



# PRIORITIES FOR ENTRY- LEVEL DIGITAL SKILLS NEEDS IN GREATER LONDON

A report for the Mayor's Digital Talent Programme

December 2016



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## Introduction

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The Tech Partnership is delighted to be working with the Greater London Authority (GLA) to support the Mayor's Digital Talent Programme.

### The Digital Talent Programme

This Mayor's Digital Talent Programme aims to increase the number of young women, young people from Black Asian Minority Ethnic (BAME) communities and young people from disadvantaged backgrounds in jobs that require digital skills, to better prepare young Londoners for digitally-skilled occupations, and to improve the pool of talent available to employers.

The Digital Talent Programme also aims to ensure that skills provision at levels 3 and above (or equivalent) becomes more 'demand-led' by industry. This will enable young people to gain the skills needed to enter employment in the booming digital, technology and digital-creative sectors of London's economy.

The GLA has identified a number of anticipated areas of growth and skills needs in the technology, digital and digital-creative sectors. London requires a pipeline of highly-skilled talent to maintain its position as a global centre of excellence for the digital industry, specifically covering:

- Software development / engineering
- Data analytics (big data)
- Cyber security
- User experience design
- Consumer and user testing
- Product management
- Internet of Things
- Digital marketing
- Video games / VFX
- Web developers
- Financial services technology (fin tech)
- Film and TV production
- Mobile and e-commerce.

### This report

This report sets out the priorities for advanced skills provision for young Londoners in digital and related roles in Greater London.

To inform the report, the GLA commissioned a programme of desk research and consultation to define further the key areas for growth in digital, technology and digital-creative roles. The desk research is summarised in the Research Annex.

The consultation was widely distributed to employers and stakeholders with an interest in digital skills in the Greater London area. The consultation paper is included at the back of this report.

The Tech Partnership is grateful to Creative Skillset for its valuable contribution to research in relation to creative media specialists.



## Overview of priorities

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This report sets out the priorities for advanced skills provision (levels 3 and above, or equivalent) for young Londoners aged 15-24 years old in digital, technology and digital-creative roles in Greater London.

These priorities have been drawn from the findings from the desk research (set out in the Research Annex of this report) and from the consultation with employers and other key stakeholders across the Greater London area.

The report presents the requirements of the digital workforce under two headings:

- IT specialists – including 'traditional' IT specialist roles such as developers, analysts, architects and technical engineers
- Creative media specialists – including those specialist media roles requiring high levels of digital skills, such as those in film and TV production and visual effects

These two headings have been used solely because the research data on which this report is based comes from different sources for the different roles.

The implications for priorities for skills training for those entering digital occupations at levels 3 and 4 are also set out below.

### Most commonly identified needs from the research

Overall, the research demonstrates that the most commonly cited needs for IT specialists in the Greater London area are for Developers, Analysts, IT Consultants and IT Project Managers, as has been the case for the last five years.

At the same time, a number of more specialist roles have been increasing in demand, notably in areas such as Full Stack Software Solutions, Data Analytics/Big Data, Cloud Specialists and Cyber Security roles.

In the case of creative media specialists, the most common hard-to-fill vacancies are in film and TV production.

### Findings from the consultation

Based on the initial desk research a number of potential priorities were identified. These were then subject to a wide consultation among employers and other stakeholders with an interest in digital skills within the Greater London area. The consultation paper is contained in the Research Annex.

The key themes from responses to the consultation were as follows:

- Cyber and information security principles should be embedded in all areas and should also be a specialist priority area
- Games developers should be a separate strand within software and applications design and development
- The priority within digital business roles should be digital marketing
- The priority areas are broadly right, but other and/or additional typical job titles need to be included.

The priorities set out below reflect the consultation responses.



## Priorities for entry-level digital specialists

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### Software and applications design and development

The biggest single priority would appear to be software and applications design and development.

This covers the full range of skills including the analysis, design, build, test and deployment of software solutions and software based products for web, mobile and software applications.

There is strong focus on user research, user-centred service design and user experience, as well as the importance of open-source technologies. It also includes the importance of knowledge of secure development and working practices. There are two sub-sets:

- **Software Developers:** covers entry level roles such as: Junior Developers, Web Developers, Agile Software Developers, Scrum Developers, Applications Designers, Media/Multi-media Designers Dev/Opps Developers, Junior Software and Product Testers, and UI/UX Designers.

Key languages continue to be SQL, Java, Windows, JavaScript, C#, HTML and .NET, with significant growth, albeit from a low base in Python, Node.js, Ruby, Scala, Powershell and Basshell.

- **Games Developers:** covers entry level roles such as Junior Games Designers and Developers, Junior Digital Designers, Video Games/VFX Games Artists, Games Animators, Games Community Managers, Junior GUI Developers and junior roles within virtual reality and augmented reality.

The most common skillsets called for are Adobe Creative Suite, including Photoshop, Illustrator and Flash. The more specific VFX related skills include video on demand, animation, and Adobe Creative Suite's Dreamweaver, After Effects and 3D Graphics. Key languages are Unity3D, Unreal and Swift.

### Hardware, network, cloud and infrastructure

This category covers the secure implementation and administration of network systems and systems support – covering both IT and telecommunications.

It covers entry level roles such as: Helpdesk Support, Systems Support, Systems Administrators, Web Administrators, Infrastructure Technician, Network Engineers and Cloud Engineers.

Within this, the most common requirement has to date been experience of Windows and/or Linux and CISCO (CCNP/CCNA) qualifications.

### Data and big data

This category covers the secure creation and maintenance of database systems, as well as the secure management and analysis of data.

It covers junior roles such as Data Administrators, Database Administrators, Junior Data Analysts, Web Data Analysts, Data Managers and Big Data Engineers. Progression from those roles would include Data Scientists and Data Architects.

The most common requirement for database roles are the need for SQL Server skills and, to a lesser extent, MYSQL. For CRM roles, Microsoft products were the most often cited, especially MS Dynamics CRM and Oracle EBS. Others are associated with substantial growth - notably in the field of big data e.g. NoSQL, Mongo DB, Hadoop and Cassandra. There is also a need for an understanding of statistics and related analytic tools, such as R or SAS.



### Digital marketing

Within the digital business services area, the biggest single requirement is for digital marketing - including digital content creation and management, search engine optimisation, search engine marketing, digital advertising and community stimulation and management; and including secure working principles and practices.

This covers entry level roles such as Web Content Creators, Digital Marketers, SEO Copywriters, Junior Campaign Executives, Search Campaign Assistants, e-mail marketing Executives, Digital Copywriters, Paid Search Executives, Digital Account Holders, Social Media Administrators and e-commerce support roles.

The most common requirement is for Advanced MS applications, including MS Dynamics CRM, Oracle EBS, HTML and Google Analytics, as well as an understanding of the major social media platforms.

### Cyber and information security

The skills shortages in cyber security are at Level 4 and above, rather than at level 3.

The in-demand job roles at Level 4 occur broadly in two business functions:

- Roles likely to be hosted by *operational functions* or classified as operational include Security Risk Analysts, Cyber Operations Managers and Incident Response Analysts.
- Roles likely to be hosted by a *technology function* or classified as technology roles include Secure Operation Centre Analysts, Network Intrusion Analysts and Penetration Testers.

For level 4 roles, the key skills and knowledge required by those seeking to enter the profession include an understanding of the foundations of cyber security (such as basic concepts of security, identity, confidentiality, integrity, availability, threat, vulnerability, risk, hazard and how they relate to each other); the technology underpinnings (including networks and databases); the foundations of secure coding; and basic law and ethics.

### TV and film production

Jobs in film production is the largest sub-sector of all film employment, and visual effects (VFX) is of significant importance in the Greater London area. A number of roles are listed by the Migration Advisory Committee as shortage occupations with employers having to recruit from overseas. New entry level routes into these roles will help to address these skills shortages.

These entry-level roles include Junior Content Producers, Edit Assistants, Audio/Dubbing Assistants, Concept Artists, Digital Painters, Junior Animators, Production Assistants, Roto Artists, Broadcast Production Assistants, Broadcast and Communications Technicians and Junior Photographers.



## Skills needs for all entry-level roles

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Those who responded to the consultation felt it important that any training for new entrants to digital roles - irrespective of the particular role they are training for - should also include the following:

- An introduction to the digital landscape and how businesses use tech– showing the interconnectivity between different roles and progression opportunities.
- Cyber security and safe working practices.
- Support to develop working approaches that are agile, diligent, flexible and creative, and that apprentices are encouraged to develop entrepreneurial skills and the ability to respond effectively to change.

## Mapping of apprenticeship standards to the priority areas

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**Table 1** overleaf sets out the level 3-4 apprenticeship standards that match these priority areas. Note that the names of the standards are those that are approved by the DfE and the job titles are examples of the job titles used by employers.

Digital careers are suitable for young people who enjoy working with tech, who have good functional maths as well as good communication and interpersonal skills. The majority of the roles also involve working as part of a team, and/or supporting internal and external customers.

**Table 2**, also overleaf, illustrates how these digital careers can be described in language that is more attractive to young people (see also: Guide to Attracting Under-Represented Groups into Digital Apprenticeships).



*Table 1: Mapping Level 3-4 apprenticeship standards to GLA priority areas*

GLA priority area	Apprenticeship standard	Sample job titles
<b>Software developers</b>	L3 Software Development Technician L3 IT Solutions Technician (in development) L4 Software Developer L4 Software Tester	Software Technician Software Engineer Software Diagnostic Tester  Web Developer Software Developer Applications Developer  Software Tester Software Test Analyst
<b>Games developers</b>	None live at present L4 Animator (early stage development)	
<b>Hardware, network, cloud and infrastructure</b>	L3 Infrastructure Technician L3 Unified Communications Technician L3 IT Solutions Technician (in development) L4 Network Engineer L4 Unified Communications Trouble-shooter	First Line Support Help Desk Technician Network Support  Telecommunications Technician Telecommunications Operative Unified Communications Technician  Systems Engineer Network Technician Network Administrator  Voice Field Engineer Unified Communications Desk Engineer Unified Communications Field Engineer
<b>Data and big data</b>	L4 Data Analyst	Data Scientist Data Manager Data Modeler
<b>Digital marketing</b>	L3 Digital Marketer L4 Digital Marketer & Social Media Officer (early stage development)	SEO Copywriter Social Media Manager Web Content Manager
<b>Film and TV production</b>	L3 Broadcast Production Assistant L4 Junior 2D Artist – Visual Effects L4 Assistant Technical Director – Visual Effects L4 Animator (early stage development)	TV/Radio Production Assistant Production Management Assistant Broadcast Assistant  VFX Supervisor Junior 2D Artist  FX Artist Assistant Technical Director
<b>Cyber security</b>	L4 Cyber Security Technologist L4 Cyber Intrusion Analyst	Security Administrator Cyber Operations Manager Cyber Security Specialist  Network Intrusion Analyst Secure Operations Centre (SOC) Analyst Incident Response Centre (IRC) Analyst





*Table 2: Describing roles in language more attractive to young people*

GLA priority areas	Example role descriptions to appeal to young people	
		They can appeal to young people who like:
<b>Software developers</b>	These roles involve the design, testing, building and deployment of software solutions and software based products for web, mobile and applications.	<ul style="list-style-type: none"> <li>• Thinking creatively &amp; using their imagination</li> <li>• Solving problems</li> <li>• Designing things</li> <li>• Attending to detail</li> <li>• Thinking logically</li> <li>• Organising things</li> </ul>
<b>Games developers</b>	These roles involve creating and producing software within games for PCs, consoles, social and online games, arcade games, tablets, mobile phones and other handheld devices.	<ul style="list-style-type: none"> <li>• Thinking creatively &amp; using their imagination</li> <li>• Solving problems</li> <li>• Designing things</li> <li>• Attending to detail</li> <li>• Thinking logically</li> <li>• Visualising solutions</li> </ul>
<b>Hardware, network, cloud and infrastructure</b>	These roles involve designing, installing, supporting and maintaining IT and communication systems and networks.	<ul style="list-style-type: none"> <li>• Problem solving</li> <li>• Understanding how things work</li> <li>• Building and fixing things</li> <li>• Thinking logically</li> <li>• Attending to detail</li> <li>• Applying technical skills</li> </ul>
<b>Data and big data</b>	These roles involve creating and maintaining databases and managing and analysing data.	<ul style="list-style-type: none"> <li>• Analysing problems &amp; working with data</li> <li>• Planning &amp; organising things</li> <li>• Thinking and researching</li> <li>• Questioning</li> <li>• Making decisions</li> </ul>
<b>Digital marketing</b>	These roles involve exploiting a wide range of digital technologies, including social media, to deliver marketing objectives.	<ul style="list-style-type: none"> <li>• Exploring ideas &amp; using their imagination</li> <li>• Using technology</li> <li>• Designing things</li> <li>• Analysing &amp; researching</li> <li>• Organising things</li> </ul>
<b>Film and TV production</b>	These roles involve working closely with other production staff to support the smooth delivery of content for TV or film productions.	<ul style="list-style-type: none"> <li>• Creating things and exploring ideas</li> <li>• Working as part of a team</li> <li>• Decision making</li> <li>• Planning &amp; organising things</li> <li>• Using technology</li> </ul>
<b>Cyber security</b>	These roles involve tackling computer based crime through digital knowledge and interpretation skills.	<ul style="list-style-type: none"> <li>• Problem solving &amp; thinking logically</li> <li>• Attending to detail</li> <li>• Applying technical skills</li> <li>• Asking questions &amp; being inquisitive</li> <li>• Working persistently until a solution is found</li> </ul>



## RESEARCH ANNEX

This annex provides an overview of some key labour market intelligence for the Greater London area.

It is divided into two sections, as the intelligence has been drawn from different sources:

- IT specialists – including developers, analysts, architects and technical engineers
- Creative media specialists – including film and TV production and visual effects.

### IT specialists

This section is intended not as an authoritative analysis but an overview of certain key aspects of the local market for IT labour and skills/related issues.

#### Sources

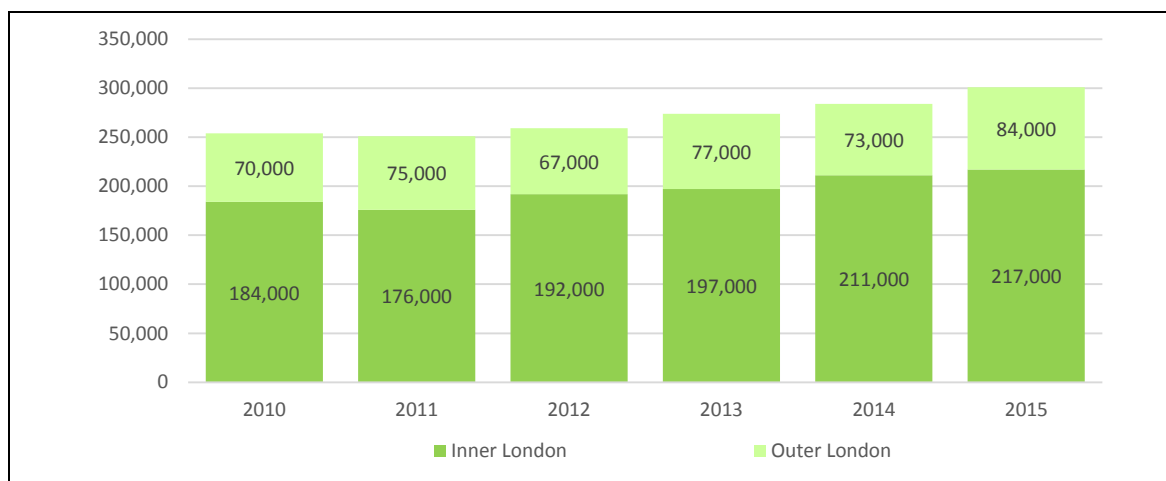
This section uses data sourced from:

- ONS Annual Population Survey special license data sets (population / workforce / 'ready candidates')
- ITJobswatch bespoke data on market demand
- DfE revised GCE attainment figures
- Experian / Tech Partnership forecasts
- BEIS / SFA apprenticeships data
- HESA HE qualifiers data.

#### IT specialists in the Greater London area

In 2015, London was home to 8.5 million people (13% of the UK total) and the place of work for 4.9 million (16%). Of those working in London, 300,000 held IT specialist positions (23% of the UK total), primarily based within Inner London (72% of London IT specialists) and the City in particular - this borough accounting for 27% of all IT specialists working in the capital in 2015.

*Figure 1: IT specialists working inner/outer London, 2010-2015*

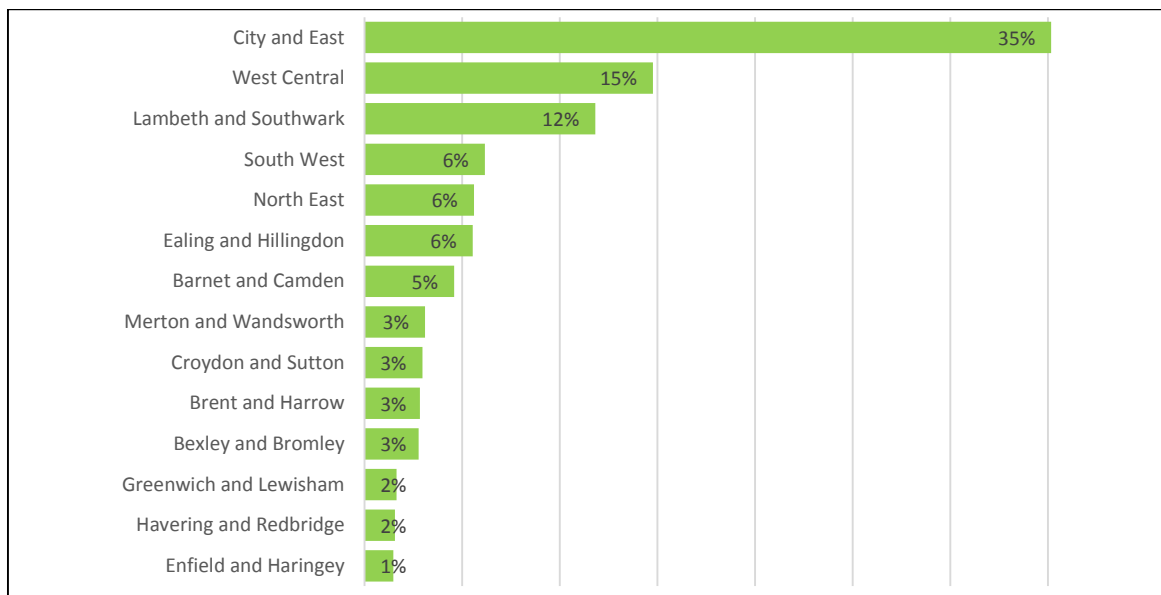


Source: ONS Annual Population Survey (APS) data analysed by the Tech Partnership



Other areas with notably large concentrations of IT specialists were Westminster (11%), Southwark (9%) and Tower Hamlets (7%).

*Figure 2: IT specialists by area of work, 2015*



*Source: ONS Annual Population Survey (APS) data analysed by the Tech Partnership*

IT specialists covers the following types of occupation:

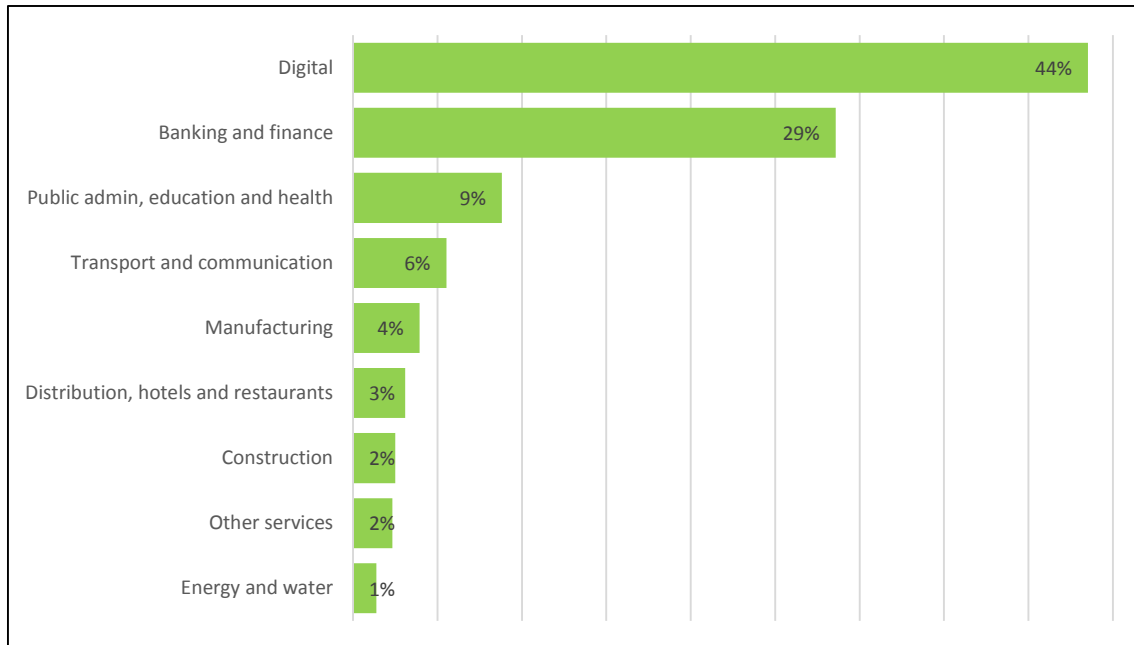
Job type	Job title
<b>Management</b>	Directors Specialist managers Project/programme managers
<b>Design / development</b>	Business Analysts, Architects & System Designers Programmers/Software Developers Web Designers/Developers
<b>Support</b>	IT Operations Technicians IT User Support Technicians Telecoms Engineers IT Engineers
<b>Others</b>	Other IT specialists



### IT specialists by industry of work

As in the rest of the UK just over half (56%) of IT specialists in London were found to be working in companies outside of the digital sector itself - notably banking and finance firms, which provided work for 29% of IT specialists in the GLA area in 2015:

*Figure 3: IT specialists by industry, 2015*

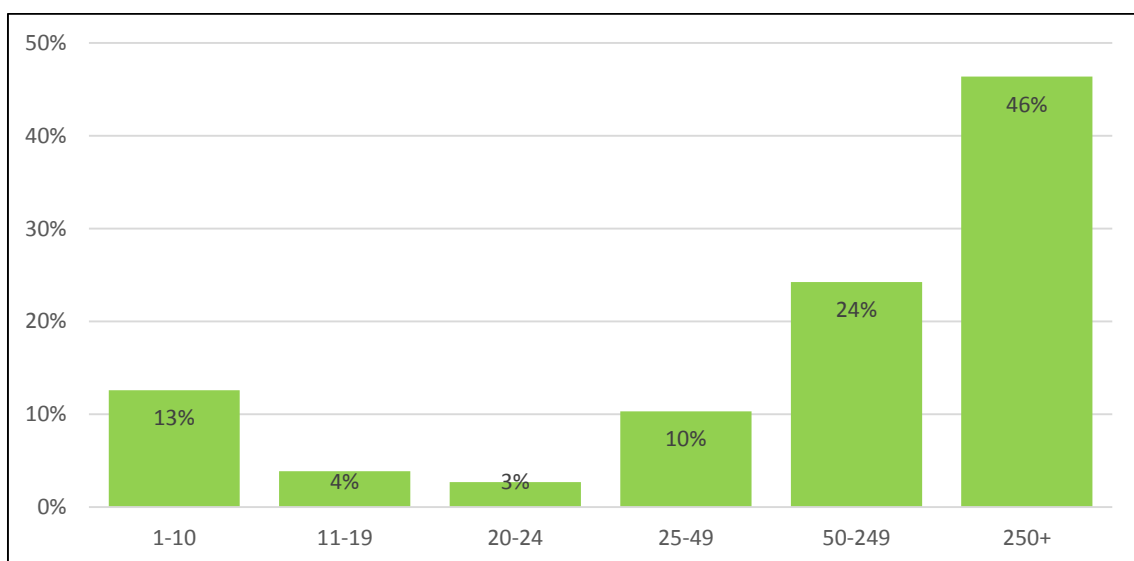


Source: ONS Annual Population Survey (APS) data analysed by the Tech Partnership

### IT specialists by size of employer

Among IT specialists working as employees, 54% were working in MSMEs (Micro, Small and Medium Enterprises) and 13% in micro businesses (those with 1-10 employees).

*Figure 4: IT specialists (employees) by employer size, 2015*



Source: ONS Annual Population Survey (APS) data analysed by the Tech Partnership



### IT specialists by occupation

Analysis by occupation shows 34% of IT specialists in London were working in design / development roles, 30% were managers (including project/programme managers), 17% were support staff and 19% were working in 'other' positions.

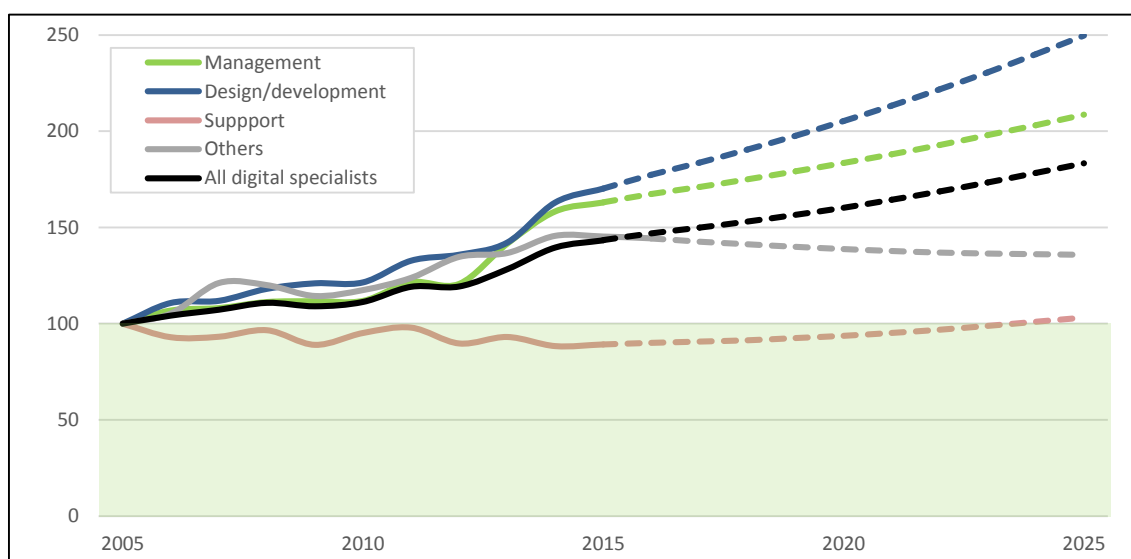
*Table 1: IT specialists by occupation, 2015*

<b>Management</b>	Directors	22,000	7%
	Specialist managers	47,000	16%
	Project/programme managers	20,000	7%
<b>Design / development</b>	Business Analysts, Architects & System Designers	26,000	9%
	Programmers/Software Developers	65,000	22%
	Web Designers / Developers	12,000	4%
<b>Support</b>	IT Operations Technicians	21,000	7%
	IT User Support Technicians	14,000	5%
	Telecoms Engineers	9,000	3%
	IT Engineers	7,000	2%
<b>Others</b>	Other IT specialists	57,000	19%
	All IT specialists	300,000	100%

*Source: ONS Annual Population Survey (APS) data analysed by the Tech Partnership*

Design / development has been the main growth area for digital employment over the previous ten years, with the number of workers holding such positions rising by 70%, compared to 43% for IT specialists as a whole. It is anticipated that this trend will continue over the next decade, with forecast increases of 47% and 28% respectively for designers / developers versus IT specialists in general.

*Figure 5: IT specialists in London (indexed), 2005-2025*





Source: Experian / Tech Partnership

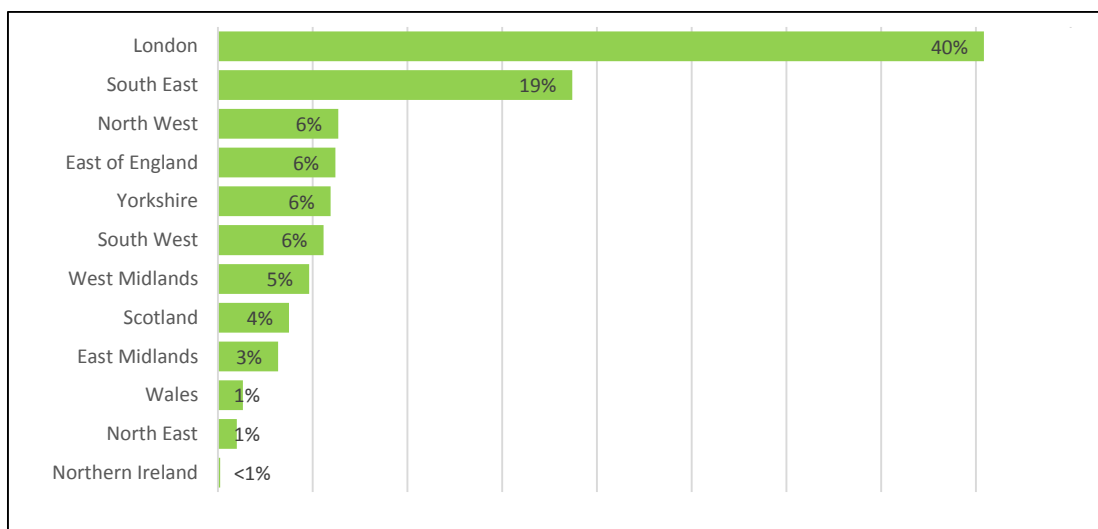
## Demand for IT specialists

### Current demand volumes

Recorded demand for IT specialists in London (as measured by advertised vacancies for staff) during 2015 was 66,000 openings per quarter on average.

London accounted for 40% of all adverts for IT specialists in the UK over the course of the year.

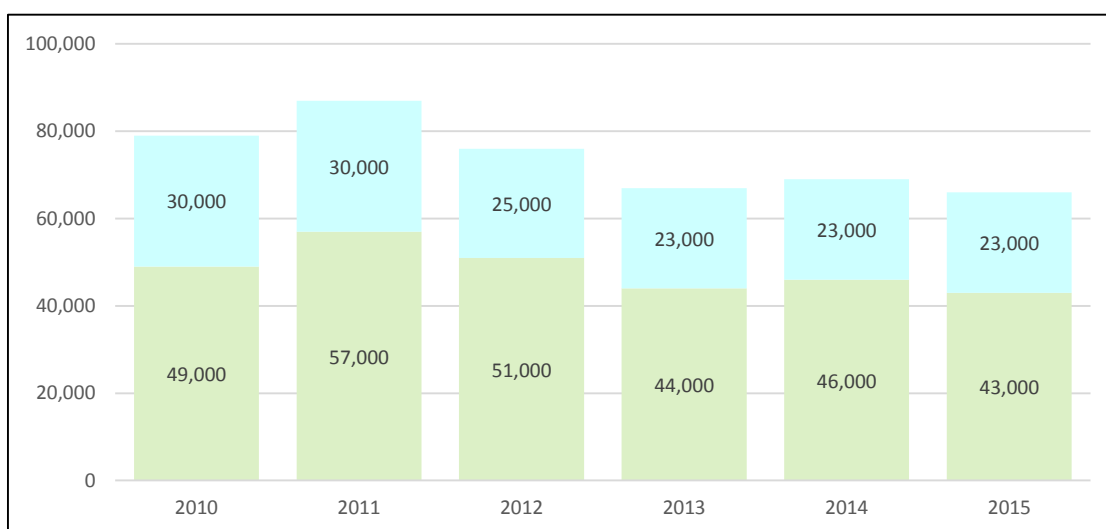
**Figure 6: Demand for IT specialists by region, 2015**



Source: ITJobswatch data analysed by the Tech Partnership

As in the rest of the UK, the majority of adverts for IT specialists in London were for permanent, as opposed to contract positions (66% in London), and this has been the case throughout the past ten years.

**Figure 7: Demand (vacancies) for IT specialists in London, 2010-15**



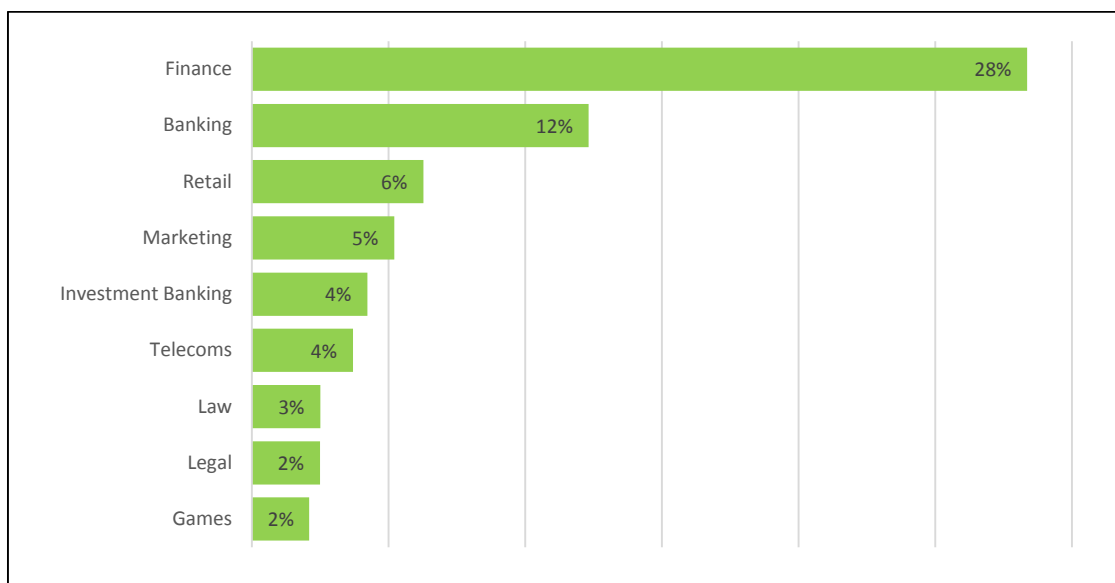
Source: ITJobswatch data analysed by the Tech Partnership



### Demand by sector

In terms of vacancies, a significant proportion of digital vacancies are within the finance/banking sector as illustrated below:

**Figure 8: Demand (vacancies) for IT specialists in London by sector, 2015**



Source: IT Jobswatch data analysed by the Tech Partnership

### Demand by role

The role most often cited in adverts for IT specialists in London during 2015 was developer (appearing in 28% of all job adverts), followed by Analyst (17%), Architect (7%), Consultant (6%) and Project Manager (also 6%). Again, this has been the case throughout recent years.

**Table 2: Top ten digital roles in demand by London employers, 2010-15**

	2010	2014	2015	Change	
				2010-15	2014-15
Developer	24,400	19,700	18,800	-23%	-5%
Analyst	15,900	11,600	11,000	-30%	-5%
Consultant	5,500	5,000	4,300	-22%	-14%
Project Manager	5,200	4,400	4,100	-21%	-6%
Architect	4,000	4,200	4,100	1%	-3%
Administrator	1,800	1,900	1,700	-5%	-8%
IT Manager	900	1,100	1,100	22%	-1%
Designer	1,000	1,300	1,000	-2%	-23%
<b>All vacancies</b>	<b>78,300</b>	<b>69,400</b>	<b>65,900</b>	<b>-16%</b>	<b>-5%</b>

Source: IT Jobswatch data analysed by the Tech Partnership

Whilst the broad digital roles required by employers have not changed (i.e. demand volumes have changed but the top roles remain the same), a number of more specialist roles have been increasingly in demand.



Over the previous year, the largest levels of growth (tech/vendor neutral) were observed for: Senior Full Stack Developers, Full Stack Developers, Cloud Consultants, Cloud Solutions Architects, Senior Data Scientists and Continuous Deployment Engineers - each associated with annual growth in demand of over 100%.

**Table 3: Main changes in demand (vacancies) for IT specialists in London, by sub-role**

Vacancies	Change		Vacancies	Change	
	2015	2010-15		2015	2014-15
Data Scientist	300	59350%	Senior Full Stack Developer	100	304%
DevOps Administrator	100	6980%	Full Stack Developer	400	240%
Developer in Test	200	5623%	Cloud Consultant	100	120%
Continuous Deployment Engineer	100	5189%	Cloud Solutions Architect	100	117%
Digital Solutions Architect	100	4071%	Senior Data Scientist	100	114%
Agile Delivery Manager	100	1600%	Continuous Deployment Engineer	100	101%
Cloud Engineer	200	1444%	Cloud Architect	200	81%
Cloud Architect	200	1317%	Information Security Manager	100	77%
Product Owner	200	1251%	Integration Architect	100	76%
Cloud Solutions Architect	100	1241%	Data Scientist	300	69%
<b>All vacancies</b>	<b>65,900</b>	<b>-16%</b>	<b>All vacancies</b>	<b>65,900</b>	<b>-5%</b>

*Source: ITJobswatch data analysed by the Tech Partnership*

### **Demand by skillset**

Advertisements for IT specialist positions commonly incorporate a requirement for both Process/methodological knowledge and skills (i.e. 'generic' IT specialist skills) and more specific 'tools' (programming languages, applications etc.). Looking at each of these areas in turn:

#### **Process / methodological knowledge and skills**

The most common process / methodological skills requirements for IT specialist roles in London over the past year were: Agile Software Development - 24% of adverts, Project Management - 9%, Test Driven Development (TDD) - 9%, Analytical Skills - 8% and Scrum - 8%.

These 'generic' IT specialists' skills were also amongst the most commonly requested among adverts for IT specialists more generally in the UK; this has been the case for the past 5 years.





**Table 4: Top ten IT specialist 'process skills' demanded by London employers, 2010-15**

	2010	2014	2015	Change	
				2010-15	2014-15
Agile Software Development	9,900	15,000	15,700	58%	5%
Project Management	7,400	6,600	6,000	-19%	-8%
Test Driven Development (TDD)	2,700	5,500	5,700	107%	4%
Analytical Skills	5,000	5,500	5,400	10%	-1%
Scrum	3,300	5,300	5,200	58%	-2%
E-Commerce	4,100	5,000	4,300	4%	-14%
Stakeholder Management	2,200	3,700	4,100	86%	12%
Business Intelligence	3,200	3,900	4,000	26%	2%
Object Oriented (OO)	5,300	4,700	3,800	-28%	-19%
Analytics	2,100	3,200	3,600	71%	11%
<b>All vacancies</b>	<b>78,300</b>	<b>69,400</b>	<b>65,900</b>	<b>-16%</b>	<b>-5%</b>

*Source: ITJobswatch data analysed by the Tech Partnership*

Over the 2010-15 period, demand increases were observed for most of these skills (bar Project Management / Object Oriented skills which were associated with falls in demand volume of 19% and 28% respectively). In the case of Test Driven Development, an increase of 107% was recorded over this period. During the past year however, demand increases were only observed for Stakeholder Management (up 12%), Analytics (11%), Agile (5%), TDD (4%) and Business Intelligence (2%).

Compared with these relatively meagre demand increases, much greater changes were recorded for a number of emerging or specialist skillsets - often in the general areas of Analytics / Big Data, Cyber security and Cloud Computing:

**Table 5: Largest demand increases for IT specialist process skills in London, 2010-15**

Vacancies	2015	Change 2010-15	Vacancies	2015	Change 2014-15
Continuous Delivery	800	81725%	Code First Entity Framework	100	264%
Cybersecurity	500	23863%	Ticket Management	100	220%
DevOps	2,200	18809%	Internet of Things	100	209%
Continuous Deployment	300	8762%	Cyberthreat	100	197%
Internet of Things	100	5075%	Data Engineering	100	148%
Disruptive Innovation	100	4400%	Security Operations Centre	100	135%
API Testing	100	2133%	Cybersecurity	500	126%
Mobile Device Management	100	1990%	Semantic Web	100	123%
Private Cloud	100	1200%	Multi-Factor Authentication	100	115%
<b>All vacancies</b>	<b>65,900</b>	<b>-16%</b>	<b>All vacancies</b>	<b>65,900</b>	<b>-5%</b>

*Source: ITJobswatch data analysed by the Tech Partnership*



### Tools for IT specialists

The most common 'tool' cited in adverts for IT specialist jobs in London in 2015 was SQL which featured in 19% of advertised vacancies. This was followed by Java (16%), Windows (14%), JavaScript (13%) and SQL Server (12%).

As with titles and process/methodological skills, the top specialist tools demanded by employers have changed little over the past 5 years.

**Table 6: Top ten IT specialist 'tools' demanded by London employers, 2010-15**

				Change	
	2010	2014	2015	2010-15	2014-15
SQL	16,000	13,500	12,700	-20%	-6%
Java	14,400	10,600	10,300	-29%	-3%
Windows	9,000	9,800	9,000	-	-8%
JavaScript	5,500	8,800	8,700	59%	-
SQL Server	10,100	8,800	8,000	-21%	-10%
HTML	6,100	8,800	7,900	28%	-11%
C#	11,900	8,200	7,400	-38%	-9%
.NET	11,400	8,200	7,300	-36%	-11%
Linux	6,700	7,000	6,800	1%	-2%
CSS	4,700	7,200	6,300	36%	-11%
<b>All vacancies</b>	<b>78,300</b>	<b>69,400</b>	<b>65,900</b>	<b>-16%</b>	<b>-5%</b>

*Source: ITJobswatch data analysed by the Tech Partnership*

As illustrated in the table above, an increase in demand was recorded for just four of these tools over the 2010-15 period whilst all were associated with a demand fall over the past year. By contrast, the number of adverts citing Node.js has risen by 338,000% over the past five years and Windows 10 by 23,000% over the past year alone (albeit from a low base).

**Table 7: Largest demand increases for IT specialist 'tools' in London, 2010-15**

Vacancies	Change		Vacancies	Change	
	2015	2010-15		2015	2014-15
Node.js	1,700	338200%	Windows 10	100	23200%
Dodd-Frank	200	75200%	React	500	1498%
SpecFlow	400	70250%	ES6	100	1456%
Neo4j	200	60400%	Mesos	100	976%
Gradle	200	49200%	Docker	500	870%
Amazon RDS	100	33100%	Spring Boot	100	666%
Heroku	100	32900%	Apple Swift	200	565%
Mocha	100	25900%	gulp	200	491%
Bitbucket	100	25300%	MuleSoft	100	464%
Gerrit	100	22300%	Apache Spark	400	406%
<b>All vacancies</b>	<b>65,900</b>	<b>-16%</b>	<b>All vacancies</b>	<b>65,900</b>	<b>-5%</b>

*Source: ITJobswatch data analysed by the Tech Partnership*



### Other specialist skillsets

Today's IT specialist will typically need to deal with a vast array of very specialist skills and digital systems; as an indicator, ITJobswatch tracks more than 5,000 available roles in real time each day.

As such it is impossible to cover every aspect of the digital skills market in depth. However, we have set out the key skills and related demand developments associated with a number of specific skill / work areas:

- **Qualifications / certifications** - a degree was the most commonly requested qualification (explicitly mentioned in 12% of adverts in 2015, and implicit in many more). After this, certification requirements were predominantly focused upon security clearance and /or related qualifications. Microsoft and Cisco certifications were also common however and in particular CCNP/CCNA awards.
- **Operating systems** - by far the most common requirement in 2015 was for experience of Windows and/or Linux (featured in 14% and 10% respectively of all London adverts) whilst Unix was cited in just 6% of adverts and Android/iOS within 3% in each case. Also of note is the fact that whilst Windows and Linux have appeared in an increasing proportion of job adverts over the past five years, demand for Unix, proportionally has fallen significantly.
- **Programming languages** - the five top programming languages were; SQL, Java, JavaScript, C# (all appearing in over 10% of advertised vacancies) and Python (6%). Python is one of a number of programming languages that have grown significantly in 'popularity' in recent years - notable others being Ruby, Scala, Powershell, Bashshell in particular (all associated with demand increases of over 100% between 2010-15). By contrast demand for SQL, Java and C# have all been in decline (as a proportion of all London based adverts for IT specialists) as has been the case for C++, C, Perl and VBA - each of which has historically been a high demand language.
- **Applications** - MS applications are those most often featured in adverts for IT specialists - MS Excel and PowerPoint in particular (in 7% and 4% respectively of all job adverts). Moreover, the proportion of adverts citing a requirement for skills of this nature has been increasing (though marginally) over the past five years. Photoshop was the only non-MS application to register in the top five during 2015 and appeared in 1% of adverts for tech specialists.
- **Business Applications** - again Microsoft products were the most often cited, especially MS Dynamics CRM (in 3% of advertised positions). The second most requested Business Application was Oracle EBS (2%).
- **Database/Analytics** - by far the most common requirement in this area was the need for SQL Server skills (12% of adverts) and SQL Server appeared in three times as many adverts for IT specialists as the second most common database requirement - MYSQL. In both cases though the proportion of adverts citing a need for these skills has remained static in recent years whilst many others are associated with substantial growth - notably in the field of big data e.g. NoSQL, Mongo DB, Hadoop and Cassandra for example.
- **Libraries, frameworks and software standards** - HTML and .NET are the most cited skills requirement under this category and have been throughout the past 5 years. The proportion of ads calling for .NET has been in decline however (down from 15% to 11% between 2010 and 2015) whilst other skills have grown at a rapid



rate - notably in this case - AngularJS, NodeJS, Spring, Rest and JSON (all associated with demand increases of over 300%).

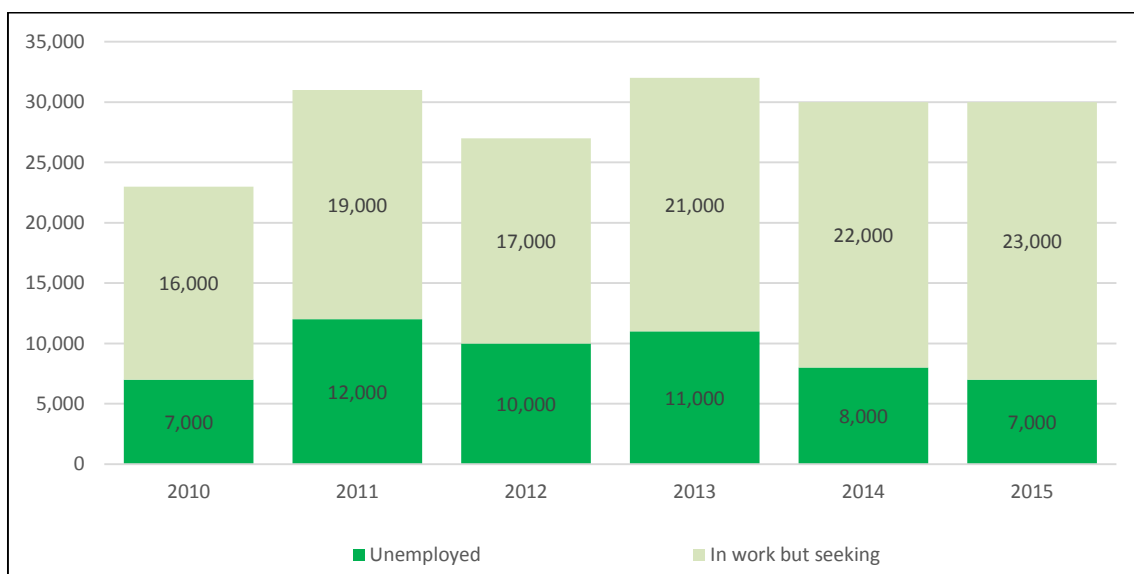
- **Cloud services** - Amazon AWS and Microsoft Azure were the cloud services skills most often required by recruiters of IT specialists in London in 2015 and in both cases demand has risen by over 2000% in the past five years. In the last year alone demand for these skills grew by 74% and 36% respectively though the highest annual growth rate in this field was associated with Google Cloud Platform (up by 130% between 2014 and 2015).
- **Games, Vfx and related** - there were 1,380 vacancies for IT specialists citing a requirement for 'games' skills in 2015, and the most common related skillsets called for were Photoshop (690), Illustrator (370), Flash (220) and Adobe Creative Suite (210). More specific Vfx/related skills included video on demand (130), animation (110), Dreamweaver (60), After Effects (50) and 3D Graphics (50).
- The most common job title cited in related adverts was Game Developer (140) followed by Digital Designer (110), Graphic Designer (50) and Java Games Developer (40). There were also a substantial number of adverts for Front End Developers (200), GUI Developers (70) and other UX positions over the course of the year.

### The talent pipeline

Whilst there were 66,000 advertised vacancies for IT specialists in London in each quarter of 2015, there was a much lower number of potential or 'ready' candidates to take up these positions, in fact only around one half the number required i.e.

- During each quarter of 2015 there were on average 23,000 IT specialists looking for a new/additional job (8% of the total).
- There were approximately 7,000 unemployed IT specialists living in London during this period.

*Figure 9: Ready candidates for IT specialist positions in London, 2010-15*



Source: ONS Annual Population Survey (APS) data analysed by the Tech Partnership



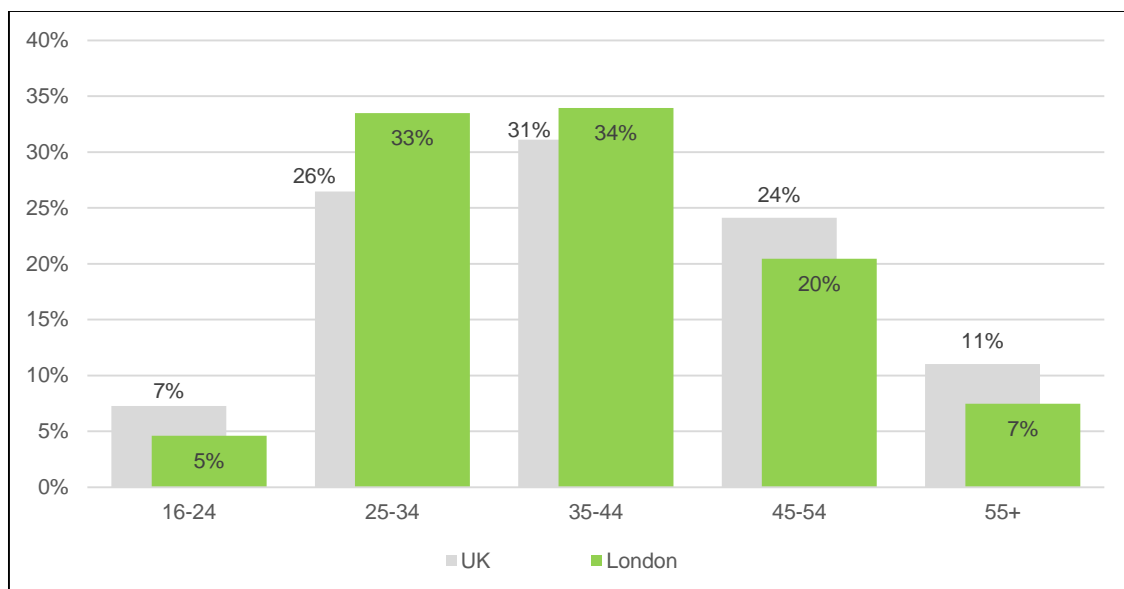
There are, of course, other sources of labour and skills aside from those that already have experience working in IT specialist positions (i.e. in work job seekers or out of work IT specialists) and the next key source for employers is new entrants to the labour market coming from the education system – Higher Education (HE), Further Education (FE), or direct from school.

## Young entrants

### Overview

Approximately 5% of IT specialists (14,000 people) working in London in 2015 were aged 16-24. Of these 'young entrants', circa 90% were aged 20-24 (based on a 5-year average over 2010-15, due to the small sample). As illustrated in the chart below, the proportion of young entrants to IT specialist positions was slightly lower within the London area than that for the UK as a whole.

**Figure 10: Age distribution for IT specialists in London / the UK, 2015**



Source: ONS Annual Population Survey (APS) data analysed by the Tech Partnership

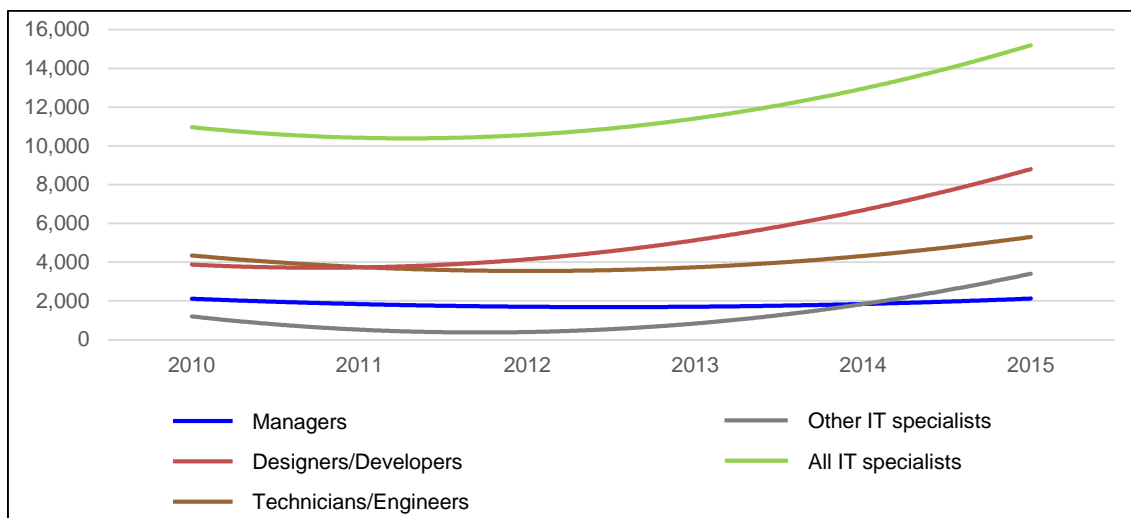
Among young entrants working as IT specialists in the capital during 2015, the majority were in design/ development jobs (38%) or working in support/engineer positions (35%). Hence, the proportion in design / development was much the same as for IT specialists as a whole in London (i.e. all ages) whilst the proportion working in support positions was more than double that for IT specialists as a whole, illustrating the importance of such positions to those seeking to commence their career in this field.

### Workforce trends for young entrants working as IT specialists

Over the past five years the proportion of IT specialists aged 16-24 has increased both within London and the UK as a whole, though in London growth was half that recorded for the UK (i.e. increases of 2 and 1 percentage points, respectively). As illustrated in the following chart, growth in young entrant numbers for IT specialist positions has been greatest for support (technician/engineer), development positions and to a lesser extent 'other' digital roles.



Figure 11: IT specialists aged 16-24 (trend lines) in London 2010-15

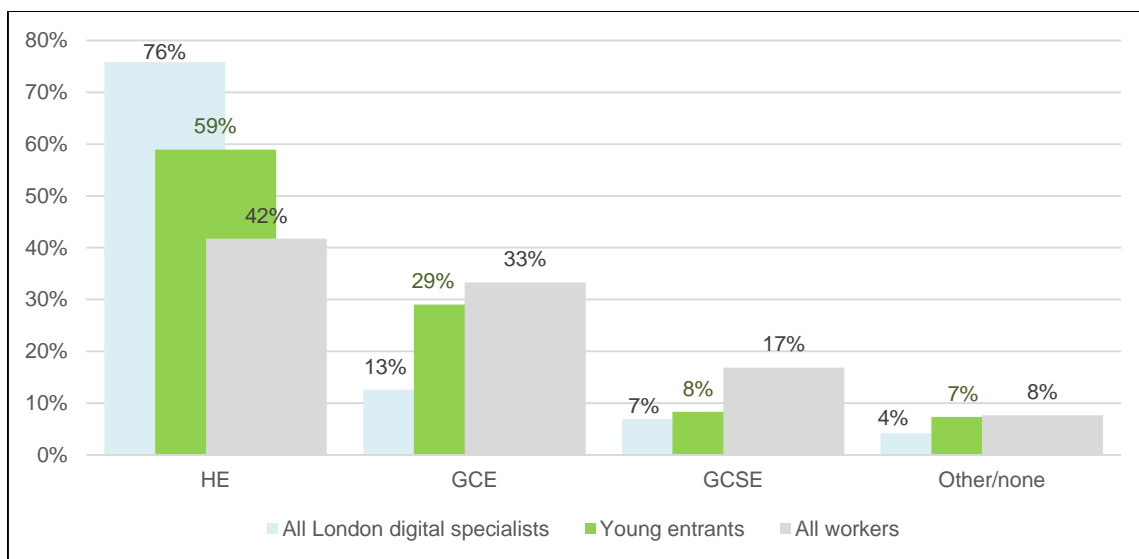


Source: ONS Annual Population Survey data, interpreted by the Tech Partnership

### Skill levels for young entrants working as IT specialists

As with London-based IT specialists generally, new entrants to digital careers tended to be educated to HE level; though to a lesser extent than the norm for IT specialists, a much greater proportion were qualified at this level than was the case for London workers more widely.

Figure 12: Highest qualification amongst IT specialists in London, 2015<sup>1</sup>



Source: ONS Annual Population Survey (APS) data analysed by the Tech Partnership

What is interesting from this chart is the relative concentrations of new entrants at the respective levels, illustrating the importance of these groups as potential sources of new entrants for London recruiters of IT specialists.

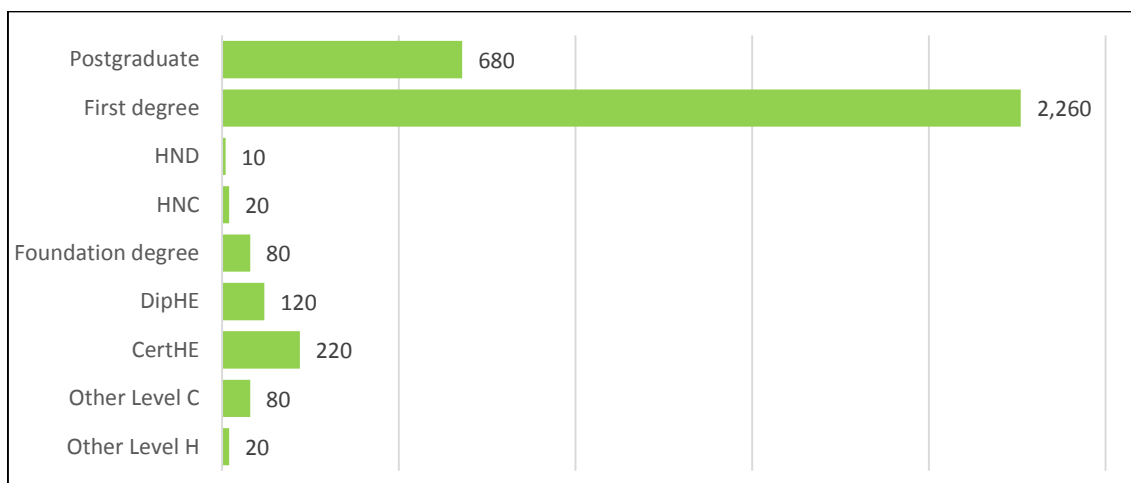
<sup>1</sup> Young entrant figure shown is a 2010-15 average



**HE qualifiers in London**

In 2015, there were 3,500 students graduates from HE institutions (HEIs) in London from Computer Science courses of which 85% had graduated at first degree/post-graduate level. In total, London accounted for 19% of all HE qualifiers in Computer Science from UK higher education institutions (HEIs) and 25% of those achieving a postgraduate award. The proportion of first degree qualifiers coming from London HEIs was slightly lower however at 17%.

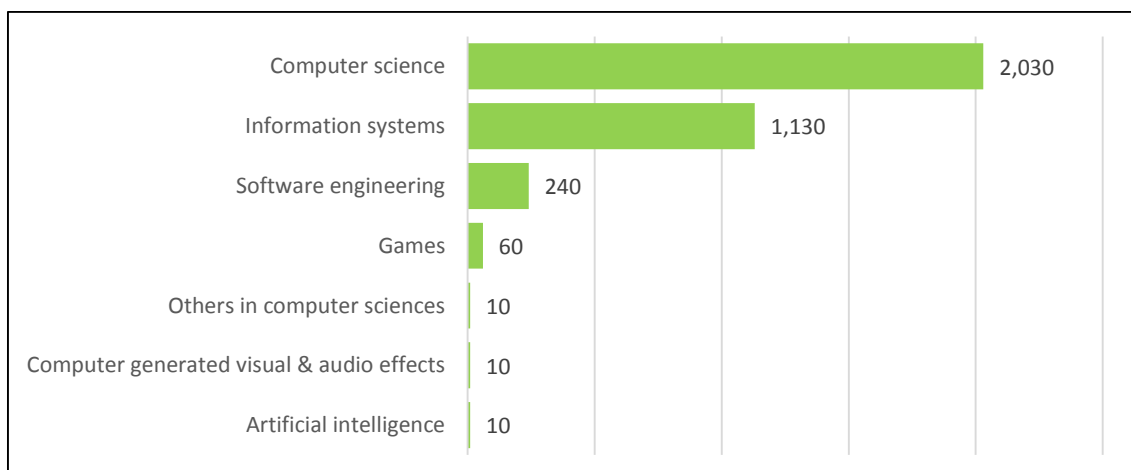
*Figure 13: IT qualifiers from London HE institutions by course type, 204/15*



*Source: HESA data analysed by the Tech Partnership*

The ‘principal subject of study’ (i.e. subject group) for HE qualifiers in Computer Science from London/UK HEIs was ‘straight’ Computer Science - taken by 58% of qualifiers followed by Information Systems (32%), Software Engineering (7%) and Games (2%).

*Figure 14: IT qualifiers from London HE institutions by subject, 204/15*



*Source: HESA data analysed by the Tech Partnership*

Further analysis of these categories is restricted due to the small number of qualifiers; however, the most notable ‘sub-streams’ were multi-media computing (part of Computer Science) - 8%; Networks & communications (also part of Computer Science) - 5%; Computer games design

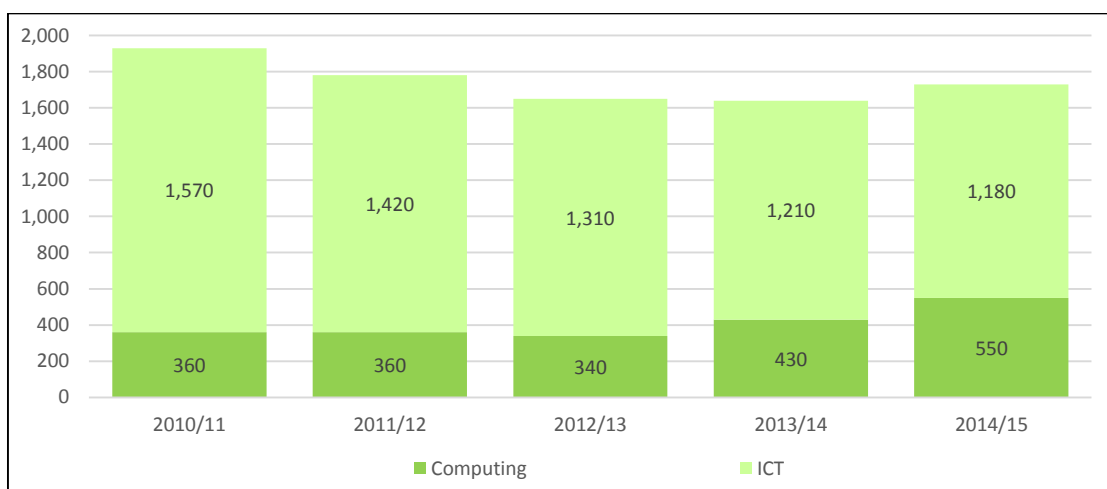


(Games) - 1%; Systems auditing (Information Systems) - 1%; Human-computer interaction (Computer Science) - 1% and, Systems analysis & design (Information Systems) - 1%.

### GCE (A-level) qualifiers in London

In 2015 there were 1,720 GCE (A-level) awards in Computing/ICT gained by students across the London area. Of these, the majority (76%) were achieved by students in outer London and in particular, Redbridge (10%), Bromley (8%), Bexley (7%) and Croydon (6% in each case). These areas were also associated with a higher concentration of computing/ICT study and in the case of Croydon and Bexley the proportion of GCE awards for Computing/ICT was more than double the national average (3.3% in each case compared with a national figure of 1.5%).

**Figure 15: London GCE awards (A-E) in Computing/ICT, 2010/11-14/15**



Source: DfE data analysed by the Tech Partnership

By comparison the number of London students gaining a GCE in media/film/television studies was much higher during 2014/15 at 3,250 awards (grades A-E). Again, the majority of awards were obtained by students from outer London (66%) though in this case the largest proportion of awards were obtained by those studying in Bromley (8%), Lewisham (6%), Redbridge (6%) and Waltham Forest (5%).

### GCSE qualifiers in London

There is no known ready source of data identifying the number of students achieving GCSEs in Computing/ICT in London however steps have been taken to secure an appropriate extract from the National Pupil Database (NPD) which provides the required information down to individual authority level.

### Apprenticeships in Greater London

Apprentices are an increasingly important source of new talent, given that apprenticeship frameworks are now available at intermediate, advanced and higher levels and focus on the full range of IT specialisms i.e. Cyber Security, Data Analysis, Digital Marketing, Infrastructure, Technical Sales, Networking, Software Development and Unified Communications (in addition to IT User programmes). These represent each of the growth areas for IT specialist employment, along with key entry roles for young people starting a career in this field.

During the course of 2015 there 3,300 participants on IT apprenticeships in London, 1,900 starts and 1,000 achievements. Participant/achievement figures are not available for constituent

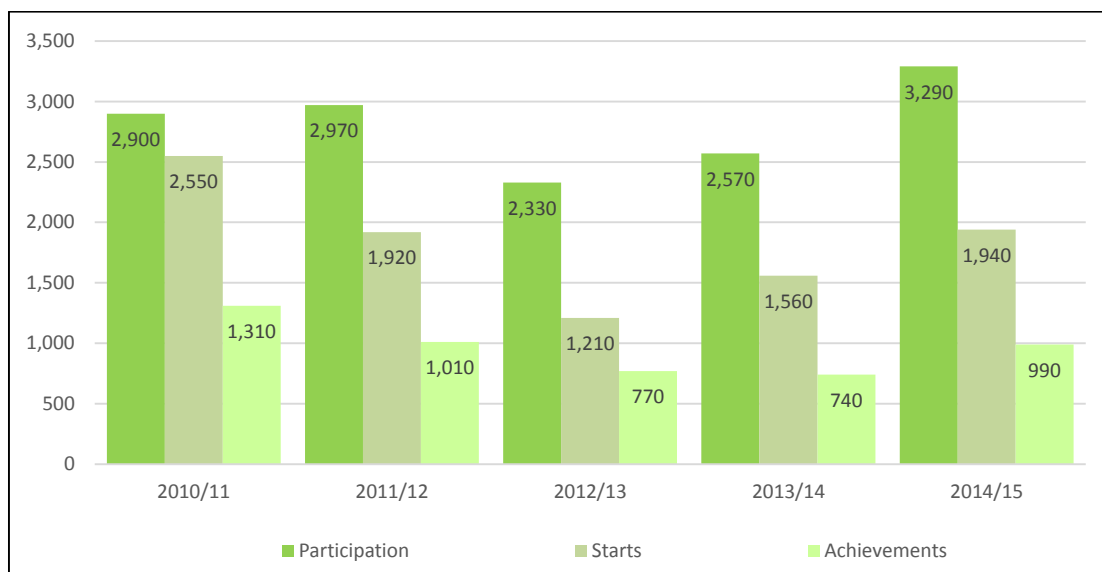




districts; however, an analysis of starts data shows that whilst 64% of IT starts were in outer London, Newham and Tower Hamlets were the individual authorities accounting for the largest proportion of IT starters (9% and 5% respectively of the London total).

Together with Harrow, Newham was also noted as having the highest proportion of starts that were IT (7% in each case) and in both instances the prevalence of IT apprenticeships was more than double the level recorded for England as a whole (3% of starts).

**Figure 16: IT apprenticeships in London 2010/11-14/15**



Source: SFA data analysed by the Tech Partnership

After Harrow and Newham, Redbridge and Tower Hamlets were the authorities exhibiting the next highest concentrations of IT apprenticeships with levels double the England average (i.e. 6% in each case).

## Creative media specialists

### Sources

- ONS: GDP Preliminary estimate quarter 3, 2015
- Olsberg-SPI: Economic contribution of the UK's Film, High-end TV, Video Game and Animation Programming sectors, 2015
- UKCES Working Futures, 2014
- Creative Skillset film employer panel, 2014
- Creative Skillset skills flash
- Creative Skillset Media Workforce Survey, 2014
- Creative Skillset Creative Media Workforce Survey, 2014
- MAC Shortage Occupation List for the UK and Scotland, Feb 2013



### **Creative media specialists in the Greater London area**

The UK's screen industries are one of the fastest growing sectors in the UK economy: in the third quarter of 2016, film and TV production grew by over 16%, while the economy overall grew by 0.5%

Building on the success in film, new creative sector tax credits for high-end TV, animation and games were introduced in 2013 and have led to rapid growth in production levels with an associated demand for skills – from new entrants to senior executives.

The UK is now second to Hollywood as a screen production centre. Total UK film production activity in 2015 was £1.4 billion, the second highest total since records began. Inward investment for film alone (from the US studios), largely driven by the tax reliefs, and the strength of UK infrastructure and our skills base now runs at over £1.1 billion p.a. - double the level of a decade ago. Total value of high end television production and animation in 2015 was £788m.

Film employs 66,000 people. The largest sub-sector, production, is largely focused around London and the South East where 65% of the workforce is based.

High-end TV additionally supported 16,800 full-time equivalent jobs.

Visual effects (VFX) is even more heavily focused in London, with all the large employers based in central London.

Across the creative and IT sectors, it is predicted that a further 1.2m workers will be required over 2012-22.

### **Qualifications**

78% of the creative media workforce are educated to degree level and is more than double the 32% in the wider UK working population. 51% of those educated to degree level hold a creative / media degree. 27% of the creative media workforce hold a postgraduate qualification.



## Demand for creative media specialists

The following table sets out hard-to-fill digital vacancies in the screen sector:

<b>Production</b>	<ul style="list-style-type: none"><li>• Programming</li><li>• Digital Imaging Technicians (DITs)</li><li>• Editors</li></ul>
<b>Post-Production</b>	<ul style="list-style-type: none"><li>• Pre-visualisation</li><li>• Computer Animators</li><li>• Mixers and Recordists</li><li>• 3DS Software Skills</li><li>• Editors</li></ul>
<b>VFX</b>	<ul style="list-style-type: none"><li>• Compositors</li><li>• Creature Effects</li><li>• Riggers</li></ul>
<b>Distribution</b>	<ul style="list-style-type: none"><li>• Discoverability</li></ul>
<b>Exhibition</b>	<ul style="list-style-type: none"><li>• Digital Marketing</li></ul>

A number of job titles within visual effects and 2D / 3D computer animation for film, TV and video games are currently on the Migration Advisory Committee (MAC) shortage occupation list.

UK Screen Association (UK Screen), the Association for UK Interactive Entertainment (Ukie), the Producers Alliance for Cinema and Television (PACT) and Ubisoft Reflections submitted evidence to the MAC that the industry has problems recruiting for these roles from within the UK and therefore has to recruit overseas.

The job titles include:

- Shader writer
- Animator
- 2d supervisor
- 3d supervisor
- Computer graphics supervisor
- Producer
- Production manager
- Technical director
- Visual effects supervisor
- Compositing artist
- Matte painter
- Modeller
- Rigger
- Stereo artist
- Texture artist

## Conclusions

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The conclusions in relation to priorities for entry-level digital skills in Greater London, based on the research and the consultation, are set out in the main part of this report.



## THE CONSULTATION PAPER

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### **THE MAYOR'S DIGITAL TALENT PROGRAMME: CONSULTATION ON DIGITAL SKILLS NEEDS ACROSS GREATER LONDON: YOUR CHANCE TO COMMENT**

The Tech Partnership is delighted to be working with the Greater London Authority (GLA) to support the Mayor's Digital Talent Programme, which aims to increase the number of women and young people from Black Asian Minority Ethnic (BAME) and disadvantaged backgrounds in jobs that require digital skills, to better prepare young Londoners for digitally-skilled occupations, and to improve the pool of talent available to employers.

The first part of this project involves us identifying the key areas for growth in digital, technology and digital-creative roles to inform the priorities for advanced skills provision (levels 3 and above, or equivalent) for young Londoners aged 15-24 years old.

This paper sets out some initial conclusions for these priority areas based on desk based research.

If you have an interest in developing the digital talent within the Greater London Area, then we would welcome your comments on the priority areas.

### **PROPOSED PRIORITY AREAS**

The annex to this paper provides a summary of the key findings from desk research on some key labour market indicators. The implications of the above in terms of priorities for advanced skills training (levels 3 and above, or equivalent) for young Londoners would appear to be:

#### **Software and Applications Design and Development**

The biggest single priority would appear to be software and applications design and development. This covers the full range of skills including design, build, test and deployment of software solutions and software based products for web, mobile and software applications – including for games and, fin tech products.

This would cover entry level roles such as: Junior Developers, Web Developers, Games Designers, Video Games/VFX, Agile Software Developers, Scrum Developers, Applications Designers, Media/Multi-media Designers Dev/Opps Developers, Junior Software and Product Testers, and UI/UX Designers.

Key languages would appear to be SQL, Java, JavaScript, C#, HTML, NET and Python. Python is one of a number of programming languages that have grown significantly in 'popularity' in recent years - notable others being Ruby, Scala, Powershell, Bashshell in particular.

#### **Hardware, Network, Cloud and Infrastructure**

This covers implementation and administration of network systems and systems support – covering both IT and telecommunications.

This would cover entry level roles such as: Helpdesk Support, Systems Support, Systems Administrators, Web Administrators, Infrastructure Technician, Network Engineers, Cloud Engineers.

Within this, the most common requirement in 2015 was for experience database servers, Windows and/or Linux and CISCO (CCNP/CCNA) qualifications.



### **Data and Big Data**

This covers creation and maintenance of database systems, as well as the management and analysis of data.

This covers junior roles such as Data Administrators, Database Administrators, Junior Data Analysts, Web Data Analysts, Data Managers and Big Data Engineers.

The most common requirement for database roles was the need for SQL Server skills and to a lesser extent MYSQL. For CRM roles Microsoft products were the most often cited, especially MS Dynamics CRM and Oracle EBS. Others are associated with substantial growth - notably in the field of big data e.g. NoSQL, Mongo DB, Hadoop and Cassandra for example.

### **Digital Business Services**

This covers those business roles that required significant skills in digital technologies including digital marketing, digital advertising, contact centre operators and financial services.

This would cover entry level roles such as Web Content Manager, Digital Marketer, SEO Copy writer Digital Copywriter, Digital Account Holder, IT Office Support; Digital Administrator, Social Media Administrator, Data Administrator and e-commerce support

The most common requirement was for MS applications, including MS Dynamics CRM, as well as HTML and Google Analytics.

### **Film and TV Production**

The cultural sector is a digital skills priority area for Greater London, and significant growth is forecast in Film and TV production, particularly in TV, Video and Audio occupations. Entry level occupations have been identified as requiring new skills and talent.

This would cover entry level roles such as Junior Assistant Editors, Audio/Dubbing Assistants, Assistant concept/visual effects and animation roles, Junior Colourist Artists, Digital Imaging Technician and VT Operator.

## **CONSULTATION QUESTIONS**

Please answer these question online at:

<https://www.thetechpartnership.com/digital-skills-needs-greater-london>

1. Are these the key digital skills priority areas across the Greater London area? If not, what would you add or change?
2. Should a further distinct priority be added for Cyber and Information Security? Or is this a skill set that should be embedded in all of the above?
3. Within each, are these the key entry level job roles?
4. Within each, are these the key requirements?
5. Any other comments?



## **ANNEX: DIGITAL SKILLS NEEDS ACROSS GREATER LONDON**

### **Introduction**

The Digital Talent Programme aims to ensure skills provision at levels 3 and above (or equivalent) becomes more 'demand-led' by industry. This will enable young people to gain the skills needed to enter employment in the booming digital, technology and digital-creative sectors of London's economy.

The GLA have identified a number of anticipated areas of growth and skills needs in the technology, digital and digital-creative sectors. London requires a pipeline of highly-skilled talent to maintain its position as a global centre of excellence for the digital industry, specifically covering:

- Software Developer / Engineer
- Data Analytics (Big Data)
- Cyber Security
- User Experience Design
- Consumer and User testing
- Product Management
- Internet of Things
- Digital Marketing
- Video Games / VFX
- Web Developers
- Financial Services Technology (fin tech)
- Film and TV production
- Mobile and e-commerce

This paper provides an overview of some key labour market indicators for the Greater London area using data sourced from: ONS Annual Population Survey special license data sets (population/ workforce/'ready candidates'), ITJobswatch (bespoke data on market demand), DfE (revised GCE attainment figures), Experian/The Tech Partnership (forecasts), BIS/SFA (apprenticeships data) and HESA (HE qualifiers data). It is intended to provide an overview of certain key aspects of the local market in these sectors

### **1) Introduction**

The following pages provide an overview of some key labour market indicators for the Greater London area using data sourced from: ONS Annual Population Survey special license data sets (population/ workforce/'ready candidates'), ITJobswatch (bespoke data on market demand), DfE (revised GCE attainment figures), Experian/The Tech Partnership (forecasts), BIS/SFA (apprenticeships data) and HESA (HE qualifiers data) . It is intended not as an authoritative analysis but an overview of certain key aspects of the local market for IT labour and skills/related issues:

### **2) The tech specialist workforce in London**

In 2015 London was home to 8.5 million people (13% of the total) and the place of work for 4.9 million (16%). Of these, 300,000 were working as digital specialists (23% of the UK total), primarily within Inner London (72% of London digital specialists) and the City in particular - this borough accounting for 27% of all digital specialists working in the capital in 2015. Other areas with notably large concentrations of digital specialists were Westminster (11%), Southwark (9%) and Tower Hamlets (7%).



As in the rest of the UK just over half (56%) of digital specialists in London were found to be working in companies outside of the digital sector itself - notably banking and finance firms, which provided work for 29% of digital specialists in the Greater London area. *For those that were working within digital businesses the majority (90%) were employed in IT software and services e.g. sales/distribution, development/repair, data processing and games.* Most digital specialists (86%) were working as employees and amongst these workers, just over one half (54%) were employed within micro/small/medium sized businesses (MSMEs).

Analysis by occupation shows 34% of digital specialists in London held design/ development roles, 30% were managers (including project/programme), 17% were support staff /engineers and 19% were working in 'other' positions. Design/development has been the main growth area for digital employment over the previous ten years (the number of workers holding such positions rising by 70% compared with 43% for digital specialists as a whole) and it is anticipated that this trend will continue over the next decade (with forecast increases of 47% and 28% respectively for designers/developers versus digital specialists in general). *By industry/activity, workforce growth is anticipated to be highest amongst companies focusing on computer facilities management, data processing and business/games software publishing.*

### 3) Key roles and skills demanded

Recorded demand for digital specialists in London (as measured by advertised vacancies for staff) during 2015 was 66,000 openings per quarter on average; London accounted for 40% of all adverts for digital specialists during the year. The majority (66%) were for permanent, as opposed to contract positions and this has been the case throughout the past 10 years.

The role most often cited in adverts for digital specialists in London during 2015 was developer (appearing in 28% of all job adverts), followed by Analysts (17%), Architects (7%), Consultants (6%) and Project Managers (also 6%) and again this has been the case over recent years.

While the broad digital roles required by employers have not changed, a number of more specialist roles have been increasingly in demand and over the previous year the largest levels of growth (tech/vendor neutral) were observed for: Senior Full Stack Developers, Full Stack Developers, Cloud Consultants, Cloud Solutions Architects, Senior Data Scientists and Continuous Deployment Engineers - each associated with annual growth in demand of over 100%.

Common requirements for these/other digital specialist roles include generic process/methodological skills such as: Agile Software Development, Project Management, TDD, Analytical Skills and Scrum along with more specific tools/applications - the most commonly requested being: SQL, Java, Windows, JavaScript and SQL Server (all of which featured in 10% or more of advertised positions for digital specialists in London during 2015).

Further analysis by certain core technical skill areas (as identified by ITJobswatch) reveals a number of core requirements for digital specialist positions as a whole:

- **Operating Systems** - by far the most common requirement in 2015 was for experience of **Windows** and/or **Linux** (featured in 14% and 10% respectively of all London adverts) whilst Unix was cited in just 6% of adverts and Android/iOS within 3% in each case. Also of note is the fact that whilst Windows and Linux have appeared in an increasing proportion of job adverts over the past five years demand for Unix, proportionally has fallen significantly.
- **Programming languages** - the five top programming languages were; SQL, Java, JavaScript, C# (all appearing in over 10% of advertised vacancies) and Python (6%). Python is one of a number of programming languages that have grown significantly in 'popularity' in recent years - notable others being Ruby, Scala, Powershell, Basshell in



particular (all associated with demand increases of over 100% between 2010-15). By contrast demand for SQL, Java and C# have all been in decline (as a proportion of all London based adverts for digital specialists) as has been the case for C++, C, Perl and VBA - each of which has historically been a high demand language.

- **Applications** - MS applications are those most often featured in adverts for digital specialists - MS Excel and PowerPoint in particular (in 7% and 4% respectively of all job adverts). Moreover, the proportion of adverts citing a requirement for skills of this nature has been increasing (though marginally) over the past five years. Photoshop was the only non-MS application to register in the top five during 2015 and appeared in 1% of adverts for tech specialists.
- **Business Applications** - again Microsoft products were the most often cited, especially MS Dynamics CRM (in 3% of advertised positions). The second most requested Business Application was Oracle EBS (2%).
- **Database/Analytics**- by far the most common requirement in this area was the need for SQL Server skills (12% of adverts) and SQL Server appeared in three times as many adverts for digital specialists as the second most common database requirement - MYSQL. In both cases though the proportion of adverts citing a need for these skills has remained static in recent years whilst many others are associated with substantial growth - notably in the field of big data, eg NoSQL, Mongo DB, Hadoop and Cassandra.
- **Qualifications/Certifications** - A degree was the most commonly requested qualification (7% of adverts) in 2015 after which certification requirements were predominantly focused on security clearance and/or related qualifications. Microsoft and Cisco certifications were also common, however - in particular CCNP/CCNA awards.
- **Libraries, frameworks and software standards** - HTML and .NET are the most cited skills requirement under this category and have been throughout the past five years. The proportion of ads calling for .NET has been in decline however (down from 15% to 11% between 2010 and 2015) whilst other skills have grown at a rapid rate - notably in this case - AngularJS, NodeJS, Spring, Rest and JSON (all associated with demand increases of over 300%).

In addition to the above, there are additional skill requirements associated with particular types of digital positions such as VFX for those working in games related positions, or NLP/text mining skills for those working in big data/analytics which though representing relatively low levels of demand are associated with substantial demand increases during recent years and as such significant opportunities for those considering a digital career.

Over and above the projected growth in the roles of greatest employment, The Education Foundation Report, 2015, into Digital Skills in the Greater London area, found that there was significant growth forecast in a number of specialist digital media roles, particularly TV, Video and Audio Engineers and to a lesser extent arts officers, producers and directors as well as photographers, audio visual and broadcasting.

#### **4) Young entrants**

Approximately 5% of digital specialists (14,000 people) working in London in 2015 were aged 16-24 - 2 percentage points below the level for the UK as a whole. Over the past five years the proportion of digital specialists aged 16-24 was up in both cases, though in London growth was half that recorded for the UK as a whole (ie. increases of 2 and 1 percentage point respectively).

Amongst those aged 16-24 working as digital specialists in the capital during 2015, the majority held design/ development jobs (38%) or support/engineer positions (35%) and were primarily educated to HE or 'A' level (56% and 46% respectively).





## 5) The talent pipeline

Whilst there were 66,000 advertised vacancies for digital specialists in London in each quarter of 2015, there was a much lower number of potential or 'ready' candidates to take up these positions, i.e.:

- During each quarter of 2015 there were on average 23,000 digital specialists looking for a new/additional job (8% of the total).
- There were approximately 7,000 unemployed digital specialists living in London during this period.

In total there were just 30,000 'ready candidates' already established in the London area potentially suited to digital specialist positions arising - less than half the number required to fill those positions available. Moreover, given the high level of specification for each job it is unlikely that the available supply will be sufficient to meet employer requirements without significant development intervention.

Other possible sources of labour upon which employers may draw are:

- **School leavers** - though not favoured by employers due to the additional training requirement involved it is notable that in 2015 there were 1,700 GCE ('A' level) awards in Computing/ICT gained by students studying in the capital.
- **Apprentices** - an increasingly important source of new talent given that apprenticeship standards are now available for the full range of digital specialisms i.e. Cyber Security, Data Analysis, Digital Marketing, Infrastructure, Technical Sales, Networking, Software Development, and Unified Communications (in addition to IT User programmes). In total, there were 3,200 starts on digital apprenticeships in London in 2015 and 1,000 achievements and whilst a breakdown of recently advertised digital apprenticeships is not currently available, there were at the time of writing approximately 150 live apprenticeship vacancies for digital specialists - 66% of which were for technician/support roles and 14% were in Software development. There were also an additional 10 apprenticeship positions available in the Creative sectors.
- **Graduates** - in 2015 there were 3,500 students graduates from HE institutions in London that had taken a Computer Science course and amongst these 85% had graduated at first degree/post-graduate level, primarily following Computer Science, Information Systems or Software Engineering courses.

As shown above, even if including all these additional academic leavers there remains a substantial gap between the number of vacancies advertised each quarter and the immediate supply with training /experience in this area. It is unsurprising then that many recruits to digital specialist positions are drawn from other occupational specialisms, however the result is an effective lag whilst appropriate technical skills training is administered.

## 6) 'Creative' occupations

In addition to the digital specialists identified in the previous sections, it is worth noting that London was the place of work for an additional 406,000 people holding 'creative' positions in 2015, of which 8% were aged 16 to 24 - this group being another core focus for the related activities of the GLA. The primary area of work for these young people (outside of digital occupations) was advertising/marketing (44%) followed by music/performing/visual arts (28%).

## 7) Digital and the broader picture

Though significant contributors to the London economy in their own right, digital businesses are often considered as being part of a wider industry grouping (industry section J) of the economy which encompasses related activities such as publishing (other than software), media and



information services. Within this group digital businesses predominate, though in 2015 there were estimated to be 59,000 in publishing and 78,000 people working within the media production/ distribution sector representing 17% and 23% respectively of employment in this industry section.

Employment within these sectors, as with digital businesses, is often highly specialised and, in the case of media production/ distribution in particular, a large number of workers positions such as: *'Arts officers, producers and directors'* and *'Photographers, AV and broadcasting equipment operators'* - in fact during 2015 there estimated to be approximately 61,000 people working within such positions across the capital.

## FURTHER READING

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The following references provide more general background:

The ONS Annual Population Survey:

<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/qmis/annualpopulationsurveyapsqmi>

The DfE revised attainment figures:

<https://www.gov.uk/government/statistics/revised-gcse-and-equivalent-results-in-england-2014-to-2015>

BEIS/SFA apprenticeship data:

<https://www.gov.uk/government/statistical-data-sets/fe-data-library-apprenticeships>

The HESA HE qualifiers data:

<https://www.hesa.ac.uk/data-and-analysis>



The UKCES Working Futures report, 2014:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/513801/Working\\_Futures\\_final\\_evidence](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/513801/Working_Futures_final_evidence)

Creative Skillsets Media Workforce Survey 2014:

[https://creativeskillset.org/assets/0001/0465/Creative\\_Skillset\\_Creative\\_Media\\_Workforce\\_Survey\\_2014.pdf](https://creativeskillset.org/assets/0001/0465/Creative_Skillset_Creative_Media_Workforce_Survey_2014.pdf)

The Tech Partnership's Employer Bulletin and Employer Insights surveys:

<https://www.thetechpartnership.com/Resources/key-reports/>

The Education Foundation and UKIE Digital Skills research for the London Enterprise Panel's Digital Talent Programme:

<https://lep.london/sites/default/files/20150618-EF-UKIE-Digital-Skills-Final>