

# Submission to the Migration Advisory Committee – Partial Review of UK Shortage Occupation Lists

## Digital technology roles

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## Executive Summary

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techUK welcome the partial review of the Shortage Occupation Lists by the Migration Advisory Committee (MAC). Herein we submit evidence for the Committee's consideration, in support of demonstrating a shortage of labour in 'Digital Technology' roles where it would be sensible to fill using workforce from outside the EEA.

techUK recommends placing the following three job titles on the Shortage Occupation Lists:

- Include Senior Developer under SOC 2136 on the Shortage Occupation Lists
- Include Big Data Analysts under SOCs 2135 or 2136 on the Shortage Occupation Lists
- Include Cyber Security Specialists (potentially under SOC 2136 but others may apply) on the Shortage Occupation Lists

We encourage the MAC to consider the inclusion on the Shortage Occupation Lists of Analogue Electronics Design Engineers and Power Design Electronics Engineers which are part of the digital technology value chain.

We strongly encourage the Home Office to increase its evidence base by undertaking a big data driven study of potential shortages to better understand the scale of the barrier affecting one of the UK's growth sectors.

## About techUK and the case for 'Smart Migration' for tech

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techUK represents the companies and technologies that are defining today the world that we will live in tomorrow<sup>1</sup>. More than 860 companies are members of techUK. Collectively they employ more than 500,000 people, which represents nearly half of all ICT sector jobs in the UK.<sup>2</sup> These companies range from leading FTSE 100 companies to new innovative start-ups. The majority of techUK's members are small and medium sized businesses<sup>3</sup>.

A significant proportion of techUK members and the wider UK technology sector are vocal about suffering skills shortages, both in terms of present-day needs and the longer-term supply of talent that needs to occur for companies to continue to grow and reach scale here in the UK. For example, the recent research with input from 1,398 employers undertaken by e-skills UK for the Tech Partnership showed that 44% of IT businesses in the UK that were seeking to recruit tech specialists had experienced difficulties finding applicants with the required skills, qualifications or experience.<sup>4</sup>

Accordingly, in '*Securing our digital future: The techUK manifesto for growth and jobs 2015-2020*'<sup>5</sup>, techUK called for the implementation of a 'smart migration' policy arguing that 'to be a global hub for tech, the UK has to be a global hub for talent'. techUK has argued on multiple occasions<sup>6</sup> that sending the right message to international talent which matches the needs of UK-based firms will be crucial not only in alleviating immediate shortages, but also in making sure high-value technology jobs are here in the UK which in turn create economic spillovers for years to come.

The MAC's focus on 'digital technology' roles, therefore, is to be welcomed. Digital technology capabilities are a key component of the 'Information Economy', recognised as a core part of the UK's industrial strategy.<sup>7</sup> The information economy is a recognisable new dynamic force. At its core, it spans sectors of software, IT services and telecommunications services.

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<sup>1</sup> Note that techUK has previously submitted to the MAC under its previous name 'Intellect'

<sup>2</sup> Using traditional government measures

<sup>3</sup> A full list of techUK's members can be found at <https://www.techuk.org/about/our-members>

<sup>4</sup> e-skills UK / the Tech Partnership employer survey 2014

<sup>5</sup> techUK (September 2014) *Securing our digital future: The techUK manifesto for growth and jobs 2015-2020*. Retrieved from <http://www.techuk.org/techukmanifesto>

<sup>6</sup> Most recently to the House of Lords Digital Skills Committee on 29th July 2014 <https://www.techuk.org/insights/news/item/1945-uk-must-become-hub-for-global-talent-says-techuk> and to the All Party Parliamentary Group on Migration on the closure of the Post Study Work Visa on 10<sup>th</sup> October 2014 <https://www.techuk.org/insights/reports/item/2279-techuk-call-for-smart-migration-in-response-to-parliamentary-inquiry>

<sup>7</sup> The government's Industrial Strategy combines horizontal interventions with support for seven key sectors, of which the 'information economy' is one. See Department for Business Innovation and Skills (2013) <https://www.gov.uk/government/collections/industrial-strategy-government-and-industry-in-partnership>

However the reach of the information economy is broader than this as it is constantly evolving and pushing into new areas. As the government's Information Economy Strategy states: "*This means we may not have an exact picture of the number of businesses in the information economy, or its employment, or the value it brings to the UK economy.*"<sup>8</sup> The desire to grow the UK's high tech clusters which drive the information economy is prominent in UK policy-making - for instance, through the Government's Tech City initiative, and recent moves to create 'Northern Powerhouses' focused on technology and science.

Whilst the 'information economy' contributes a significant amount to GDP<sup>9</sup> – it is also understood as a powerful sector in innovating solutions to the pressing social and economic challenges of our time. Consistently outperforming the UK's national averages on productivity, the UK's information economy is linked to the major social and economic challenges of our time, such as the reduction of public debt, creating new high-value jobs and enabling all to reap the benefits of the digital revolution.

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<sup>8</sup> Department for Business, Innovation and Skills (2013) Information Economy Strategy <https://www.gov.uk/government/collections/industrial-strategy-government-and-industry-in-partnership>

<sup>9</sup> Department for Business, Innovation and Skills (2013) Information Economy Strategy <https://www.gov.uk/government/collections/industrial-strategy-government-and-industry-in-partnership>

## Evidence approach and wider considerations for the MAC

After discussions with Stephen Earl of the Migration Advisory Committee and with a number of techUK members, techUK's evidence in submission to the MAC is in three parts. The submitted evidence contained in the following sections relates to:

1. Primary evidence collected from techUK members via **a shortages survey**, conducted in November 2014
2. Anecdotal evidence and **'soft market intelligence'** received from techUK members
3. Primary evidence collected from techUK members via **a separate survey targeted solely at Analogue Electronics and Power Electronics Design Engineers** fielded in November 2014
4. **Findings from a previous short survey** conducted in collaboration with e-skills UK / the Tech Partnership for the Government's Digital Ministerial Taskforce, conducted in October 2014

The primary evidence collected from techUK members via the shortages survey, whilst containing a number of rich results and insights is regrettably not as large in the sample size as techUK would have wished. We believe that this is, in part, due to the short timeframe in which the survey was open and additionally a perceived 'survey fatigue' by a number of companies approached. As a membership body, there are practical resource difficulties in conveying the importance of the survey to complex and often large organisations – there are a range of companies that we know by market intelligence experience shortages but were, on this occasion, unable to provide evidence within the timeframe. techUK believe, therefore, that it would be erroneous for the MAC to interpret a low sample to mean that those who did not submit primary evidence from the techUK membership do not experience a shortage. techUK received 33 responses to the techUK shortages survey and 16 responses to the techUK-e.net survey.

**techUK primary evidence participation by company size**  
*(measured by UK employee number)*

Shortages experienced and survey completed		Verbal feedback on shortages (no survey inputs)		No shortages experienced by company	
S: 0-49	7	S: 0-49	1	S: 0-49	3
M:50-249	2	M:50-249	1	M:50-249	2
L:250-500	0	L:250-500	1	L:250-500	1
L+ : 500+	9	L+ : 500+	3	L+ : 500+	3
<b>All:</b>	<b>18</b>	<b>All:</b>	<b>6</b>	<b>All:</b>	<b>9</b>
<b>Overall: 33</b>					

Before continuing to techUK’s evidence and inputs for the MAC’s consideration, it is worth highlighting a number of issues that arise when evaluating ‘digital technology roles’.

Firstly, **‘digital technology’ roles are not limited only to the ‘information economy businesses’**, and digital technology a relatively loose and not strictly-defined term by which a number of roles right across the economy can apply. However, for the purposes of this submission, our evidence is primarily focused on those digital technology roles which are core for success in the government’s definition of the ‘information economy’. However, the MAC may wish to consider that shortages in digital technology roles may also be having a detrimental effect on businesses that we are not considering to be a core part of the information economy. The talent needed for the digitalisation of the wider economy is crucial for the UK’s ongoing economic success, and is an important area for consideration.

Secondly, measurements of employment in the ‘information economy’ are based on traditional measures drawing from SOC and SIC codes. A recent report from the National Institute of Economic and Social Research<sup>10</sup> showed that using big data methods shifts information economy businesses’ employment share substantially upwards, from 3.7% (using government-defined SOCs) to 8.92% in 2010-12. Whilst there are a number of potential reasons behind this increase in share (notwithstanding the sometimes dated nature of SOCs) it shows that **the proportion and growth of digital technology roles in the information economy can often be higher than is understood through traditional measures**. This is important for the MAC to consider, as

<sup>10</sup> National Institute of Social and Economic Research (November 2014) Mapping Information Economy Business with Big Data: Findings from the UK. Retrieved from <http://niesr.ac.uk/sites/default/files/publications/DP442.pdf>

employment estimates and their estimated corresponding shortages may lag behind the reality for tech firms.

Finally, on possible shortages related to **data analytics**: the recent report on 'Big Data Analytics' by e-skills UK / the Tech Partnership and SAS<sup>11</sup> suggests that whilst many jobs are adequately included in the current SOC, some emerging job roles may not be captured accurately. The report gives an assessment of demand for a number of job roles and from this we can match these to 4 digit occupations<sup>12</sup>. Whilst some do match with a SOC code, the distinction in the SOC coding between 'data' and 'database' is nuanced and seem to describe different job roles, and the MAC should be aware of this when conducting their review.

## Headline figures on skills shortages in digital technology

e-skills UK/ the Tech Partnership research shows that 134,000 new recruits a year are needed for IT specialist jobs in the UK<sup>13</sup>, while Baroness Martha Lane-Fox states that 1 million new tech jobs will be created by 2020.<sup>14</sup> Almost 44% of UK tech firms plan to hire more staff over year ahead, with only 7% expecting a fall in staff numbers.<sup>15</sup> techUK and others have previously stated that future recruitment demands cannot be met without non-EEA recruits.<sup>16</sup> European Commission research suggests that the skills gap is larger in the UK than anywhere else in the EU.<sup>17</sup> As a result, the UK especially is in need of non-EEA employees in the tech sector.

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<sup>11</sup> Tech Partnership and SAS (October 2014), *Big data analytics: assessment of demand for labour and skills, 2013 – 2020*. Retrieved from <http://www.e-skills.com/research/research-themes/big-data-analytics/>

<sup>12</sup> We have done this whilst omitting the term 'big data' because these job roles as specified may relate to 'big data' or not.

<sup>13</sup> e-skills/ the Tech Partnership (2014)

<sup>14</sup> Baroness Martha Lane-Fox (January 2014) Maiden speech in the House of Lords. Retrieved from <http://marthalanefoxblog.wordpress.com/2014/01/16/25th-anniversary-of-the-world-wide-web/>

<sup>15</sup> KPMG report 4/2013. Retrieved from <http://www.kpmg.com/uk/en/issuesandinsights/articlespublications/newsreleases/pages/uk-tech-sector-records-best-growth-performance-for-almost-a-decade-according-to-kpmg-market-tech-monitor-uk-report.aspx>

<sup>16</sup> View the techUK submission to the All Party Parliamentary Group on Migration on the closure of the Post Study Work Visa on 10<sup>th</sup> October 2014 <https://www.techuk.org/insights/reports/item/2279-techuk-call-for-smart-migration-in-response-to-parliamentary-inquiry>

<sup>17</sup> European Commission (2014) Does digital technology create or kill jobs? [http://europa.eu/rapid/press-release\\_MEMO-14-383\\_en.htm](http://europa.eu/rapid/press-release_MEMO-14-383_en.htm)

## Evidence 1 – techUK member shortages survey on digital technology roles

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techUK primary evidence participation by company size  
(measured by UK employee number)

Shortages experienced and survey completed		Verbal feedback on shortages (no survey inputs)		No shortages experienced by company	
S: 0-49	7	S: 0-49	1	S: 0-49	3
M:50-249	2	M:50-249	1	M:50-249	2
L:250-500	0	L:250-500	1	L:250-500	1
L+ : 500+	9	L+ : 500+	3	L+ : 500+	3
<b>All:</b>	<b>18</b>	<b>All:</b>	<b>6</b>	<b>All:</b>	<b>9</b>
<b>Overall: 33</b>					

techUK primary evidence participation by direct and indirect tech industry

	Shortages experienced and survey completed	Verbal feedback on shortages (no survey inputs)	No shortages experienced by company
Tech business	14	6	9
Indirect tech value chain (all professional services targeted at tech industry)	4	0	0

The 18 responding businesses which experienced shortages and completed the full survey felt that digital technology shortages were affecting their commercial performance.

The **three most pronounced and regularly cited shortages** were:

- Senior Developers
- Big Data Specialists
- Cyber Security Specialists

Further shortages were indicated in management, engineering, and specific technology occupations where 'digital technology' plays an important role.

## Pronounced shortage 1 – Senior Developer

On 'Senior Developers', there was overwhelming accord that this job title would sit under SOC code 2136 (Programmers and software development professionals). More than half of those who completed the survey stated suffering a shortage of specialised developers.

The following 'specialised Developer' or 'Senior Developer' role titles were mentioned:

- User Interface Developers
- CRM Dynamics Developer
- 3D technical developer
- C# .net Developers
- PHP Developer
- C# Developer
- .Net Developer
- Mid Level Drupal Developer
- Senior Drupal Developer
- Junior Drupal Developer
- Oracle Developer (E-business Suite)
- .NET Developer
- Mobile App Developer
- Senior 3D infrastructure and solutions developer
- Web Developers
- Java Developer
- SC clearable Java Developer

Demonstrative of a **Shortage for Senior Developers**, there was evidence of a rise in earnings for the mentioned developer roles<sup>18</sup>:

	Have the earnings in this role increased over the last year?
Yes, by up to 10%	2
Yes, by more than 10%	12
Yes	5
No	0
Don't Know	0

One survey respondent commented: "For example, on java development in the past 12 months the salaries have risen from c. £35-40 K to £45-55K due to FS increasing development work/ individuals choosing careers as contractors to benefit from rising rates of contractor pay too, impacting further the supply of permanent and experienced staff."

<sup>18</sup> Note that n is larger than respondent number because where multiple Senior Developer roles were submitted, each stated job title had the opportunity for further feedback. See Appendix A for further details.

Indicative of the present shortage, 16 out of 19 Senior Developer job vacancies have been open for longer than 6 weeks in the last year.

	Have vacancies for this role been open for longer than 6 weeks in the last year?
Yes, in multiple cases	11
Yes, at least once	5
No	2
Don't know	1

When asked on the anticipated future vacancies for Senior Developers, a unanimous majority stated they believe this shortage to continue over the next 12 months.

	Do you expect the shortage for this role to continue over the next 12 months?
Yes	18
No	0

In demonstrating the **Skill level of Senior Developers**, more respondents did not require their Developer to have a university degree than require one. However, the majority of respondents stated the Developers they needed had to have skills equivalent to university degree level. Notably, the vast majority of respondents agreed that suitable candidates must have specific work experience.

	Suitable candidates for this job must have a university degree	Suitable candidates must have skills equivalent to university degree level	Suitable candidates must have specific work experience
No	11	5	2
Yes	7	12	16

In demonstrating the **Sensible need for non-EEA Senior Developers**, respondents were divided over advertising Developer vacancies beyond the UK.

Does your company advertise vacancies in these job titles in the EEA?	
Yes	5
We only advertise it in the UK	7
We only advertise it outside the EEA	2
Don't know	3

The reason cited by respondents to only advertise a job title shortage within the UK was security clearance: multiple respondent companies, particularly those in the Defence industry, require UK citizenship or specific security clearance which is very difficult to obtain for non-UK citizens.

Security clearance makes specific business especially dependant on on-going efforts to up-skill the UK workforce:

*"In General 90% of our roles require eligibility for SC Clearance and for employees to be mobile throughout the UK. This has proven exceptionally difficult as a lot of roles (PHP Developer / Mobile Developers / JBOSS) are predominantly EU nationals who have not been in the UK 5 years."*

However even the SC clearance requiring tech firms have a pressing interest in a smart migration policy to attract tech talent. This crystallised in multiple discussions between these businesses and techUK. As these businesses compete with other UK tech employers over human resources, it is in their interest to have a larger tech talent pool within the UK.

Pro-actively addressing their shortage in the longer term, the overwhelming majority of respondents in need of Senior Developers have increased their business's training offer for this role.

Has your company considered training UK workforce for this job role?	
Yes, we have increased our training offer	11
Yes, but we lack the necessary capacity	6
No	2
Don't know	0

## Pronounced shortage 2 – Big Data specialists

On 'Big Data Specialists', respondents agreed this job title would sit under SOC code 2135 (IT business analysts, architects and systems designers) or 2136 (Programmers and software development professionals). Respondents collectively stated eight Big Data specialist shortages.

The job titles supplied in the category of Big Data specialists were:

- Big Data Specialist
- Data Scientist
- Data Analyst
- Big Data Analyst
- Data Scientist
- Big Data Consultants

In demonstrating a **Shortage for Big Data Specialists**, each of the companies that indicated a need for Big Data specialists experienced a rise in earnings of Big Data specialists.

	Have the earnings in this role increased over the last year?
Yes	6
Yes, by up to 10%	1
Yes, by more than 10%	1
No	0
Don't Know	0

Half of the respondents in need of Big Data specialists have had open vacancies for this job role in their company for longer than 6 weeks in the last year.

	Have vacancies for this role been open for longer than 6 weeks in the last year?
Yes, in multiple cases	2
Yes, at least once	2
No	0
Don't know	4

All but one undecided respondent expected the shortage of Big Data specialists to continue over the next year.

Do you expect the shortage for this role to continue over the next 12 months?	
Yes	7
No	0
Don't know	1

In demonstrating the **Skilled nature of Big Data Specialists**, all respondents in need of Big Data specialists stated the workforce they need must have skills equivalent to university degree level. All but one of these respondents further stated the Big Data specialist they need must have specific work experience.

	Suitable candidates for this job must have a university degree	Suitable candidates must have skills equivalent to university degree level	Suitable candidates must have specific work experience
Yes	6	8	7
No	2	0	1

In demonstrating the **Sensible need for Big Data Specialists**, there was no clear trend on whether the industry systematically advertises beyond the UK and the EEA.

Does your company advertise vacancies in these job titles in the EEA?	
Yes	5
We only advertise it in the UK	3
We only advertise outside the EEA	0
No	0

It is likely that those respondent companies advertising only in the UK did so because of the same security clearance issues as discussed in the section

above on Senior Developers. However in the case of Big Data specialists, there were no comments explicitly stating this reason.

When asked on training efforts, the majority of companies in need of Big Data specialists indicated having increased their training offer, but their present shortage remains.

Has your company considered training UK workforce for this job role?	
Yes, we have increased our training offer	6
Yes, but we do not have the necessary capacity	0
No	2
Don't know	0

### *Pronounced shortage 3 – Cyber Security Specialists*

Collectively, respondents mentioned shortages in ten job titles which we group under 'Cyber Security Specialists'.

The titles mentioned that fell in this category were:

- Cyber Security Consultants / Engineers
- Security Architects
- Information Assurance Consultants
- Senior Cyber Researchers
- Security Operational Analyst
- Information Assurance (ie: Cyber) Specialists
- Information Security
- Sales Consultant Security
- Sales Consultant Cloud Security

Most respondents found no SOC code fully matching their Cyber Security shortage job title. There is a pronounced shortage of specific skills and knowledge on Cyber Security. These skills and knowledge are needed across digital technology disciplines including Architects, Engineers, and Consultants. Current SOC lists including job codes do not fully reflect the roles of Cyber Security specialists across digital technology disciplines. From techUK view, the most likely SOC to accommodate these Cyber Security Specialists is SOC 2139 Information technology and telecommunications professionals nec.

In demonstrating the **Shortage of Cyber Security Specialists**, respondents provided evidence of a rise in earnings of Cyber Security specialists at each of the companies indicating a shortage of Cyber Security specialists:

	Have the earnings in this role increased over the last year?
Yes, by more than 10%	4
Yes, by up to 10%	5
No	0
No response	1

All but one of the respondents in need of Cyber Security specialists stated vacancies for this job role in their company had remained open for longer than 6 weeks in the last year.

	Have vacancies for this role been open for longer than 6 weeks in the last year?
Yes, in multiple cases	7
Yes, at least once	2
No	0
Don't know	0
No response	1

All but one of the respondents expected their experienced shortage of Cyber Security Specialists to continue over the next year.

	Do you expect the shortage for this role to continue over the next 12 months?
Yes	9
No	0
Don't Know	0
No response	1

In demonstrating the **Skill level of Cyber Security Specialists**, the majority of respondents needing Cyber Security Specialists required these to have a university degree. The vast majority of respondents also required specific work experience.

	Suitable candidates for this job must have a university degree	Suitable candidates must have skills equivalent to university degree level	Suitable candidates must have specific work experience
Yes	7	7	7
No	1	0	1
No response	2	3	2

In demonstrating the **Sensible need for Cyber Security Specialists**, the majority of respondents were unable to advertise for this job title beyond the UK. Key reason for this was, similar to the job titles discussed in previous sections, the requirement for security clearance by many respondent companies. Nevertheless, as indicated above in the Senior Developers section, these companies have an expressed interest in attracting international talent into the UK in order to alleviate the competition for human resources in the UK.

	Does your company advertise vacancies in these job titles in the EEA?
We only advertise it in the UK	7
We only advertise it outside the EEA	0
Yes	1
No response	2

The majority of companies in need of Cyber Security Specialists indicated having increased their training offer, but their experienced shortage remains.

Has your company considered training UK workforce for this job role?	
Yes, we have increased our training offer	3
Yes, but we lack the necessary capacity	2
No	3
Don't Know	0
No response	2

### *Additional shortages for further investigation*

In addition to Senior Developers, Big Data Specialists and Cyber Security Specialists, survey responses indicated shortages of specific **Managers**, specific **Architects** and of certain **Engineers**. techUK would be happy to provide further detail on these roles, but we encourage the MAC to focus on the three pronounced shortages outlined in detail above.

## Evidence 2 – further intelligence from market analysis

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There is a concern amongst a section of the techUK membership that the UK is starting to lag (or is being perceived to lag) behind its competitors in terms of its ability to attract the best talent internationally, and that the inclusion of certain roles (as outlined previously) would make positive steps in sending out the right messages to international talent. A 2014 LinkedIn analysis of its membership relocations suggests that the cities attracting most workers with tech skills were in India, the United States and Australia. Berlin, Montreal, and Toronto also ranked above the UK's leading tech cities.<sup>19</sup>

There were a number of comments from the techUK membership which collectively indicate that training efforts alone will not be sufficient to meet the present skills gap:

*“Our strategy is to employ good C# .net developers and then train them up in CRM Dynamics: We have used apprentice schemes but we have too many inexperienced people and need experience.” (Small Digital Technology Services Provider)*

*“We started graduate consultant recruitment - but sometimes people move to other countries after six months of training which can hurt the business even more.” (Small Digital Technology Services Provider)*

*“We are tackling our shortage and acting on our social responsibility by innovating and creating jobs in the UK, but we just need access to the brightest and best diverse people and skills in this area especially from the commonwealth and China.” (Micro business Digital Technology Services Provider)*

Further, techUK is pleased to support Tech London Advocates, whose founder Russ Shaw has stated that “a lack of skills and challenging immigration legislation is inhibiting growth in the capital and threatening London's position as a global technology hub”.<sup>20, 21</sup>

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<sup>19</sup> Reuters citing LinkedIn. Reuters, 17.9.2014. 'Insight -London's young techs find anti-immigrant mood a drag'. Retrieved from <http://www.reuters.com/article/2014/09/17/us-europe-startups-britain-insight-idUSKBN0HC0UL20140917>

<sup>20</sup> TechCityInsider.net 22.4.2014. 'Talent crunch 'blocks tech business growth'. Retrieved from <http://www.techcityinsider.net/skills-and-immigration-block-tech-business-growth/>

<sup>21</sup> We understand that Tech London Advocates will be making their own submission to the MAC. Note that TLA are made up of individuals as 'advocates' and do not represent entire organisation as techUK

## Evidence 3 – Evidence from techUK-e.net - The Electronics Network on Analogue Electronics Design Engineers and Power Electronics Design Engineers

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In addition to the survey fielded in Evidence 1, techUK's electronics network, (or "techUK-e.net") fielded a short survey to its membership **specifically targeted at the inclusion of Analogue Electronics Design Engineers and Power Electronics Design Engineers on the Shortage Occupations List**. The Electronics Network is techUK's community of over 6,000 electronics-related companies. The questions are outlined in Appendix B.

16 companies responded to this survey and the headline results are as follows:

### **Analogue Electronics Design (AED) Engineer roles**

- 14 out of 16 respondents experienced a shortage in AED roles
- Of those 14, all had been unable to fill those vacancies after over three months of advertising.
- Of those 14, 10 were unable to fill those vacancies over 6 months of advertising
- Of those 14, 12 conducted significant internal training efforts to enable AED roles, but shortages still remain.

### **Power Electronics Design (PED) Engineers roles**

- 12 out of 16 respondents experienced a shortage in PD roles
- Of those 12, 11 were unable to fill those vacancies after over 6 months of advertising
- Of those 12, 10 conducted significant internal training efforts to enable PD roles, but shortages still remain.

### **The importance of AED and PED roles in the Digital Technology value chain**

Digital technology roles are most often associated with software applications or services, and understanding that where 'electronics' is not always an immediate consideration for policy-makers.

Ashley Evans, Director of Electronics at techUK makes an important contribution to this debate:

*"Whilst most people recognise the venacular of 'the chip', and perhaps its worthwhile to dwell on this for a moment.'Chips' perform a myriad of*

functions, however there are basically two types, fixed logic or programmable logic.

Fixed logic chips are known as ASICs and they perform one specific function, optimising on power and form factor. They are generally utilised for high volume applications and design is focused on the 'logic' of the chip utilising high level programming tools. This is something that can be very specialised.

Programmable logic refers to devices often called microcontrollers. These chips can perform a variety of tasks, and are programmed to perform these tasks. **This is where 'digital technology' skills come into play.** Microcontrollers are programmed using languages such as C++ or Python. Programming 'chips' requires digital input and digital skills.

Analogue refers to 'real world' signals. These are usually either radio frequency (Analogue Electronics) or voltage (Power Electronics). To enable a 'chip' to perform a specific task, it is often necessary to understand what the 'real world' is telling it, in order that it can compute the next decision. This means that the analogue signal has to be converted to a digital signal to enable the chip to process the information. Often, you will find Analogue to Digital converters (ADC) in the process step to enable this stage of signal processing.

Processing these analogue signals is the domain of the Power Electronics and Analogue Electronics design engineers. The skills that these engineers have enable 'real world' systems to be developed, where that be for the Internet of Things, complex radar systems or high voltage switching for power distribution."

techUK-e.net would be happy to provide further information to the MAC on this point.

## Evidence 4 – prior e-skills UK / techUK survey on Digital Skills shortages

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techUK and e-skills UK fielded a joint short survey in early October 2014, at the request of the Government's Digital Ministerial Taskforce. Overall, there were 66 responses from a variety of small, large and medium companies across the UK. **The survey found that Big Data Analysis and Big Data Development were the two most needed skills for the respondents over the next five years.** This backs the finding of the techUK survey at hand that UK businesses suffer a shortage of Big Data specialists. techUK and e-skills UK would be happy to provide further detail on this survey, should it be of interest to the MAC.

## Conclusions from Evidence

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UK technology businesses suffer common shortages of specific digital technology professionals. Headline findings from the short survey conducted for the MAC suggest that recruitment demand for specific digital technology professionals cannot be met by recruiting within the EEA alone.

**The largest demand by a large margin was found for Senior Developers, followed by Big Data Specialists and Cyber Security Specialists.**

When considering the inclusion of 'Big Data Specialists', it is worth noting that data analyst job roles could also relate to non-ICT related SOCs of 3539 (Business and related associate professionals nec). Whilst techUK members allocated them as 2135 and 2136, in line with the call for evidence, the MAC should understand that the title of these roles may be classified under several SOCs.

We additionally encourage the MAC to give consideration to the inclusion of Analogue Electronics Design Engineers and Power Electronics Design Engineers as a key part of the digital technology value chain.

## techUK Recommendations to the MAC

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techUK recommends placing the following three job titles on the Shortage Occupation Lists for the UK and Scotland.

### 1. Senior Developer

*Under 2136 Programmers and software development professionals*

Multiple companies have stated the need for more developers. The developers most often must have specific platform and services skills or knowledge. The specific developing skills in demand span a wide range including C#, .NET, 3D development and other platforms and specific skills.

### 2. Big Data Specialist

*Under 2135 IT business analysts, architects and systems designers or 2136 Programmers and software development professionals*

Multiple companies have stated the need for more Big Data Specialists. The most needed skills in Big Data Specialists are data analysis, business intelligence and data infrastructure development.

e-skills UK have suggested the most cited shortage (globally) in this area is for the job title 'Data Scientist' which the Office of National Statistics allocates to SOC code 2425. Given the seniority/nature of the jobs in question/cited below e-skills UK recommend that 2425 would be more appropriate as the allocated SOC for this shortage. techUK is agnostic on this point and believes that addition should be made to the Shortage Occupation Lists on the basis of the need outlined in this submission.

### 3. Cyber Security Specialist

*Provisionally under 2139 Information technology and telecommunications professionals nec*

Multiple companies have stated the need for Cyber Security Specialists across various digital technology disciplines including architecture, analysis, and engineering. SOC codes do not seamlessly accommodate this shortage for Cyber Security Specialists, but the best fit is SOC 2139 to be added to the SOL and accommodate Cyber Security Specialists as the shortage job title. It may be considered by the MAC whether Cyber Security Specialists should more narrowly defined by the specific areas in which they operate. E.g. a shortage job title could read: Cyber Security Specialist (Software architect, engineer, analyst or developer focusing on cyber security, with significant work experience in cyber security).

Additionally, we believe the MAC should give future consideration to the inclusion of **Analogue Electronics Design Engineers and Power Electronics Design Engineers**, as per Evidence section 3 as compiled by techUK-eNet.

These job titles fall under SOC code 2126 Design and Development Engineers following the Warwick University Cascot tool.<sup>22</sup>

We encourage the MAC to give consideration to the inclusion of Analogue Electronics Design Engineers and Power Electronics Design Engineers as a key part of the digital technology value chain. The shortage of Power electronics engineers has in part already been included by the MAC adding 'Power electronics engineers within the aerospace industry' (SOC 2123 Electrical engineers) to the Shortage Occupation Lists, but we believe this should be extended to include the roles mentioned above as part of the digital technology value chain.

Finally, **techUK recommends the MAC advise the Home Office boost its evidence base in assessing the skills shortages the UK technology sector suffers.** techUK suggests such an approach should be two-fold: firstly, a research company may be suited to provide a wide-ranging overview of the digital technology skills UK businesses are experiencing, on a much larger scale than the techUK survey. Secondly, this approach should be triangulated with a big data driven approach which uses online tools provided by companies such as LinkedIn and Adzuna to understand the nature of vacancies, shortages and international talent movements. techUK and its members would be happy to assist in such an undertaking.

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<sup>22</sup> This tool was presented to techUK by the MAC. It can be accessed here: [http://www2.warwick.ac.uk/fac/soc/ier/software/cascot/choose\\_classification/](http://www2.warwick.ac.uk/fac/soc/ier/software/cascot/choose_classification/)

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Sarah Scarlett, Wodeland Ventures

Ashley Evans, Director of Electronics, techUK

Laura Mortimer, Department of Business, Innovation and Skills

## Appendix A: techUK digital technology roles - survey questions, November 2014

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The following text is taken from the survey that techUK fielded to its members to inform this submission. The survey was fielded to over 1000 individuals across the techUK membership and received 18 complete responses. The survey was open from Wednesday 26<sup>th</sup> November to Thursday 4<sup>th</sup> December 2014. The survey was originally available via this link:

<https://www.surveymonkey.com/s/2ZBJJYS>

*“Have your voice heard on digital technology skills shortages in the UK – survey to support techUK evidence to the Migration Advisory Committee”*

This survey aims to gather data on specific workforce shortages in digital technology. The results will feed into the techUK submission to the Migration Advisory Committee. techUK will make the case to add specific digital technology job titles to the Shortage Occupation List, in order to fill current digital skills gaps with international talent.

There is general consensus that the digital technology sector suffers from skills and workforce shortages. Migration of tech talent to the UK is a complicated and often lengthy process. In order to facilitate recruitment of digital technology roles, the MAC requires evidence that specific roles are - skilled, - in shortage, - it is sensible to fill the role with non-EEA citizens. Thank you for taking this survey to help techUK compile powerful evidence to present to the MAC.

For more information on the MAC reviewing the Shortage Occupation List please visit: <https://www.gov.uk/government/consultations/review-of-the-shortage-occupation-lists-for-the-uk-and-scotland>

1. What job roles in your company are you currently experiencing difficulties recruiting? List up to eight job titles.  
Please keep note of the number next to each job title as this will facilitate answering the next questions.
2. What are the key professional skills necessary to work in these job roles? List up to three skills e.g. app development, systems design, data analysis
3. The MAC requires evidence that there is a shortage in the job titles you identified - please give details below.

4. How many new employees would your company like to recruit in this role?

A: 0-10; 11-20; 21-50

5. Have the earnings in this role increased over the last year?

A: Yes; Yes, by more than 10%; Yes, by up to 10%; No; Don't know

6. Have vacancies for this role been open for longer than 6 weeks in the last year?

A: Yes, in multiple cases; Yes, at least once; No; Don't know

7. Do you expect the shortage for this role to continue over the next 12 months?

A: Yes; No; Don't Know

[Comments]

8. Please share anecdotes and other intelligence that demonstrates the shortage in the job titles you have identified. Please specify the job title you are referring to. [comment box]

9. The MAC requires evidence that the shortage job title is a 'skilled' occupation equivalent to university graduate level - please give details below.

10. Suitable candidates for this job must have a university degree.

A: Yes; No; Don't know

11. Suitable candidates must have skills equivalent to university degree level

A: Yes; No; Don't know

12. Suitable candidates must have specific work experience

A: Yes; No; Don't know

13. If the job titles you identified require specific qualifications or experience please specify these below. Please specify the job title(s) you are referring to.

A: [comment box]

14. The MAC requires evidence that your job shortage cannot be met by employing UK or wider EEA workforce - please give details below.

15. Does your company advertise vacancies in these job titles in the EEA?

A: Yes; We only advertise it in the UK; We only advertise it outside the EEA; Don't know

16. Has your company considered training UK workforce for this job role?  
A: Yes, and we have increased our training offer; Yes, but we lack the necessary capacity; No; Don't know  
[comment box]

17. Finally, the MAC wants to understand which Standard Occupation Classification (SOC) codes apply to your shortage job titles. Do the job titles you identified fall under any of the SOC codes listed below?  
2135 IT business analysts, architects and systems designers  
2136 Programmers and software development professionals  
2134 IT project and programme managers  
2139 IT and telecommunications professionals  
2126 Design and development engineers  
None of these codes match

Please give details about your company to enable us to better understand your response.

18. Company name  
[comment box]

19. Does your company use Intra-company Transfers to get international workforce into the UK?  
A: Yes, often; Yes, occasionally; No; Don't know  
[comment box]

20. Number of employees in the UK  
A: 0-10; 11-50; 51-249; 250-499; 500 or more  
[comment box]

21. UK Region(s) your company operates in:  
[comment box]

22. Your contact details  
A: Name; Job title; Contact email address; Contact phone number

23. May techUK contact you for further information to feed into the techUK submission to the MAC?  
A: Yes; No  
[comment box]

24. Is your company a techUK member?

A: Yes; No

Thank you for participating in the techUK survey for a submission to the MAC.

The techUK secretariat will draft a response to the MAC based on your responses. If you would like to submit more evidence to feed into the techUK submission, please comment in the below text box or email us directly at [laura.weidinger@techuk.org](mailto:laura.weidinger@techuk.org).

[comment box]

## **Appendix B: techUK-e.net survey questions, November 2014**

The following text is taken from the survey that techUK-e.Net fielded to its members to inform this submission. The survey was fielded to over 400 relevant companies and received 16 complete responses. individuals across the techUK-e.net membership. The survey was open from Tuesday 2<sup>nd</sup> December to Friday 5<sup>th</sup> December.

The survey was available via this link: <http://www.techUK-e.Net/skillshortages.aspx>

The electronics network, or techUK-e.net is techuk's community of over 6,000 electronics-related companies.

The electronics network feeds into techUK's electronics programme, which has been designed to support the UK's electronics industry in two distinct ways:

Facilitating business growth - through access to markets and access to funding and finance

Improving competitiveness - through better insights into market dynamics, education, training, network building, the development of best practices, standards, accreditation and more.

### **Please indicate if you have skills shortages for the following roles/functions**

1. Do you have shortages for Analogue Electronics Design Engineering Skills?

A: Yes, No

2. How many vacancies does your Company have for Analogue Electronics Design related roles (on average per annum)?

[comment box]

3. Please give an average length of time to fill a vacancy for an Analogue Electronics Design Engineer.

[comment box]

4. Do you conduct any internal training to develop your Analogue Electronics Design Engineers?

A: Yes, No

5. Do you have shortages for Power Electronics Design Engineering Skills?

A: Yes, No

6. How many vacancies does your Company have for Power Electronics Design related roles (on average per annum)?

[comment box]

7. Please give an average length of time to fill a vacancy for a Power Electronics Design Engineer.

[comment box]

8. Do you conduct any internal training to develop your Power Electronics Design Engineers?

A: Yes, No

Contact Details

[Name]

[Telephone number]

[Company title]

[Job title]

[Address]

[Email address]