related), respondents identified data-related skills/knowledge as being the most difficult to source, giving data tools a recruitment difficulty rating of 3.0 on average (i.e. equivalent to 'fairly' difficult) and data process/methodological skills a rating of 2.9 (compared with figures of 2.6 and 2.5 respectively for comparable IT skills).

In contrast to the other skillsets analysed, generic big data skills were not only the most commonly cited data process/methodological requirement but also one of the most difficult to find among applicants for big data positions (i.e. with a recruitment difficulty rating of 2.9 out of 4).

Management/ business acumen were the generic skills hardest to find among applicants to big data posts

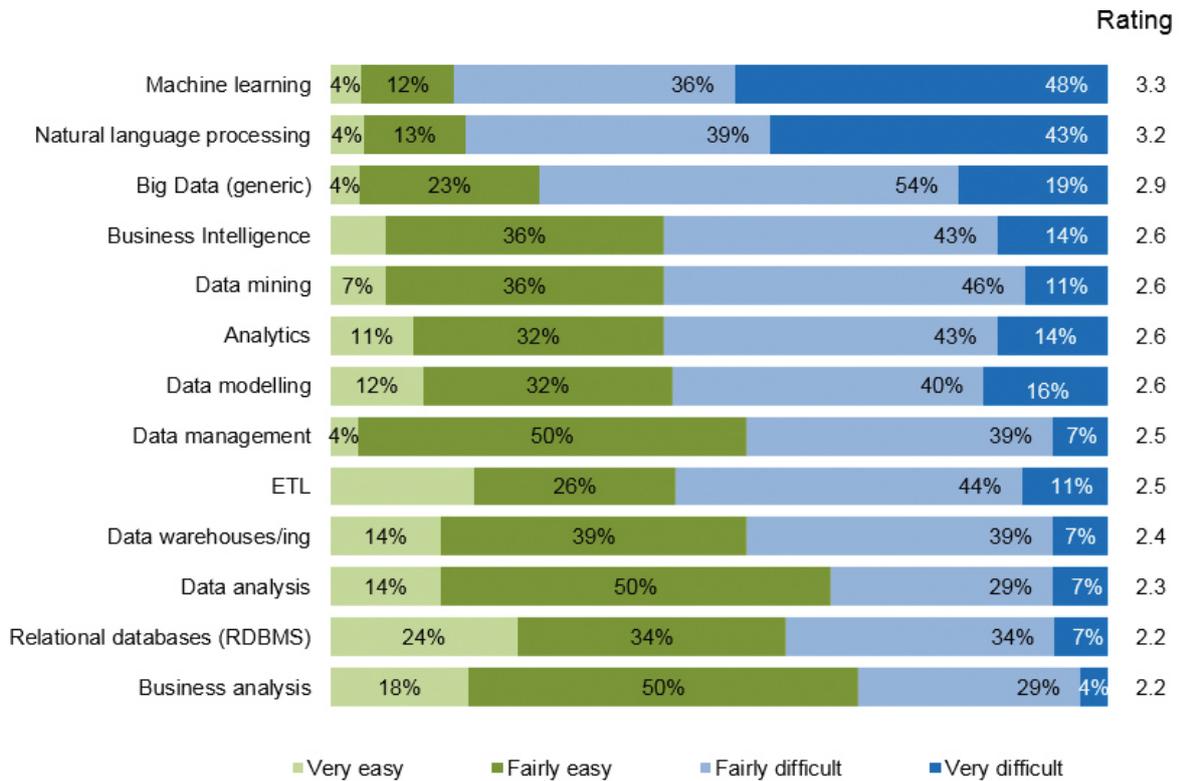


Figure 19: Ease/difficulty of recruiting big data staff with data process/methodological skills

Source: The Tech Partnership

Aside from the generic, data and IT skills listed here, respondents to the web survey were also asked some ad hoc questions about their experiences recruiting big data staff with knowledge/skills of cloud computing, social media and the Internet of Things. Though these topics were not specifically related to any of the skills analysis presented in this/the previous report, they are shown below, not least as the knowledge of the 'Internet of Things' was cited as one of the most difficult attributes to find among candidates for big data positions during 2013 (i.e. with a recruitment difficulty rating of 3.0).

Knowledge of the Internet of Things considered to be among the most difficult 'skills' to source

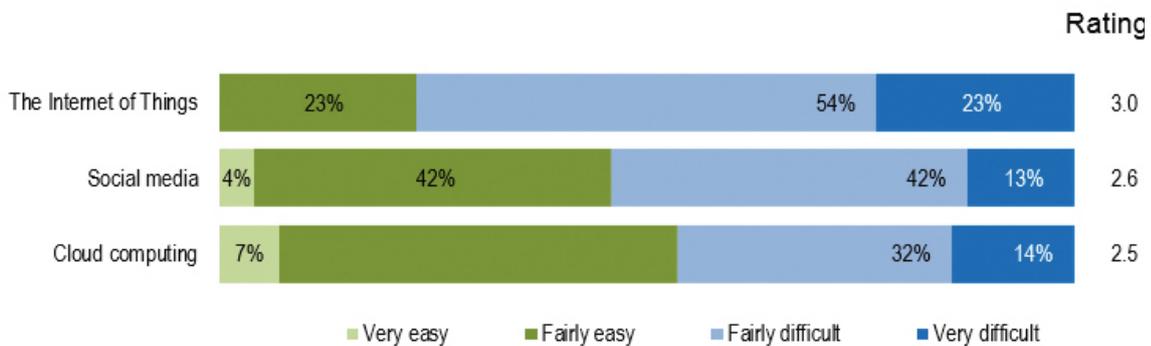


Figure 20: Ease/difficulty of recruiting big data staff with data process/methodological skills

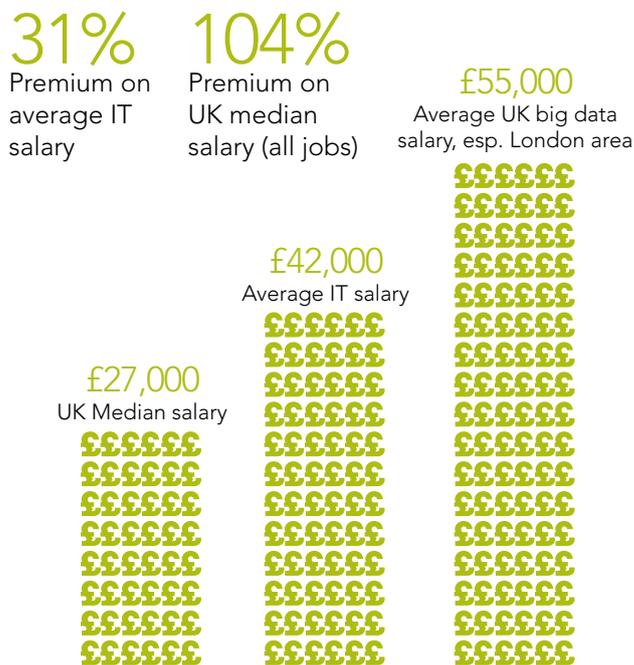
Source: The Tech Partnership

4 Remuneration Trends for Big Data Jobs

4.1 Overview

Given the high incidence of related recruitment difficulties, it is perhaps unsurprising to see that big data positions are associated with (advertised) levels of remuneration well above the norm. In 2013, the median (advertised) salary for permanent big data positions, at £55,000 was 24 per cent higher than that for IT staff as a whole and 29 per cent higher than the advertised rates for data warehouse/business intelligence staff in particular (with associated rates of £55,000, £44,500 and £42,500 p.a. respectively).

The median advertised salary for permanent big data positions in 2013 was £55,000



A pay premium for big data jobs, though smaller in scale, was also apparent within the contract market, where rates for big data jobs were found to be 6 per cent higher than those for contract IT jobs and 10 per cent higher than for such positions in data warehousing/business intelligence (i.e. £430, £400 and £390 per hour respectively).

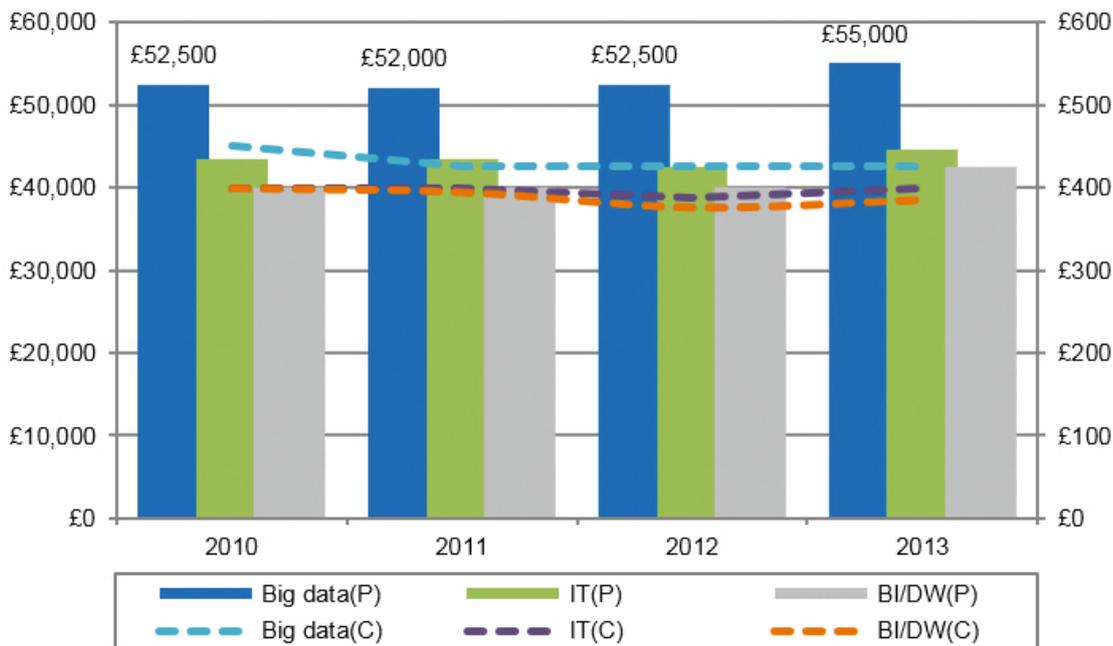


Figure 21: Advertised rates for permanent (P) and contract (C) big data staff, 2010-2013

Source: The Tech Partnership analysis of data provided by ITJobs Watch

As illustrated in figure 21, not only were advertised rates for permanent/contract big data staff higher in 2013, they were also higher in each of the preceding years³. Within the permanent jobs market, the premium has fluctuated mildly over the period (between 20 per cent and 24 per cent compared with IT jobs), whilst in the contract sector the premium between big data and other IT jobs has varied between 6 per cent and 13 per cent.

Looking more specifically at changes over the past year, it was found that though the premium for big data positions had not changed, within the permanent sector at least, advertised rates for big data posts had increased in line with rates for IT positions more generally - rising by 5 per cent over the 2012-2013 period.

Advertised salaries for permanent big data posts were up 5% on the past year but contract rates were unchanged

4.2 Advertised rates by nation/region

Advertised rates for big data staff were found to be highest in London in 2013, both with respect to permanent and contract positions (where median rates recorded were 5 per cent and 6 per cent higher than for the UK as a whole). By contrast, Wales in particular was identified as an area for relatively low advertised rates, with permanent (advertised) salaries set at around half (52 per cent) the UK norm and contract rates approximately a fifth (21 per cent) of the median figure for all UK nations/regions.

Rates for big data jobs in London between 5% and 6% higher than in the UK as a whole

³ Figures are presented from 2010 to avoid low base sizes/retain consistency within this section

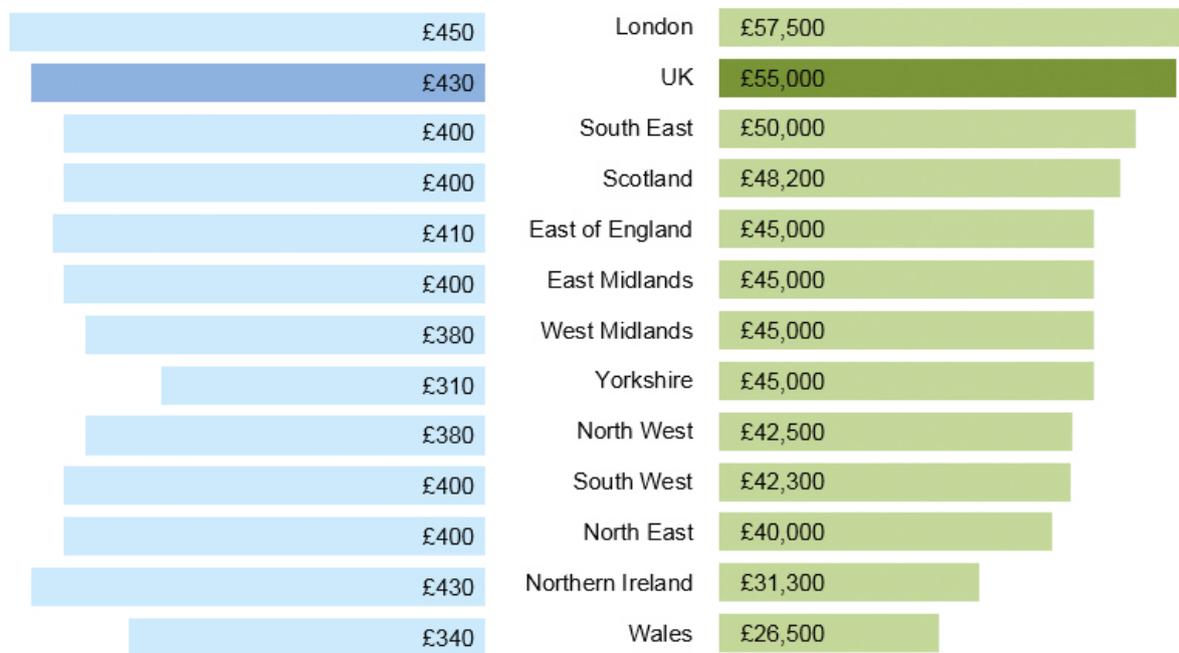


Figure 22: Advertised rates for big data positions by nation/region, 2013

Source: The Tech Partnership analysis of data provided by Experian

A comparison of advertised rates in 2012 and 2013 shows increases to have occurred within most nations/regions, the most pronounced being associated with Yorkshire, Scotland and the East of England (where a rise of more than 10 per cent was observed in the median annual salaries for permanent positions and an increase of 2 per cent or more seen to have occurred among adverts for big data contractors).

By contrast, an annual decline in rates was thought to have occurred across the board (i.e. permanent and contract positions) within Wales and the East Midlands whilst falls within the contract sector only were also seen in the West Midlands, the North West, the North East and the South East⁴.

⁴ Estimates for Wales (contract) and the North East (permanent/contract) based on a small sample (<30 cases) and as such should be treated with caution

4.3 Advertised rates by job group

By broad role group, project manager and architect positions were associated with the highest (median) advertised rates in 2013, both with respect to permanent and contract posts on offer (with rates of £70,000 p.a. and £490 per hour respectively). In addition, these two groups were characterised by some of the largest increases in advertised rates recorded over the 2012-2013 period, with median salaries for project managers rising by 15 per cent over the year and contract rates for big data architects increasing by 11 per cent.

An analysis by role group for the nations/regions (combined) is restricted due to the number of advertisements upon which estimates can be based. However, it would appear that permanent rates in London were consistently above the norm irrespective of the job group in question - this pay differential varying from 5 per cent for administrators and analysts to 11 per cent for big data designers.

Advertised rates for big data project managers and architects the highest in 2013



Figure 23: Advertised rates for big data positions by job group, 2013

Source: The Tech Partnership analysis of data provided by Experian

4.4 Advertised and actual rates of pay

There is a potential discrepancy between the rates advertised for big data positions and the salary actually awarded to successful applicants, not least as actual pay awards will be determined by a range of factors (such as qualifications, skills and experience, for example) and the fact that a higher advertised rate would likely attract a larger number of potential applicants (i.e. a benefit to recruiters).

To provide an indication of what the actual salaries are likely to be for big data staff (and hence a comparison with other types of employment), data on gross weekly earnings for IT/Comms specialists (taken from the ONS Labour Force Survey/Annual Survey of Hours and Earnings) has been compared with advertised rates data, and the results used as a basis to down weight the pay figures contained within this report. The resulting estimates for big data were then compared with other employment groups as illustrated in figure 24.

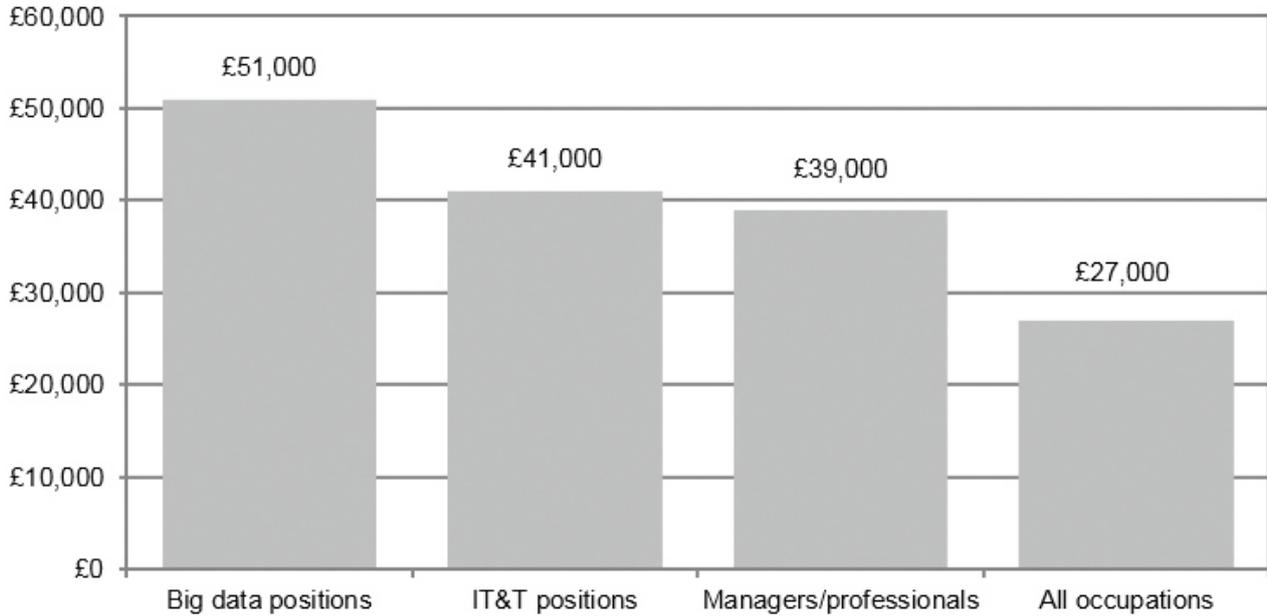


Figure 24: Estimated actual earnings of big data and other workers, 2013

Source: The Tech Partnership analysis of data provided by Experian

In this manner we arrive at an (estimated) median salary for permanent big data staff of approximately £51,000 p.a. - a figure 24 per cent higher than that for IT&T specialists, 30 per cent higher than that for people working in managerial/professional positions (i.e. an equivalent for the majority of big data/IT&T staff) and 87 per cent higher than that for UK workers as a whole.

Actual salaries for big data staff estimated to be almost double the level of UK workers overall

5 Future Demand

5.1 Forecasting overview

Having analysed the current/historical market for big data staff in depth, in this section we set out our view of how such demand is likely to change over the 2013–2020 period. The forecasts presented here, have been developed in association with Experian's Economics Group and are based around the integration of bespoke demand data with dedicated employment forecasts for IT/Comms specialists/UK workers as a whole. More specifically:

5.2 Forecast employment 2013–2020

ONS estimates from the Labour Force Survey (LFS) suggest that in 2013 there were approximately 1.2 million people working in IT/Comms roles in the UK and that, in total, IT/Comms staff accounted for approximately 4 per cent of all UK employment. The number of people working in IT/Comms positions has increased at a much greater rate during the past five years than was the case for workers in the UK as a whole with comparative increases over the 2008–2013 period of 8 per cent versus 1 per cent respectively.

Number of workers in the UK increased by just 1% in the past 5 years

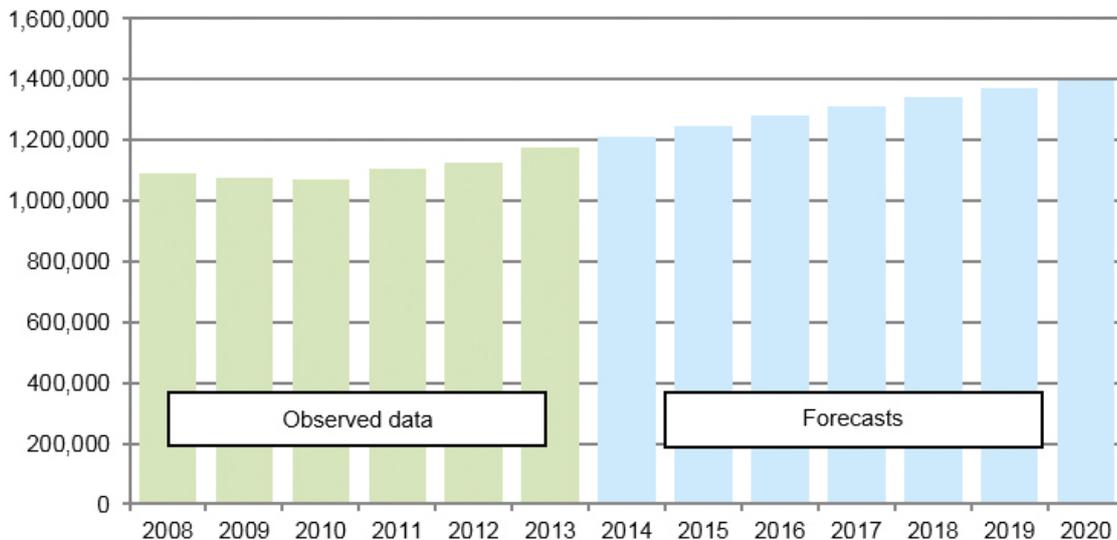


Figure 25: Employment of IT/Comms staff in the UK 2008–2020⁵

Source: The Tech Partnership/Experian

This (relatively) high growth is expected to continue in the future and over the 2013–2020 period, growth in IT/Comms workers is forecast, on average, to increase by 19 per cent compared with growth of 6 per cent within the wider labour market (with IT/Comms employment growing to around 1.4 million people by 2020).

UK employment to grow by 6% between 2013 and 2020

⁵ By staff we mean both permanent and contract workers

5.3 Forecasting demand for big data positions 2013-2020

Demand forecasts for big data positions are based upon an analysis of historical recruitment (advertising) combined with the results of the dedicated IT/Comms employment forecasting exercise summarised above.

When developing these forecasts, it has been assumed that *a)* given the skills requirements for big data and the strong links between big data/IT functions⁶ related jobs should be well captured within the IT/Comms employment estimates/forecasts discussed and *b)* advertised vacancy statistics can reasonably be employed to quantify the gross number of big data job opportunities arising in the future. The term gross job opportunity has been used here on the understanding that an advertised position may arise as a result of *a)* a new post being created (growth) or *b)* someone leaving a job (replacement), e.g. to take up another post or to exit the labour market entirely. When considering the two effects together (i.e. growth + replacement), the result equals total gross job opportunities (job vacancies).

When developing these forecasts, it was recognised that gross job opportunities created by replacement normally tend to be much more numerous than those created by expansion (our research shows a ratio averaging at around 6:1 for IT/Comms positions) and that the net change in employment can be either positive or negative. Lastly, and perhaps most significantly, it is worth bearing in mind that the future growth in the number of big data job opportunities may not continue at the growth rates we have seen before – historical demand series and adoption rates tend to relate to very limited time periods and/or specific circumstances (e.g. actions of major employers) and, hence, in spite of indications provided by our previous survey of UK companies, uncertainty over future adoption levels still remains, particularly within the SME sector where poor awareness of the big data concept has made it extremely difficult to ascertain even current levels of market penetration. With this in mind it was decided that three growth scenarios would be produced:

1. A high growth scenario that assumes the big data industry is still at the early majority stage where adoption of the new technology will continue to rise for a further two years before reaching the late majority stage where growth in adoption rate is expected to slow.
2. A low growth scenario that assumes that the industry has moved further along the adoption curve and, as such, adoption rates and employment demand will slow considerably in comparison with the recent past.
3. A medium growth scenario that follows a path of growth midway between the two cited above.

⁶ See previous reports for 2012 and 2013 (www.sas.com/uk/reports)

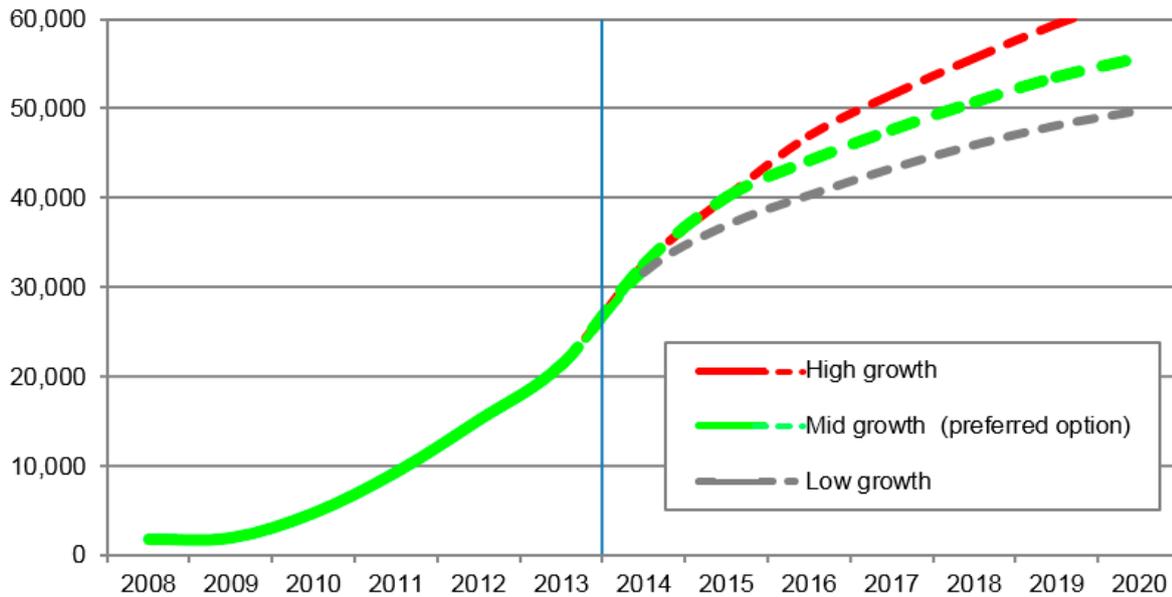
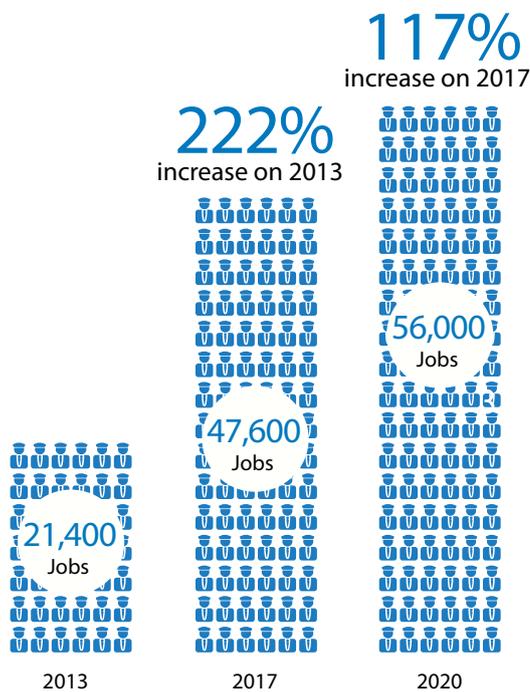


Figure 26: Actual/forecast demand (vacancies per annum) for big data staff 2008-2020

Source: The Tech Partnership/Experian

Under the preferred growth scenario, big data demand (vacancies) is expected to grow by 160 per cent between 2013 and 2020 the equivalent of an annual average growth rate of 23 per cent per year. The gross job opportunities for big data related jobs will be approximately 56,000 p.a. by 2020 and over the whole forecast period there will have been around 346,000 big data gross job opportunities created in the economy.

Demand growth for big data staff forecast to rise by 160% between 2013 and 2020



6 Appendix

6.1 Methodology

This report has been produced by the Tech Partnership on behalf of SAS UK & Ireland with the aim of providing an understanding of the developing demand trends for big data related staff in the UK, focussing in particular on demand arising within the IT function of UK businesses.

This is the third report in a dedicated series looking at big data analytics and related labour and skills issues in the UK.

- The first report of the series 'Big Data Analytics: An Assessment of Demand for Labour and Skills, 2012-2017', provided an in depth analysis of historical recruitment trends together with possible scenarios for future demand growth using bespoke data from employment forecasts for the 2012-2017 period developed in association with Experian (www.sas.com/uk/report).
- The second report 'Big Data Analytics: Adoption and Employment Trends, 2012-2017', based on a survey of over 1,000 UK employers, provided benchmark estimates for big data adoption and employment levels, together with an overview of associated skills shortages/gaps experienced by firms operating/implementing big data solutions (www.sas.com/uk/report).

In this report we have sought to update and extend the work already undertaken by:

- Providing a refresh of the initial demand analysis, using updated figures provided by Experian
- Providing a more detailed investigation into the incidence and magnitude of related recruitment difficulties and skills shortages facing big data recruiters by way of a dedicated web survey of UK staffing companies servicing this sector
- Updating our demand forecasts using the aforementioned demand side analysis together with information on adoption trends collected in the course of our second big data study.

i) Demand-data analysis

The demand-side analysis presented in this report has been carried out according to the same methodology/within the same parameters as set out in our first report in order to allow direct comparison between the findings. A full explanation of the methodology/parameters is given in that report and as such is not repeated here. However, the key points for consideration are:

- The demand-data analysis is based upon the interrogation of a dataset containing details of all advertised positions for big data staff in the UK, arising within primary IT recruitment sites/ portals

Understanding the
developing demand
trends for big data related
staff in the UK

- In the absence of a common operational definition of "big data", that employed when building this dataset has been derived using a combination of key terms (e.g. big data), affiliated job titles (data scientist) and selected skillsets (e.g. Hadoop) considered specific to big data employment
- The demand analysis focusses on big data specialists as opposed to users (e.g. those involved in the design, development, administration, support of big data systems/software and the capture, storage, transformation and interpretation of associated data content, as opposed to those who utilise the end products as a tool in the performance of their main work tasks).

Demand analysis
focusses on big data
specialists as opposed to
users

ii) Web survey

The methodology employed for the collection of data from staffing companies was as follows:

- A list of staffing companies was drawn up containing details of those that were known to have recruited for big data positions during the previous year. Each of the organisations was then contacted by telephone and an individual with responsibility for this recruitment area was invited to undertake a dedicated web survey designed to explore their experiences of recruiting for such positions
- The survey questionnaire was designed to provide a simple comparison of the perceived ease/difficulties experienced when recruiting big data staff for specific roles and/or with specific skills/knowledge requirements. The framework for these questions was built around an analysis of related demand data and included common and high-demand big data roles/skills together with some more generic recruitment areas for comparison purposes
- In total, we received just over 70 responses to the survey questionnaire, of which 50 were able to provide the detailed information on big data recruitment required. In total, these organisations were thought to have been responsible for recruiting around 2,200 big data staff over the past year (i.e. around 10 per cent of the total number of related adverts identified in the demand dataset).

iii) Forecasts

The initial element of the forecasting activity focussed on the generation of related employment forecasts (i.e. all workers and IT/Comms employment) for the 2013–2020 period based on an occupational definition derived from relevant components of the ONS Standard Occupational Classification system (SOC2010).

To produce these forecasts, Experian's Regional Planning Service (RPS) first creates output and employment forecasts for the 38 (2 digit) industry 'divisions' defined by the ONS Standard Industrial Classification coding system (SIC2003). Using Index of Production (IOP) data from the ONS, estimates of consumer demand and intermediate demand and related trend data, a shift-share methodology is then employed to extrapolate results at a more detailed level (4 digit industry 'class').

These forecasts by class are anchored to the higher (division) estimates to increase robustness/ensure consistency and are then disaggregated by region using official employment data - these estimates are then also anchored at the broader industry level to increase robustness. The end result is a set of detailed industry forecasts for each region that are fully consistent with Experian's broader economic forecasts, which are then subject to a SIC converter (from ONS) to produce updated figures according to the latest industry classification system (SIC2007).

To translate these industry forecasts into occupation forecasts according to the latest occupational classification system (SOC2010), Experian has developed a dynamic matrix system that maps industry employment to occupations for the current/previous years. This matrix can be extrapolated forward to 2020 using past trends, and is also adjusted to account for shifts in occupational distributions observed between 2002 and 2010 under previous ONS classification systems, i.e. SOC2000 (which encompasses a longer time series). Hence, by applying this matrix to the regional industry forecasts previously generated, a series of estimates for future employment by IT/Comms and other occupational groups can be produced.

6.2 ONS Classification Systems

The Standard Occupational Classification (SOC) system has been developed by ONS to provide a common methodology for the classification of occupations in the UK based upon associated skill levels and skill content. The latest version of SOC (SOC2010) was introduced from 2011 as an update/replacement for the previous classification system (SOC2000).

SOC (2010) is based on a hierarchical system, starting with 9 high-level, single-digit codes (major groups) which are then sub-divided into 25 more detailed two-digit classifications (sub-major groups), 90 three-digit codes (minor groups) and finally 369 four-digit (unit) codes.

When developing our forecasts of employment for IT&T occupations, we defined this group at the most detailed level possible using the following four-digit unit codes:

- 1136 Information technology and telecommunications directors
- 2133 IT specialist managers
- 2134 IT project and programme managers
- 2135 IT business analysts, architects and systems designers
- 2136 Programmers and software development professionals
- 2137 Web design and development professionals
- 2139 Information technology and telecommunications professionals n.e.c.
- 3131 IT operations technicians
- 3132 IT user support technicians
- 5242 Telecommunications engineers
- 5245 IT engineers

7 Data Presentation

1. The analysis of vacancies presented within this report is based upon data provided by IT Jobs Watch (www.itjobswatch.co.uk) who track the demand patterns for IT staff through the application of semantic analysis to data obtained from major IT recruitment sites. Where reference is made to specific groupings of skills in this report (e.g. IT/data tools and IT/data related process/methodological skills) these groupings have been drawn up by the Tech Partnership only, and are not groupings developed or employed by IT Jobs Watch (with the exception of the 'data warehouse/ business intelligence' group).
2. Where figures are provided showing the number of advertised vacancies, they have typically been rounded to the nearest 10 (i.e. unless specified otherwise, and unless shown within related charts). When referencing advertised pay the figures have been rounded to the nearest £1,000 in the case of permanent annual salaries and the nearest £10 for contract day rates. As a result of this rounding process, apparent discrepancies may appear in row/column totals (i.e. integers/percentages).
3. Commentary/data presented within this report relating to advertised vacancies generally relates to incidences where 30 more adverts were recorded over the past year.

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For further information please contact:



The Tech Partnership
1 Castle Lane
London
SW1E 6DR

+44 207 963 8920
thetechpartnership@e-skills.com
www.thetechpartnership.com



SAS UK & Ireland
Wittington House
Henley Road, Medmenham
Marlow, Bucks
SL7 2EB

+44 1628 486 933
info.uk@suk.sas.com
www.sas.com/uk