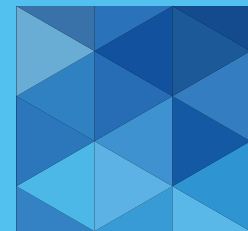


Creating an integrated ICT Talent Pipeline for growth and prosperity.



2014
FIT ICT SKILLS AUDIT



Seizing opportunity through the Internet of Things (IoT)

Acknowledgements

The authors would like to thank the Board of FIT, SOLAS, IBM who generously co-funded the report and all of the companies and their executives who participated in the survey / research. The contribution of Mark Taylor of FIT deserves special mention for his invaluable support with the survey and the data analysis.

Authors

Peter Davitt, CEO FIT.
George Ryan, COO FIT.

About FIT

FIT is an industry-led initiative which works in close collaboration with government departments and national education and training agencies, local development organisations and a host of community based organisations. Our primary partners in education and training include SOLAS, ETBs, Third Level Institutions, Leargas, Leader Companies and LESNs. FIT's mission is to promote an inclusive Smart Economy by creating a fast track to marketable technical skills for those with the aptitude and ambition to commence a career in ICT. FIT is a registered charity and not-for-profit organisation. The Initiative develops and promotes technology-based programmes and career development opportunities for job seekers who have become detached from the labour market in an increasingly knowledge-based economy. FIT commenced in Dublin in 1999 and now operates across the Republic of Ireland and more recently in Northern Ireland.

Contents

Foreword	02
Preface	03
Executive Overview	04
Introduction	07
Mapping the Skills Needs	09
Key Findings	12
A First Response: ICT Associate Professional	30
Wider Implications	32
Conclusions and Recommendations	36
APPENDIX 1: FIT Skills Audit Questionnaire	41
APPENDIX 2: List of Participating Companies	49

Foreword

Skills demand in technology companies is a global issue. With the phenomenal growth in the sector, all jurisdictions are competing for tech talent. Yet, Ireland has turned this global demand for skills into a competitive advantage. As the issue emerged, Ireland moved first and fast. We are now ranked as top in the world for the availability of skilled labour.

Record levels of students are sitting higher level maths. More students are undertaking 3rd level courses in engineering, science and software development. A new generation of coders are growing up through Coder Dojo. Tech professionals globally are now seeking experience in Ireland to enhance their careers. We are well on our way to being the world's best location for tech talent.

The FIT Skills Audit is a crucial report detailing current industry trends. It also highlights a healthy vacancy rate that is not surprising, given the numbers employed in the sector have risen by a staggering 40% since 2010. Recently, it has often been the case that where one company finishes a recruiting round, another has a major jobs announcement. This is an incredibly positive story, requiring continued momentum for the strong plans in place, particularly the joint Government and industry ICT Skills Action Plan.

40% the rise in numbers
employed in the IT
sector since 2010...

While the Audit tracks trends for tech skills, it also draws attention to the need for critical communications skills, project management, marketing and business acumen. The tech industry does not operate on tech skills alone. Alternative routes into the sector are also needed, such as the proposed Associate Professional Programme which modernises the apprenticeship model for the digital age. This is a very exciting new initiative with serious potential to secure Ireland's reputation in the tech space.

Ireland is perfectly poised to become a genuine global technology hub. However, we are not alone in this ambition. Time is of the essence and we must be smart and innovative in how we meet the sector's needs.

Paul Sweetman

*Director, ICT Ireland & the ISA
Ibec*

Preface

When FIT first approached IBM about partnering on this year's Skills Audit, we were delighted. As a people-based business, the issue of skills is a key focus area for IBM globally. In Ireland, finding practical ways to meet our skills needs has been central to the growth of our operations here over the past two decades.

There have been many reports published on this topic – rightly so, as it is a vitally important one. What makes the FIT Skills Audit especially valuable is that it is built on a very pragmatic, bottom-up approach, asking employers what their actual hiring plans are in the coming 12 months, and what specific skills they are looking for. This lends its findings and recommendations a particular immediacy and weight.



We must create multiple pathways to ICT careers that are attractive to a broader range of people.

This year's report demonstrates clearly that the Further Education and Training sector has a huge role to play in addressing the immediate and foreseeable skills needs in Ireland. Naturally enough, a lot of the discussion around skills tends to focus on the higher end of the skills spectrum, and it is true that there is strong demand for people with university degrees and doctorates. However, this is far from the whole story. In fact, there are more vacancies for people with skills at Level 5/6 on the National Framework of Qualifications than at the higher levels.

By thinking about tertiary education in Ireland in a more integrated way we will not only address the skills shortage more effectively, but we will also better serve the needs and aspirations of our young people. The traditional path of going from the Leaving Certificate into four or more years of university, and then looking for a job, does not suit everyone. We must create multiple pathways to ICT careers that are attractive to a broader range of people.

With the launch of this report, FIT has the almost unique distinction of simultaneously implementing one of the main recommendations. With the cooperation of SOLAS, the Education and Training Boards, a new ICT Associate Professional programme is being launched. This will provide candidates with a two-year pathway to a Level 6 qualification, combining classroom training with workplace experience in a sponsoring company. I'm particularly delighted that IBM is one of several companies who will be hosting participants in the pilot programme starting in a few weeks' time.

I want to thank FIT for their leadership and drive, not just in relation to this excellent report, but for making a real difference in helping people develop the right skills to get started on their careers in IT.

Peter O'Neill

*Managing Director
IBM Ireland*

Executive Overview

It is widely accepted that advanced economies are characterised by a high and rising demand for high-skilled and professional workers. In Ireland the key policy response by successive governments has been to expand higher education as the principal way of ensuring the skills needs of the economy are met. There has been less emphasis given, until recently, to the potential contribution of further education and training, and the extent to which firms utilise the skills, knowledge and competencies of their employees in the workplace.

In order to compete globally Ireland must make progress in all three areas and coordinate its strategies for doing so. In particular, a more effective continuum of tertiary education provision encompassing Further Education (FE) and Higher Education (HE) needs to be systematically determined, strategically coordinated and appropriately resourced. A significant annual sum of circa €800m is invested in FE facilitating certification and attainment up to Level 6 on the National Framework of Qualifications and it should be viewed as a vital component of Ireland's human capital strategies.

The Aims of this Report are:

1. To present to readers a clear and simple picture of what specific ICT skills are most needed in Ireland in 2014 and 2015
2. To give readers an understanding of the relative demand at different levels of expertise
3. To assist the education and training sector in planning and developing further education programmes and higher level conversion programmes and in guiding their potential participants
4. To inform prospective ICT practitioners whether they are young people, those who are unemployed, those considering a career change or entrepreneurs seeking to start a new business
5. To give the ICT sector a coherent and valid overview of the skills needs of the sector as a whole
6. To inform national and regional development agencies and assist them in creating their development strategies
7. To assist policy makers in developing suitable policy responses, identifying priorities and putting in place effective funding strategies.

Key Features & Findings

The report is based on the inputs of 61 companies, split evenly between major multi-nationals and representative SME's, with in excess of 30,000 employees in total accounting for approximately 30% of all of those employed in the sector.

- There are currently 7,000 immediate vacancies. This is significantly more than when the survey was last carried out in 2012.
 - 75% of demand is for entry and competent level skill sets with only 25% required at expert level.
 - Much of this demand could be addressed through technology skills development programmes ranging from 6 months to 24 months at Level 5 to Level 6 on the National Framework of Qualifications. Greater recognition needs to be given to industry certification and it should be integrated into national certification and the National Framework of Qualifications.
 - Disciplines noted with significant vacancy levels include:
 1. **Programming**
 2. **Mobile Technology / Development Platform**
 3. **Web Development / Technologies**
 4. **Software Development Tools and Methodologies**
 5. **Cloud Computing**
 6. **Platform Administration**
 7. **Digital /Creative Media**
 8. **Networking & PC Maintenance**
 9. **CRM**
 10. **Contact Centre Support**
 11. **Digital Marketing**
 12. **Project Management**
- There is a growing acceptance within the sector of the need to broaden the scope of interventions and to recruit candidates beyond traditional cohorts. Companies are willing to engage with appropriate interventions which could address such needs in a timely and efficient manner
 - Multi-national companies indicated that if they had greater confidence in the pipeline of tech skills supply they could compete within their global operations for further business development opportunities to be located in Ireland. This could result in significantly more employment opportunities in the Irish labour market.
 - There is a general consensus that the concept of 'smart people with smart skills' should be promoted as a means of widening the pool of candidates interested in pursuing careers in the technology sector, as their primary need is for employees with talent and ability.
 - More needs to be done now to address shortages and satisfy companies' skills needs by drawing on the large pool of job seekers with the acumen to work within the sector and providing them with additional skills training programmes which respond to the broad range of varied roles and disciplines in demand across the sector.

7,000 current vacancies

Main Conclusions

Existing and emerging skills shortages in key areas of the economy such as ICT and other sectors, if left unaddressed, will slow economic growth and slow the reduction in unemployment associated with economic recovery even more. The jobs market, particularly in the technology and similar knowledge-intensive exporting sectors, will continue to create a strong demand for degree-holders. However, the 'human capital' requirements of even these sectors would appear to be significantly broader and embraces people with a range of technical as well as general skills that can, in-part, be facilitated within FE provision.

Many of the roles and skills-sets in demand lend themselves to vocational forms of study. Accordingly, within the current restructuring of FE provision in Ireland, renewed focus should be given to strengthening vocational education and training, and to promoting its attributes to learners, particularly, those with applied learning styles and to encouraging employers to avail of the quality skills provided. It is insufficient and, indeed, unwise for policymakers and industry to rely principally on increasing the number of HE graduates in the workforce to supply the skills that the economy will need.

The courses and qualifications taken by young people and job seekers across the continuum of tertiary education that is FE + HE provision need to better match the requirements of employers and learners' needs for subsequent employment. This is a challenge and a golden opportunity for SOLAS, the Education and Training Boards (ETBs) and other FE providers.

Seven Key Recommendations:

- 1. Excellence:** enhance the quality of FE provision at Levels 5 and 6 in accordance with the recently revised Common Awards System (CAS) and by the use of proven international qualifications, such as City & Guilds and industry awards, and direct it to where employers are prominently engaged and employment prospects are best assured;
- 2. Collaboration:** research into employers' skills needs should encompass what both FE and HE are capable of supplying. The dichotomy between further and higher education should be lessened and the two developed as a continuum;
- 3. Information:** engagement between tertiary education providers, both FE and HE, and employers needs to be more systematic and granular;
- 4. Variety:** develop dual-education learning opportunities such as associate professional programmes for a number of different occupations as a complement to existing provision;
- 5. Validation:** opportunities for work-based learning and work experience should become much more prevalent in tertiary education;
- 6. Focus:** all work orientated further and higher education programmes should be employment proofed;
- 7. Direction:** Young people aged 15 and over should have access to appropriate skills inventories and aptitude assessments; full information on the range of educational pathways and professional guidance to deliberate the best learning route and style of learning to realise their aspirations – be it an academic track or technical/vocational route, or a pathway that combines the best of both.

Introduction

The first FIT ICT Skills Audit was carried out in late 2012, a time when employment in the economy was continuing to fall and the unemployment rate approached 15 per cent. It was a surprise that the Audit still identified 4,500 immediate vacancies in the technology sector. It was a greater surprise that more of these jobs were for people to work at competent and entry levels rather than for experts. Three insights were presented in that first Audit: (i) even at a time of high unemployment, a shortage of workers was holding back the development of a key sector of the economy; (ii) there was a damaging skills mismatch or gap between the skills of those looking for work and the types of jobs available, and (iii) the responsiveness of the education and training system to the skills needs of a key sector of the economy and to latent employment opportunities for their learners was wanting.

This current audit has been carried out in 2014, a year in which employment in the economy is again growing and unemployment falling. It is also a time of particularly strong expansion in the ICT sector, partially fed by fresh inward investment. As outlined below, the 2014 Audit estimates that a skills mismatch has not just persisted in ICT but is now on a larger scale. It conservatively estimates that there are in excess of 7,000 vacancies across a range of disciplines requiring a broad assortment of technical skills-sets and professional attributes. The skills in broad demand span the National Framework of Qualifications from Level 5 to Level 8 and, once again, the largest number of vacancies do not necessarily require a higher education programme and are within the remit of FE provision to ensure.

It needs to be acknowledged that major reforms are underway in practically every sphere of Ireland's education and training system. The introduction of the new Junior Cert cycle and the proposed review of the Leaving Cert cycle reflect the need to achieve greater cohesion between applied and academic learning as integral components of the education process. Within the further education and training (FE) sector the amalgamation of the previous VECs and former FÁS training centres into 16 Education and Training Boards (ETBs) with independent oversight from SOLAS are fundamental and far reaching steps in the creation of a new further education infrastructure and have been followed by the adoption of the first ever five-year, integrated strategy for the sector as a whole. Within the higher education sector, new alliances across higher education institutions and stronger regional coordination are at an advanced stage and strategies have been clearly articulated to improve how the sector engages with industry and contributes more strongly to national and regional economic development and improves the employment prospects of its graduates.



the 2014 Audit estimates that a skills mismatch has not just persisted in ICT but is now on a larger scale...

In active labour market policies, there is a new emphasis and determination to ensure that the registered unemployed, particularly those without a job for more than 12 months, access further education and training that is effective in helping them enter employment.

The Audit, in highlighting vacancies that employers still find hard to fill, reminds us that educational and training reforms can have a long lead time and that it may take years before employers, learners and jobseekers enjoy their full benefits.



there is still major scope to implement measures that would lead to an increased supply of talent...

The Audit's findings underline the urgency of proceeding resolutely and speedily with the reform programmes and invite the prioritisation of measures that can have the most immediate impact in helping employers to create employment opportunities for young people and jobseekers. FIT believes there is still major scope to implement measures that would lead to an increased supply of cadres of talent to the ICT sector within a short space of time. A particular objective of the 2014 Audit, therefore, is to support the ambition and determination of SOLAS and the HEA that tertiary education providers should

capitalise on the buoyancy and employment potential in the booming technology sector, both to enhance their educational offerings and to ensure the skills needs of a sector that is vital to the economy's health are met expeditiously. By doing so, they will help more enterprises to remain competitive and rooted in Ireland.

Emerging technologies continue to shape the skills needs of the ICT sector. Just as the public are getting used to terms such as 'The Cloud' we are seeing the emergence of new drivers of change such as 'Big Data' and the 'Internet of Things' that are already shaping the immediate future. A further key objective of the FIT ICT Skills Audits is to assist those responsible for providing technology skills courses in understanding just which specific technologies continue to be in demand and which new ones need to be catered for. The Audit is also intended to be a resource to policy makers helping them to prioritise and make the most effective use of available funding.

Mapping the Skills Needs

The ICT sector has a complex skills eco-system surrounding it that constantly changes, evolves and re-invents itself. FIT continues to develop its methodology for analysing the sector's skills needs in a way that respects this complexity while providing a high definition snapshot of any skills that may be in short supply and occasioning hard-to-fill vacancies.

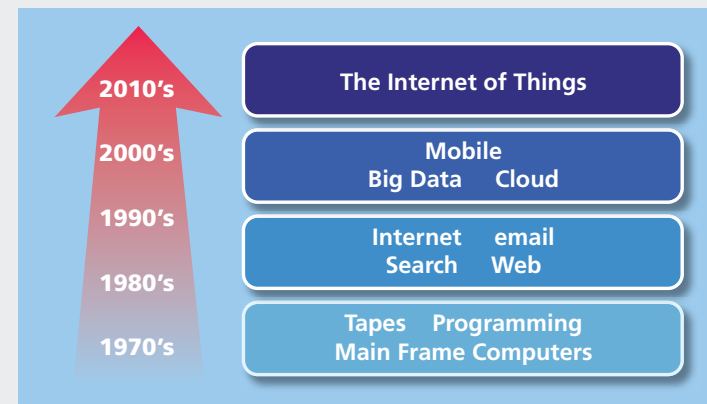
The methodology and findings of the 2014 Audit are presented here. But first a brief reflection on technological change in the ICT sector is provided based on FIT's now extensive experience with the sector. FIT considers it important to guard against the assumption that only people with exceptionally high educational attainment are needed to work with advanced technologies and to explain the need for, and the value of, the hard 'listening' to employers that is a characteristic of its Audit's methodology. Those with less interest in the evolution of technologies may wish to proceed directly to the section entitled ICT Skills Audit Methodology.

An expanding sector marked by evolutionary and revolutionary changes

The general public, politicians, policy makers and businesses are aware that ICT technology trends profoundly affect their lives, countries, enterprises and economies.




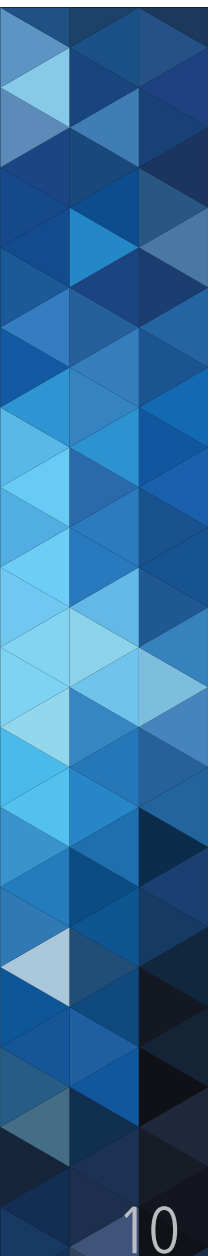




One of the distinct insights from this second FIT ICT Skills Audit is that technology trends combine evolutionary and revolutionary changes. All of us struggle to understand what such big changes headlined in the media as Mobility, Cloud, Big Data and now the Internet of Things (IoT) actually involve and will mean for the skills that are in demand, specific enterprises, jobs and

careers. These four paradigm shifts all required the invention of the internet to precede them giving the internet the status of an 'underpinning technology'. In turn, earlier technologies underpinned the internet and facilitated its emergence such as software programming, computers and networks among others. The skills sets brought into prominence by the earlier advances are still required today but, in many respects, in more sophisticated forms than when they were first deployed.



The Development of our Digital World

New developments can be revolutionary in their scale and impact while being quite evolutionary in their underpinning technologies. Cloud Technology moved computing and storage resources to hugely scaled-up centralised off-site locations. The novel aspect of this was that the combination of the internet, broadband and mobility allowed millions of people to connect at low cost (in 'clouds'), while new software tools evolved from disciplines such as virtualisation to facilitate the connections and allow each user to get specific services relevant to their needs. So, now, we can order a product and pay for it from our



ICT Skills Audit Methodology

The Skills Audit model, first developed by FIT in 2012, is designed to accumulate granular skills needs data from leading ICT companies. In 2014, the detailed questionnaire (Appendix 1) was filled in by senior business development managers and technology experts in 61 companies, in the large majority of cases during a face-to-face interview with a senior FIT representative lasting on average one hour. As in 2012, the face-to-face interviews facilitated discussion and the acquisition by FIT of invaluable qualitative inputs that strengthened the interpretation of the quantitative data.

90 new skillsets and three further disciplines were added to the 2012 framework...

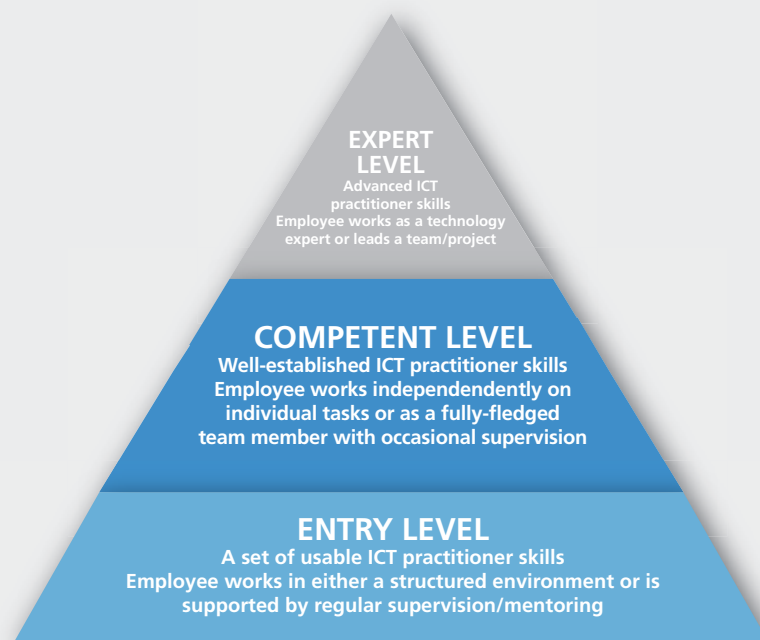
Respondents/participants were asked to quantify the scale of their current need for additional employees who could carry out each of 203 specific skills categorised within fourteen occupational disciplines (see questionnaire, Appendix 1). The specific skills and disciplines are not exhaustive but adopted after extensive consultation as a robust framework that the industry itself currently endorses as meaningful and adequate to the task of capturing their skills needs. In the light of the rapid pace of technological change in an industry (sketched above) where 18 months is a long time, the framework is a 'live' structure that has to evolve between successive audits to ensure that in-demand skills are being captured as reliably as possible. In 2014, 90 new skills and three further disciplines ('Software Development Tools and Methodologies', 'Digital Marketing'

and 'Big Data') were added to the 2012 framework and the responses related to the Game Technology discipline were integrated with the Programming / Development Support Skills discipline's responses to best reflect needs.

As in 2012 and very importantly, respondents were also asked to classify the level at which additional employees would need to be able to exercise each skill in order to be hired as either 'expert', 'competent' or 'entry' level. These skill levels are defined as follows:

- **Entry level** - jobs that call for a set of useable ICT practitioner skills and where the employee works in a highly structured environment or is supported by regular supervision or mentoring.
- **Competent level** - jobs that call for a set of well-established ICT practitioner skills and where the employee works independently on individual tasks or as a fully-fledged team member with occasional supervision.
- **Expert level** - jobs that call for a set of advanced ICT practitioner skills and where the employee works as a technology expert or leads teams and projects.

Because of this classification, the Audit's methodology has enabled a revisiting of a long standing and still persistent misconception that the ICT skills gap is exclusively or even largely made up of roles at the apex of the skills triangle, in this report's terminology, at the 'expert level'. The methodology captures the extent of demand in the ICT sector itself for people at all three levels and the ensuing analysis shows that the majority of demand is actually for people at entry and competent levels.



Survey respondents were also asked to provide their existing employees headcount by discipline and to estimate the number of potential vacancies that they might have in that discipline over the next 12 months and their challenge in sourcing suitable candidates. Just over 75% of the respondents elected to provide some or all of this information, which was up from the previous survey.

FIT believes this is because respondents were even more determined than in 2012 to share the challenges they are facing and more open to engagement with new and creative solutions. Where complete information was given it was possible to quantify the growth in employment anticipated in each discipline and these ranged from 10% to over 100% with a median of 35%. This was a markedly higher expectation of headcount growth than when the survey was last carried out.

Key Findings

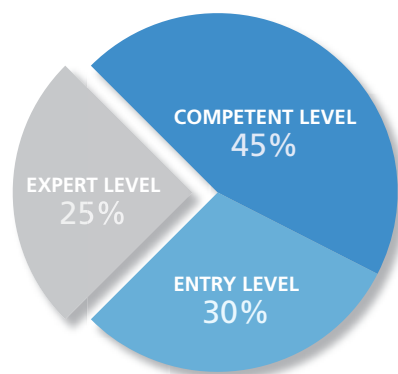
FIT estimates that there are approximately 7,000 current vacancies in the ICT sector.

This is based on the empirical data provided by the employers who participated in the audit and this has been used to extrapolate the total number of vacancies for the sector as a whole. The estimate is also informed by in-depth research into the volume and type of vacancies flagged by leading recruitment agencies operating in the sector.

FIT benchmarked the findings of the current skills audit against its earlier one and also against the findings in the FORFAS / EGFSN (Expert Group on Future Skill Needs) report on Demand for High Level ICT Skills published in November 2013. The FORFAS / EGFSN report projected that the HE sector would meet 53% of the demand in 2014 and about 56% from 2015 through 2018. It based its projection on its 'Central Growth' scenario of just below 5% compound annual growth in demand for higher level ICT skills. It outlined a 'Higher Growth' scenario based on 7.2% annual compound growth but on balance elected for the central growth scenario.

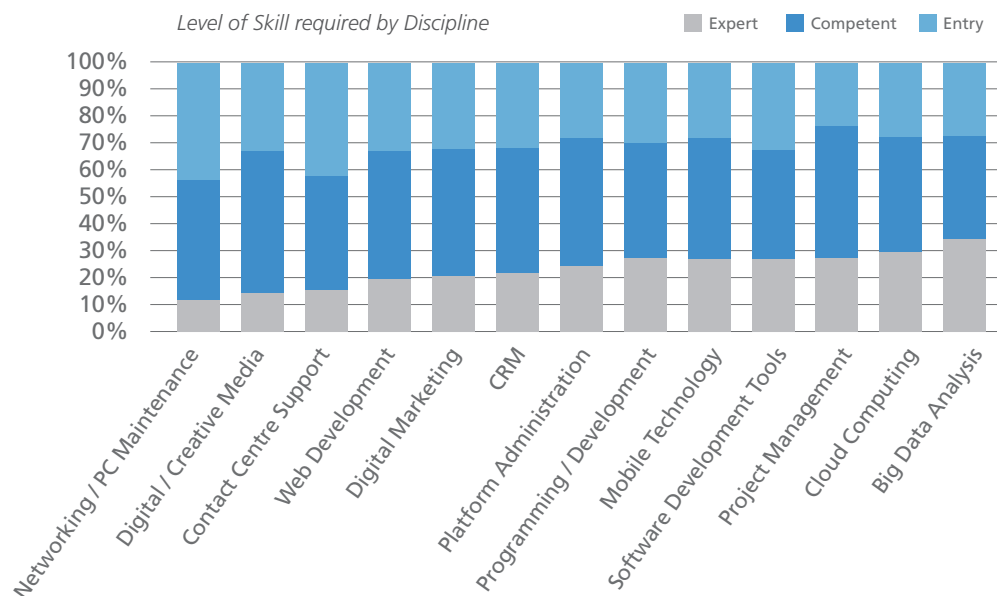
FIT believes that its latest survey which took place in Spring/ Summer 2014 is reflecting an uptick in growth and is suggesting that the industry is now growing at roughly a mid-point between the central and higher growth scenarios described in the other study.

As discussion elsewhere in this report makes clear, the scale of the responsiveness of the tertiary education sector remains wanting and if the supply side falters it will exacerbate an already challenging skills shortage facing the ICT sector. In this regard employers expressed disquiet at not being able to have their recruitment needs expeditiously satisfied.



It may come as a surprise to readers that the majority of in-demand vacancies are currently made up of competent and entry level skills requirements. The 2014 survey finds that 75% of immediate vacancies are for employees able to exercise skills at the competent and entry levels, as the pie chart illustrates, compared to 25% at the expert level. The bar chart shows the level of

competence required by discipline. Big Data Analysis indicates the highest demand for skills at expert level, whereas areas such as Networking/PC Maintenance, Contact Centre Support, and Platform Administration highlighted a higher requirement for candidates with competent and entry level skillsets.



The survey responses were also analysed to determine the specific skills most in demand for each discipline. This information is presented in radar charts which present the data in a form which is easy to assimilate and which gives readers an overview of the intensity of demand reported for each specific skill within a discipline.

In each radar diagram:

- The outermost ring represents the highest demand for a specific skill
- All rings represent significant demand even the inner ones
- Different coloured symbols illustrate demand for entry, competent and expert levels
- Accompanying each diagram is a table which gives the same information in the form of a ranked list with the number one position occupied by the most in-demand skill.

Readers of this report are invited to explore the top ranked skills / high demand roles as set out in the radar diagrams and tables which follow for any of the disciplines which are of particular interest to them or indeed all of the disciplines if a comprehensive understanding is required. For those who only need an overall understanding of skills needs the following general trends should prove useful.

General Trends in Relation to ICT Skills' Demand

Software development is a thriving sector with strong demand for programmers across platforms. Skills sets most sought after include Java and SQL and entry level roles in mobile development platforms (Android and iOS) are a good route for newcomers into the sector.

Software testing skill sets are in demand and entry level roles are on offer.

Skills in HTML5 along with CSS, JavaScript and JQuery are most in demand and SQL skills were ranked second in demand.

There are a large number of opportunities available at entry and competent levels and it should be noted that Project Management and Soft Skills are also highly valued at these levels.

In the Mobile Technology discipline there was an increased demand for Android skills and new to the in-demand rankings are skills in Xamarin's cross-platform apps development software which facilitates code sharing across all platforms using C# e.g. iOS, Android, Mac and Windows platforms.

Platform administration roles in demand call for Windows Server and Linux skills. Networking has solid requirements and MCITP, CCNA and security skills are good routes into the sector.

The Networking & PC Maintenance discipline remains an excellent route into the ICT sector for those with entry level skills which account for about 40% of the in demand roles available. CompTIA A+ Certification is regarded by employers as an indication of desired skills at entry level and allied to Microsoft MCITP, CISCO CCNA and Security skills would make for attractive candidates at this level.

In the Cloud discipline the skill most in demand is Virtualisation and most of the demand for this is clustered in the Competent and Expert levels. However there are opening in the Cloud discipline for entry level roles and exposure to SAAS, IASS and Azure along with Virtualisation skills can provide a gateway at that level.

In the CRM discipline the most in demand skill is Microsoft Access/Excel and is a good skill to have at Entry and Competent levels allied to Project Management and Customer Facing skills. Four in demand CRM platform skills are Sugar, Dynamics, SAP and Salesforce and although not making the rankings in the last Skills Audit the enterprise quality management software TrackWise featured on this occasion as in demand especially at Competent and Entry levels.

The overriding skill sets in demand in the Contact Centre Support discipline were those related to Customer Service Experience and Customer Service Principles and Practices. There are a significant volume of entry level roles and these can be accessed by those with the Customer related skills noted above allied to proficiency in Computer Applications, Admin and Keyboard skills.

The discipline of Big Data has solid requirements at all levels for those with SQL or MySQL. As an emerging sector there are evolving requirements and a new set of technical skills that aren't readily found today. Among these are Hadoop, noSQL and PIG and although the scale of demand is not currently very large the scarcity of supply will dictate that these skills sets are sought after.

The Digital Marketing discipline is calling for skills at all levels in Search Engine Optimisation (SEO); Social Media, Mobile & Digital Marketing Planning; email Marketing; Social Media Monitoring & Analytics; Pay Per Click Advertising and Inbound Marketing. These should be rounded out with Project Management and Soft Skills.

Within disciplines Project Management, Soft Skills and Customer Facing skills typically make the top ten and are sometimes high in the ranking at 4, 5 or 6. Teamwork and Multi-tasking were voted into the first and second rank slots in a survey section given over entirely to Soft Skills. The Project Management discipline itself called for hands-on experience of Project Management, Strategic Planning and People Management combined with knowledge of the related techniques & tools. Despite the demand for experience there were still openings at Entry level in support roles, especially for those with Agile / Scrum / Kanban skills.

Another emerging area of increased demand in Inside Sales requiring a combination of business acumen, data analytics, database technologies and customer interaction.

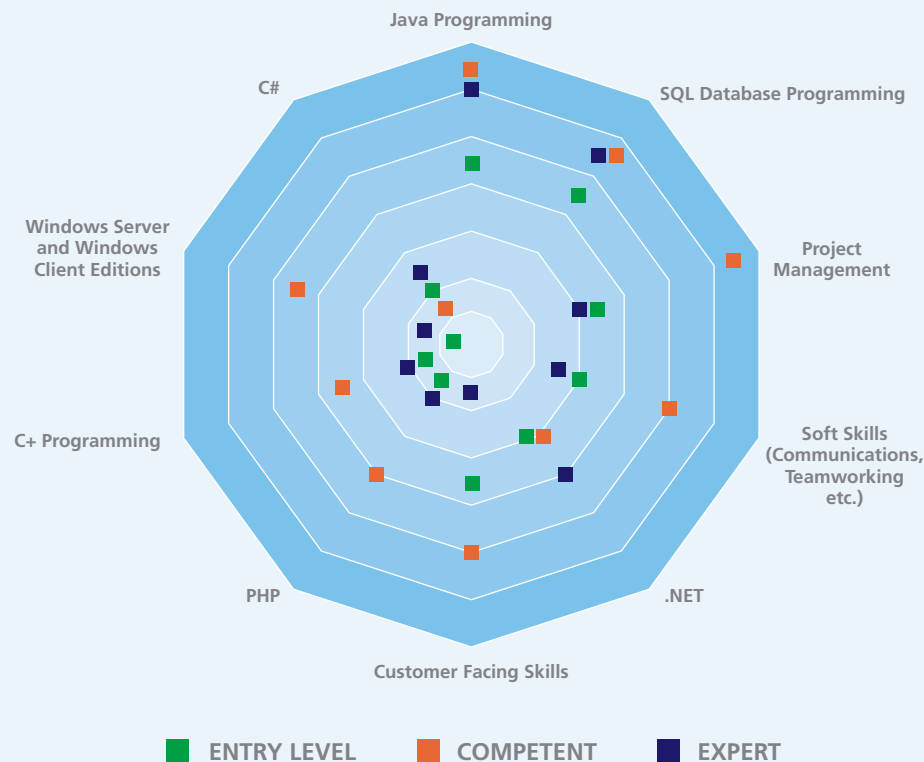
What follows is a detailed representation of the specific skill sets in demand for each discipline in radar diagram format.

Discipline 1: Programming

Demand was highest for those with Java and SQL Database Programming allied to Project Management skills and there was demand for these skills at all three levels. The strong requirement for Project Management and Soft Skills belies the fallacy that Programmers can operate independent of colleagues and emphasises that related working environments are typically team based and call for effective interaction and communication.

Programming

Outer rings are highest demand



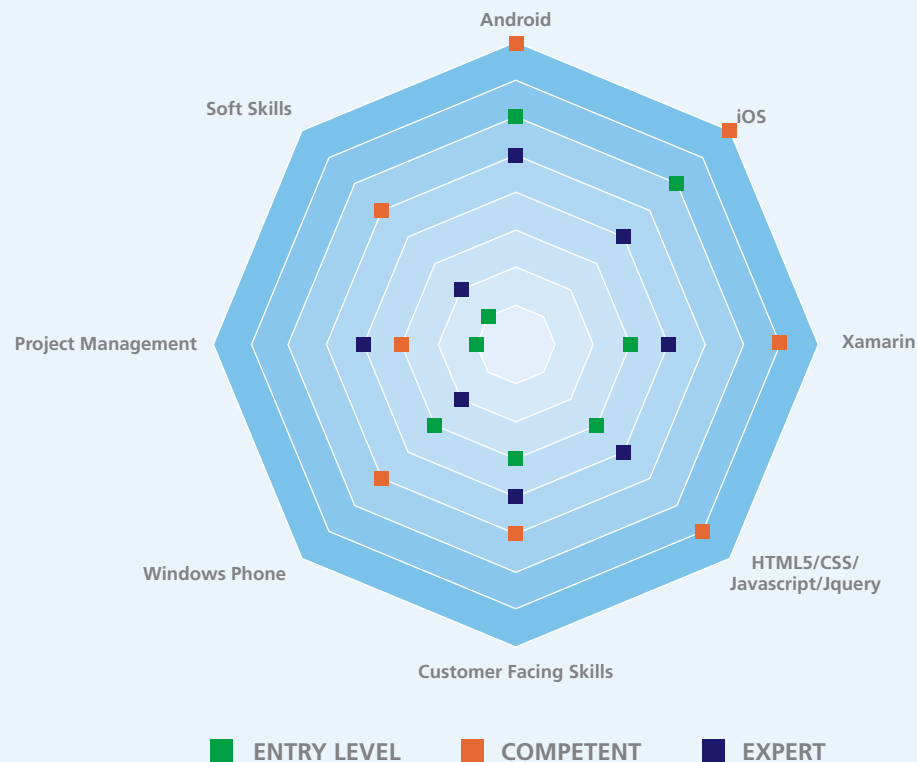
Rank	Entry Level	Competent Level	Expert Level
1	Java Programming	Java Programming	Java Programming
2	SQL Database Programming	Project Management	SQL Database Programming
3	Project Management	SQL Database Programming	.Net
4	Customer facing skills	Customer facing skills	Project Management
5	Soft skills (Communications, Teamworking etc.)	Soft skills (Communications, Teamworking etc.)	Soft skills (Communications, Teamworking etc.)
6	.Net	Windows Server and Windows Client Editions	C#
7	C#	PHP	PHP
8	PHP	C+ Programming	C+ Programming

Discipline 2: Mobile Technology / Development Platform

There was a more pronounced demand for Android skills, which is now the most in demand skill at all three levels, compared to the previous Skills Audit when it was ranked much lower. New to the in-demand rankings are skills in Xamarin's cross-platform apps development software which facilitates code sharing across all platforms using C# e.g. iOS, Android, Mac and Windows platforms.

Mobile Technology / Development Platform

Outer rings are highest demand



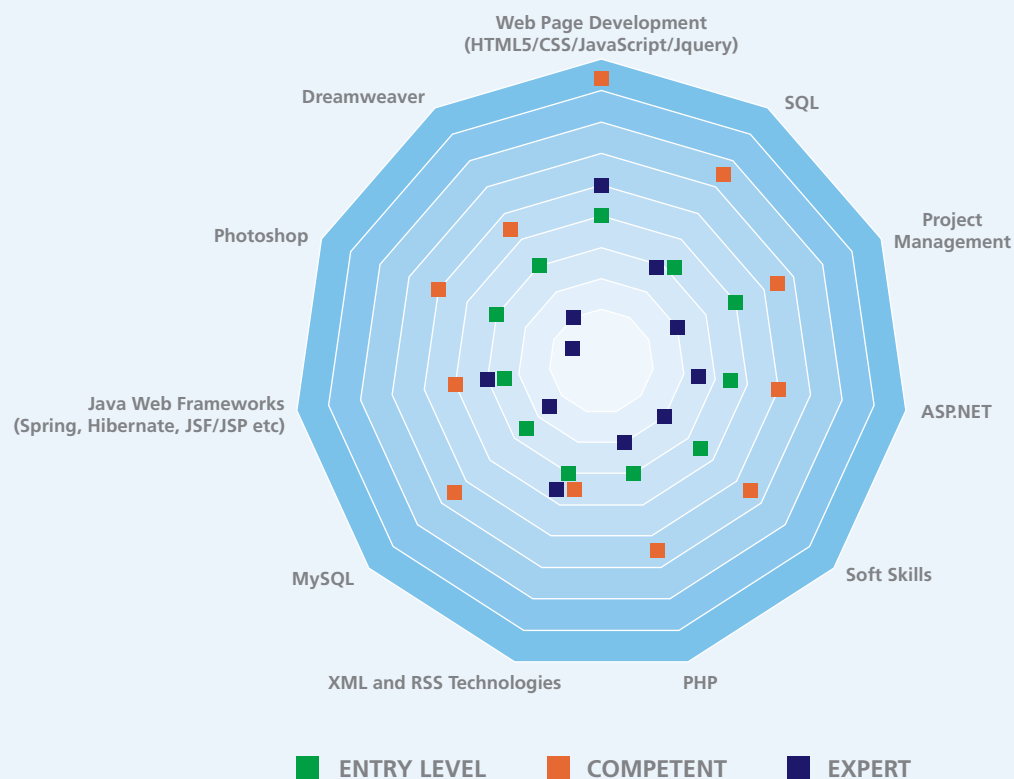
Rank	Entry Level	Competent Level	Expert Level
1	Android	Android	Android
2	iOS	iOS	iOS
3	Xamarin	Xamarin	Xamarin
4	HTML5/CSS/ JavaScript/Jquery	HTML5/CSS/ JavaScript/Jquery	HTML5/CSS/ JavaScript/Jquery
5	Customer Facing Skills	Customer Facing Skills	Customer Facing Skills
6	Windows Phone	Windows Phone	Project Management
7	Project Management	Soft Skills	Windows Phone
8	Soft Skills	Project Management	Soft Skills

Discipline 3: Web Development/Technologies

Skills in HTML5 along with CSS, JavaScript and JQuery are most in demand and SQL skills were ranked second in demand. There are a large number of opportunities available at entry and competent levels and it should be noted that Project Management and Soft Skills are also highly valued at these levels.

Web Development / Technologies

Outer rings are highest demand



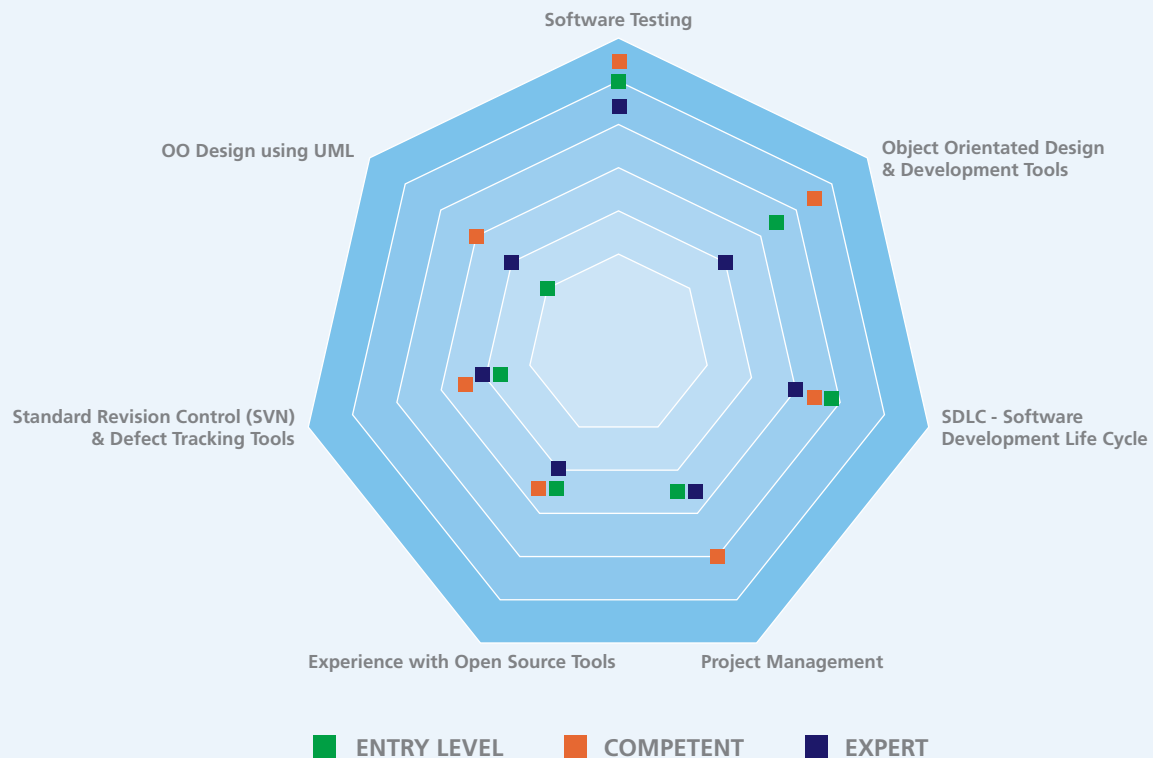
Rank	Entry Level	Competent Level	Expert Level
1	Web Page Dev (HTML5/CSS/JavaScript/Jquery)	Web Page Dev (HTML5/CSS/JavaScript/Jquery)	Web Page Dev (HTML5/CSS/JavaScript/Jquery)
2	Project Management	SQL	XML and RSS Technologies
3	ASP.NET	Project Management	SQL
4	Soft Skills	Soft Skills	Java Web Frameworks (Spring, Hibernate, JSF/JSP etc)
5	SQL	PHP	ASP.NET
6	PHP	MySQL	Project Management
7	XML and RSS Technologies	ASP.NET	Soft Skills
8	Photoshop	Photoshop	PHP

Discipline 4: Software Development Tools and Methodologies

Software testing is the stand out skill required and is a clear access route for new entrants which can be usefully complemented by skills in Object Orientated Design & Development Tools and SDLC -Software Development Life Cycle.

Software Development Tools and Methodologies

Outer rings are highest demand



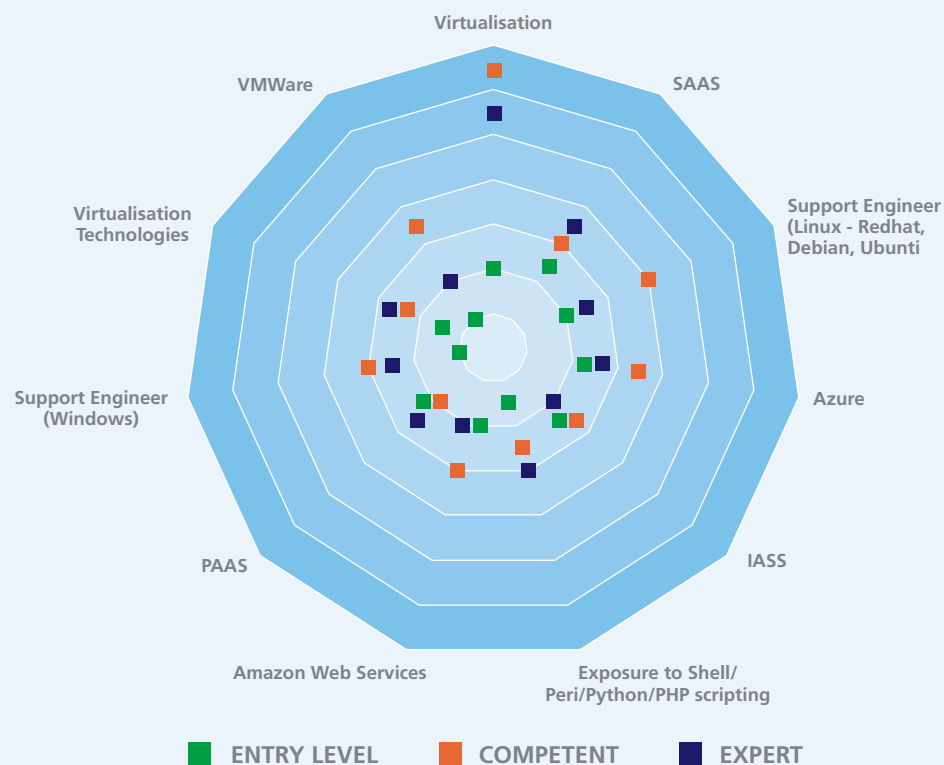
Rank	Entry Level	Competent Level	Expert Level
1	Software Testing	Software Testing	Software Testing
2	Object Oreinted Design & Development Tools	Object Oreinted Design & Development Tools	SDLC - Software Development Life Cycle
3	SDLC - Software Development Life Cycle	Project Management	Project Management
4	Project Management	SDLC - Software Development Life Cycle	Object Oreinted Design & Development Tools
5	Experience with Open Source Tools	OO Design using UML	OO Design using UML
6	Standard Revision Control (SVN) & Defect Tracking Tools (JIRA)	Soft Skills	Experience with Open Source Tools
7	Object Orientated Development	Experience with Open Source Tools	Standard Revision Control (SVN) & Defect Tracking Tools (JIRA)
8	OO Design using UML	Standard Revision Control (SVN) & Defect Tracking Tools (JIRA)	Soft Skills

Discipline 5: Cloud Computing

As in FIT's previous Skill Audit the skill most in demand is Virtualisation and most of the demand for this is clustered in the Competent and Expert levels. However there are opening in the Cloud discipline for entry level roles and exposure to SAAS, IASS and Azure along with Virtualisation skills can provide a gateway at that level.

Cloud Computing

Outer rings are highest demand



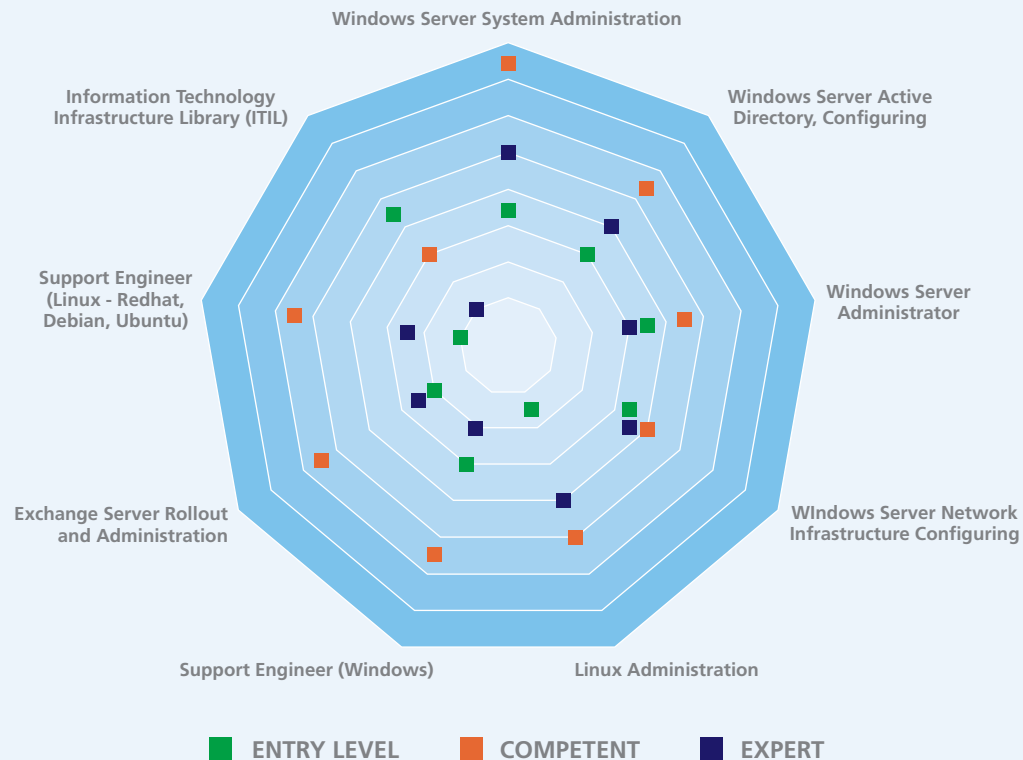
Rank	Entry Level	Competent Level	Expert Level
1	SAAS	Virtualisation	Virtualisation
2	Azure	Support Engineer (Linux-Redhat, Debian, Ubuntu)	SAAS
3	IASS	Customer Facing Skills	Exposure to Shell/Perl/Python/PHP Scripting
4	Virtualisation	Azure	Support Engineer (Linux - Redhat, Debian)
5	Support Engineer (Linux - Redhat, Debian, Ubuntu)	VMWare	Azure
6	Amazon Web Services	SAAS	Support Engineer (Windows)
7	PAAS	Amazon Web Services	Virtualisation Technologies
8	Exposure to Shell/Perl/Python/PHP Scripting	Project Management	PAAS

Discipline 6: Platform Administration

Windows Server System Administration and Windows Server Active Directory are the most in demand skill sets and provide good opportunities for those at entry and competent levels. Linux skills are also in demand which is weighted more towards Competent and Expert levels.

Platform Administration

Outer rings are highest demand



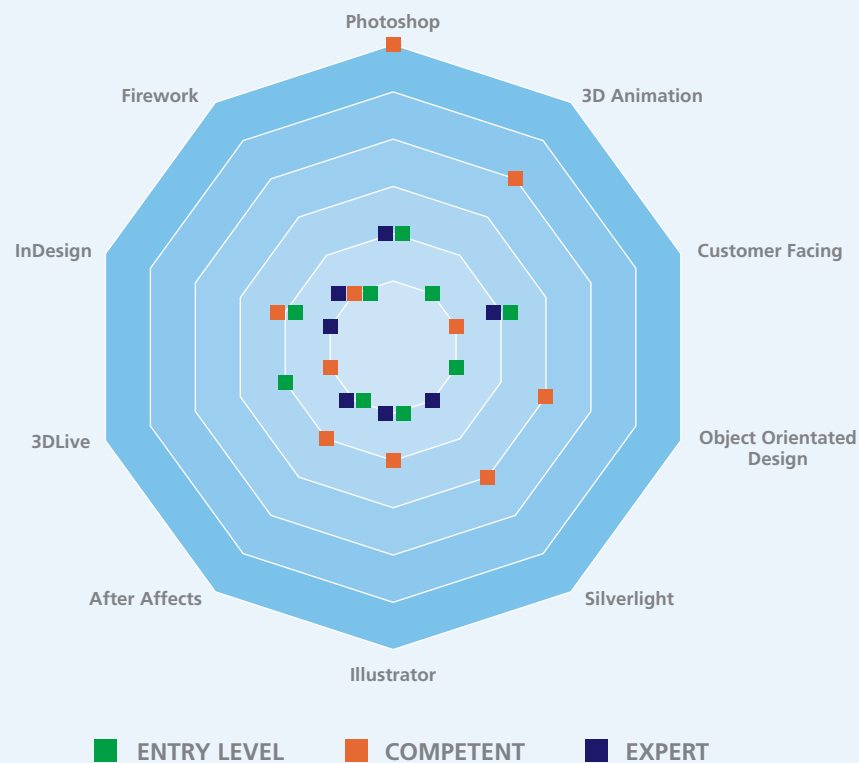
Rank	Entry Level	Competent Level	Expert Level
1	Information Technology Infrastructure Library	Windows Server System Administration	Windows Server System Administration
2	Windows Server System Administration	Windows Server Active Directory, Configuring	Windows Server Active Directory, Configuring
3	Windows Server Administrator	Support Engineer (Windows)	Linux Administration
4	Windows Server Network Infrastructure Configuring	Exchange Server Rollout and Administration	Windows Server Network Infrastructure Configuring
5	Windows Server Active Directory, Configuring	Support Engineer (Linux - Redhat, Debian, Ubuntu)	Windows Server Administrator
6	Support Engineer (Windows)	Linux Administration	Exchange Server Rollout and Administration
7	Project Management	Windows Server Administrator	Support Engineer (Linux - Redhat, Debian, Ubuntu)
8	Exchange Server Rollout and Administration	Windows Server Network Infrastructure Configuring	Support Engineer (Windows)

Discipline 7: Digital / Creative Media

The need for those at Competent level with Photoshop skills stands out but there is strong demand also for those with a balanced set of entry level skills as listed in the table below.

Digital / Creative Media

Outer rings are highest demand



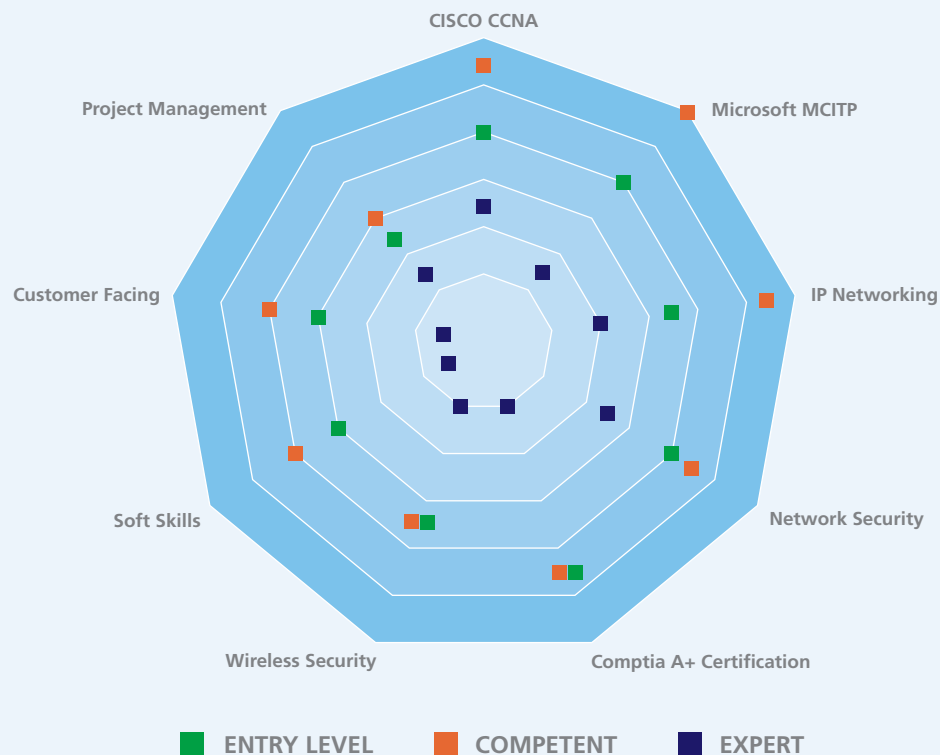
Rank	Entry Level	Competent Level	Expert Level
1	Photoshop	Photoshop	Photoshop
2	Customer facing	3D animation	Customer facing
3	3D Live	Object Orientated Design	Silverlight
4	3D animation	Silverlight	Illustrator
5	Object Orientated Design	Illustrator	After Affects
6	Illustrator	After Affects	InDesign
7	After Affects	InDesign	Firework

Discipline 8: Networking & PC Maintenance

This remains an excellent route into the ICT sector for those with entry level skills which account for about 40% of the in demand roles available. CompTIA A+ Certification is regarded by employers as an indication of desired skills at entry level and allied to Microsoft MCITP, CISCO CCNA and Security skills would make for attractive candidates at this level.

Networking & PC Maintenance

Outer rings are highest demand



Rank	Entry Level	Competent Level	Expert Level
1	Comptia A+ Certification	Microsoft MCITP	CISCO CCNA
2	CISCO CCNA	CISCO CCNA	Network Security
3	Microsoft MCITP	IP Networking	IP Networking
4	Network Security	Comptia A+ Certification	Microsoft MCITP
5	IP Networking	Network Security	Project Management
6	Wireless Security	Soft Skills	Comptia A+ Certification
7	Soft Skills	Customer Facing	Wireless Security
8	Customer Facing	Wireless Security	Soft Skills

Discipline 9: CRM

The most in demand skill is Microsoft Access/Excel and is a good skill to have at Entry and Competent levels allied to Project Management and Customer Facing skills. Four in demand CRM platform skills are Sugar, Dynamics, SAP and Salesforce and although not making the rankings in the last Skills Audit the enterprise quality management software TrackWise featured on this occasion as in demand especially at Competent and Entry levels.

CRM

Outer rings are highest demand



Rank	Entry Level	Competent Level	Expert Level
1	Project Management	Soft Skills	MS Access/Excel
2	TrackWise	TrackWise	Sugar CRM
3	MS Access/Excel	Project Management	Dynamics CRM
4	Customer Facing	Customer Facing	Salesforce
5	Sugar CRM	Knowledge of Data-base Design	Customer Facing
6	Soft Skills	MS Access/Excel	SAP
7	Knowledge of Data-base Design	Sugar CRM	Oracle
8	Peoplesoft/SAP Sharepoint	Salesforce	Soft Skills

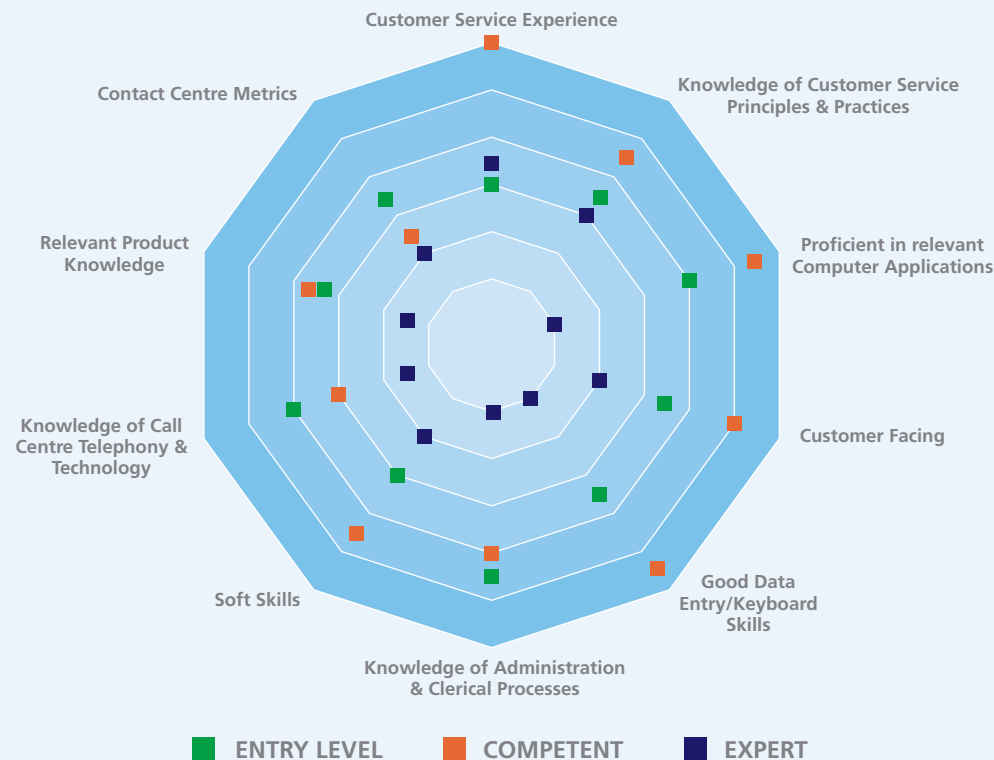
Discipline 10: Contact Centre Support

The overriding skill sets in demand were those related to Customer Service Experience and Customer Service Principles and Practices. This discipline provides a significant volume of entry level roles and these can be accessed by those with the Customer related skills noted above allied to proficiency in Computer Applications, Admin and Keyboard skills.

The survey did not address the needs for employees conversant in foreign languages as this was considered a study requiring a separate focus.

Contact Centre Support

Outer rings are highest demand



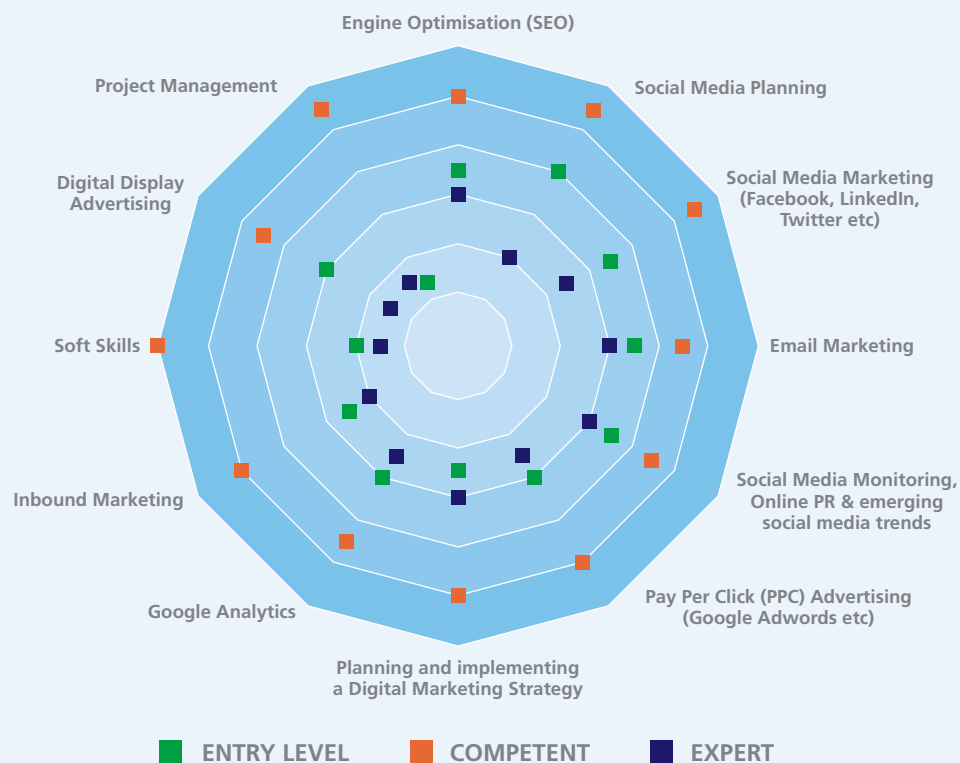
Rank	Entry Level	Competent Level	Expert Level
1	Knowledge of Administration & Clerical Processes	Customer Service Experience	Customer Service Experience
2	Proficient in relevant Computer Applications	Proficient in relevant Computer Applications	Knowledge of Customer Service Principles & Practices
3	Knowledge of Call Centre Telephony & Technology	Good Data Entry/Keyboard Skills	Customer Facing
4	Appreciation of E-Commerce / Cloud Technologies	Customer Facing	Contact Centre Metrics
5	Knowledge of Customer Service Principles & Practices	Knowledge of Customer Service Principles & Practices	Soft Skills
6	Customer Facing	Soft Skills	Knowledge of Call Centre Telephony & Technology
7	Good Data Entry/Keyboard Skills	Knowledge of Administration & Clerical Processes	Relevant Product Knowledge
8	Relevant Product Knowledge	Relevant Product Knowledge	Knowledge of Administration & Clerical Processes

Discipline 11: Digital Marketing

Skills sets in demand at all levels are Search Engine Optimisation (SEO); Social Media, Mobile & Digital Marketing Planning; email Marketing; Social Media Monitoring & Analytics; Pay Per Click Advertising and Inbound Marketing. These should be rounded out with Project Management and Soft Skills.

Digital Marketing

Outer rings are highest demand



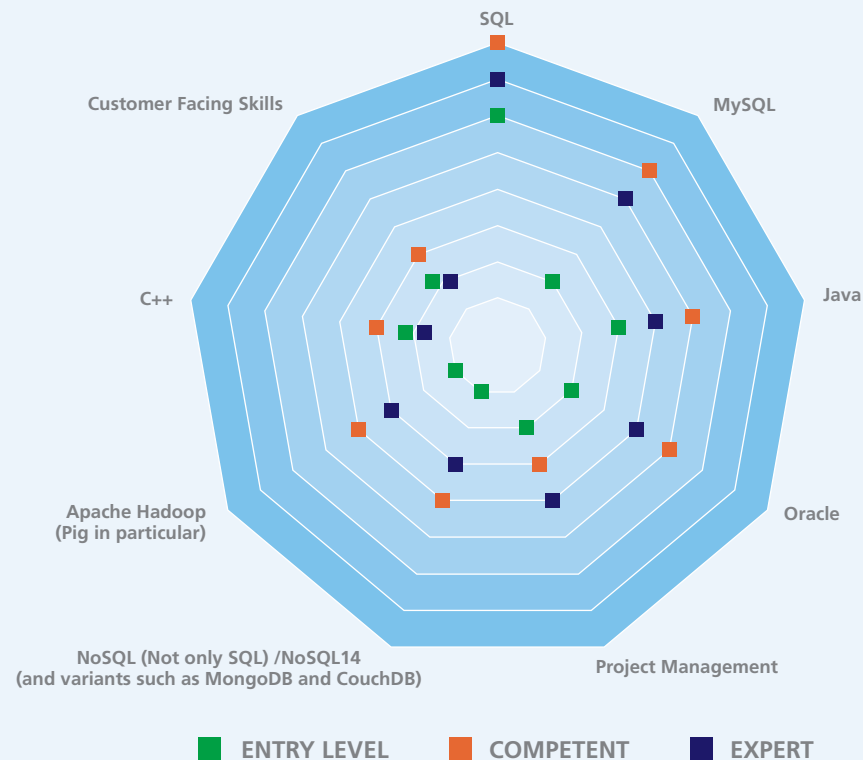
Rank	Entry Level	Competent Level	Expert Level
1	Social Media Planning	Soft Skills	Search Engine Optimisation (SEO)
2	Search Engine Optimisation (SEO)	Social Media Planning	Planning and Implementing a Digital Marketing Strategy
3	Social Media Marketing (Facebook, LinkedIn, Twitter etc)	Social Media Marketing (Facebook, LinkedIn, Twitter etc)	Email Marketing
4	Email Marketing	Project Management	Social Media Monitoring, Online PR & emerging social media trends
5	Social Media Monitoring, Online PR & emerging social media trends	Search Engine Optimisation (SEO)	Social Media Marketing (Facebook, LinkedIn, Twitter etc)
6	Pay Per Click (PPC) Advertising (Google Adwords etc)	Pay Per Click (PPC) Advertising (Google Adwords etc)	Pay Per Click (PPC) Advertising (Google Adwords etc)
7	Google Analytics	Planning and Implementing a Digital Marketing Strategy	Google Analytics
8	Digital Display Advertising	Inbound Marketing	Customer Facing

Discipline 12: Big Data Analysis

The discipline of Big Data has solid requirements at all levels for those with SQL or MySQL. As an emerging sector there are evolving requirements and a new set of technical skills that aren't readily found today. Among these are Hadoop, noSQL and PIG and although the scale of demand is not currently very large the scarcity of supply will dictate that these skills sets are sought after.

Big Data Analysis

Outer rings are highest demand



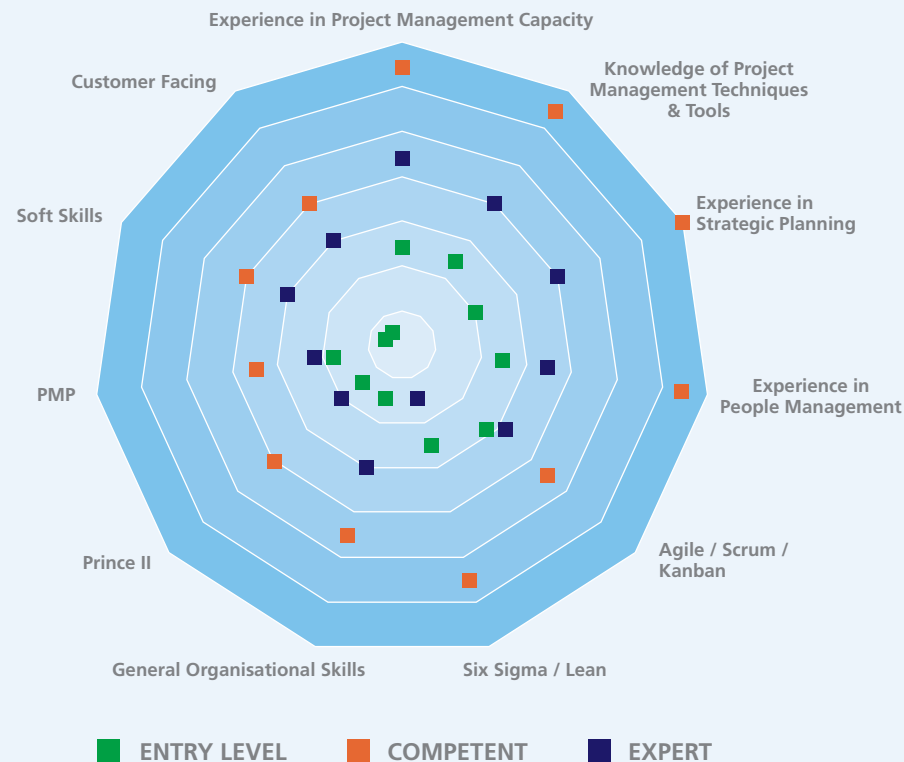
Rank	Entry Level	Competent Level	Expert Level
1	SQL	SQL	SQL
2	Java	MySQL	MySQL
3	MySQL	Java	Java
4	Oracle	Oracle	Oracle
5	Project Management	NoSQL (Not only SQL) /NoSQL14	Project Management
6	C++	Apache Hadoop (Pig in particular)	NoSQL (Not only SQL) /NoSQL14
7	Customer facing skills	Project Management	Apache Hadoop (Pig in particular)
8	Soft skills	C++	Linux

Discipline 13: Project Management

The top requirements for the Project Management discipline were for hands-on experience of Project Management, Strategic Planning and People Management combined with knowledge of the related techniques & tools. Despite the demand for experience there were still openings at Entry level especially for those with Agile / Scrum / Kanban skills.

Project Management

Outer rings are highest demand



Rank	Entry Level	Competent Level	Expert Level
1	Agile / Scrum / Kanban	Experience in Strategic Planning	Experience in Project Management Capacity
2	Experience in Project Management Capacity	Experience in Project Management Capacity	Experience in Strategic Planning
3	Knowledge of Project Management Techniques & Tools	Knowledge of Project Management Techniques & Tools	Knowledge of Project Management Techniques & Tools
4	Experience in People Management	Experience in People Management	Experience in People Management
5	Six Sigma / Lean	Six Sigma / Lean	Agile / Scrum / Kanban
6	Experience in Strategic Planning	Agile / Scrum / Kanban	General Organisational Skills
7	PMP	General Organisational Skills	Soft Skills
8	Oracle E-Business Suite	Prince II	Customer Facing

Supplementary Information

This year, for the first time, the survey added supplementary questions to the questionnaire inviting the companies to share their feedback and opinions on selected issues.* The two principal ones were:

- their key request to Government on the Skills Agenda; and
- their key request to Government on how to further support their doing business in Ireland.

Here is a summary of the responses.

Key request to Government on the Skills Agenda:

Respondents were keen to get across the lack of understanding graduates and jobseekers typically have of business, and their deficits in real-life skills and practical / work experience. They asked that government promote and prioritise usable skills that are vendor and market cognisant and engender customer awareness. In addition, there was a view that Project Management should be included in course curricula and that the acquisition of technical skills is complemented by the provision of employability skills. There was strong interest in seeing second level education explore the introduction of more continuous and project based assessment.

Key request to Government re doing business Ireland:

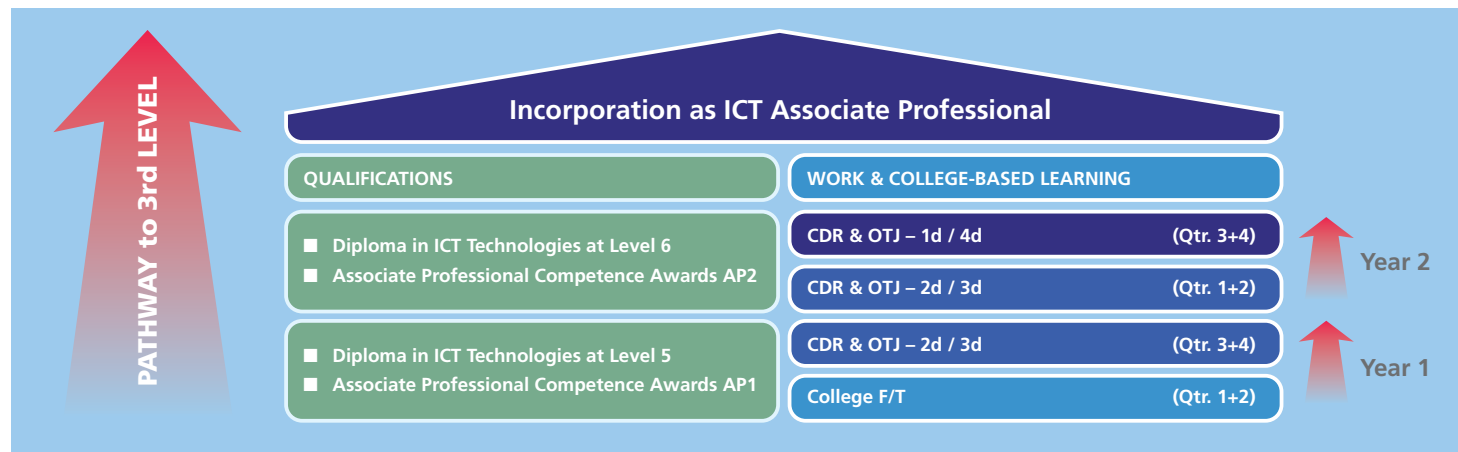
SMEs asked that it be made easier for them to access skills as some felt multinationals had the first call on a finite talent pool and, as a result, some said they had to look to the UK to locate people with experience in relevant disciplines. Government should also continue to encourage skilled people from other countries to come to live and work in Ireland. There was a request that Government should allow Founder/Owners to re-invest their income tax back into their own businesses in the start-up years and ensure the right incentives for an entrepreneurial / risk oriented culture to develop. Maintaining or reducing corporation tax was considered essential. Finally, high levels of personal taxation are becoming an impediment to recruitment when benchmarked against competing economies.

* We are grateful to respondents who shared their views on these issues and are encouraged to further develop this aspect of the survey in future versions.

A First Response - ICT Associate Professional

In response to the significant skills shortages highlighted in the previous Audit, the Board of FIT committed to creating new pathways to employment for young people and job seekers in the sector*. As an industry-led initiative with a social purpose, it sought in particular to exploit the gap that was evident between the diversity of practitioner skills the industry was seeking and the relatively narrow subset of young people and jobseekers who consider themselves, and are considered by all too many employers and tertiary providers, as candidates for employment in the sector.

The principal recommendation in the previous Skills Audit was that Ireland should initiate a dual-education model to foster a new ICT Associate Professional stream of talent for the ICT/technology workforce. FIT subsequently worked with a broad group of stakeholders in education, industry, government and agencies to design a new pathway that, over a two-year period, combines paid work experience with applied learning to equip people with in-demand ICT skills and which enables them to acquire a Level 6 Diploma culminating in an industry recognised Associate Professional status (See the graphic below). The programme is specifically designed to attract young people and jobseekers who prefer learning by doing and have a desire to earn income while training (an eligibility-based state training allowance is payable for the first six months and a wage by the employer thereafter).



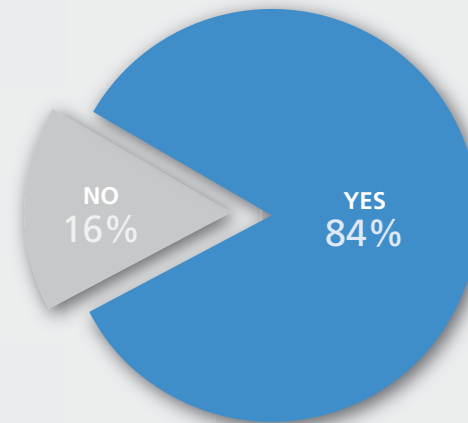
CDR: College Day Release OTJ: On The Job Training

* The Board of FIT, which is a not-for-profit company, is made up of senior executives from major multi-nationals and indigenous companies: Accenture, AOL, ARYZTA, ATOS, Cisco, EMC, Fujitsu, IBM, ICT Ireland, KantanMT, Lionbridge, Maxim, Microsoft, Novartis, Oracle, Origin Enterprises, PayPal, eBay, SAP, Skillssoft, Siemens, Sisk Healthcare, Symantec, Version 1 and Welocalise. .

FIT is delighted that the industry has endorsed this new approach and encouraged that ICT Ireland recommended its prioritisation by government. Government, in turn, listened to the views of industry and the Department of Education and Skills subsequently asked FIT to proceed with a pilot of the ICT Associate Professional initiative. FIT is currently working closely with SOLAS, ETBI, ICT Ireland and a number of participating ETBs and enterprises to get the initial pilot programmes up and running from Autumn 2014 onwards.

Strong Industry Endorsement for ICT Associate Professional at 84%

The 2014 Audit posed a third and final supplementary question to the business development managers and technology experts who were interviewed. They were asked whether their company would support the ICT Associate Professional programme being developed by FIT as a complement to existing provision. There was strong endorsement for the initiative with 84% of those who responded expressing support that in many discussions was quite emphatic.



Would your company support the introduction of a dual-education initiative (ICT Associate Professional)?

With the engagement and support of large number of prestigious companies we are confident that ICT Associate Professional Programme is a desirable, innovative and viable complementary route into the ICT workforce and will result in sustainable and rewarding careers.

Wider Implications

While the primary focus of the FIT ICT Skills Audits is the ICT sector itself, the knowledge set that FIT is acquiring through carrying them out has wider application across other sectors of the economy and for education and labour market policy in general. Since its inception, FIT in collaboration with FE providers across the county has facilitated in excess of 13,000 people to participate in vocational training technology programmes up to Level 6 certification. Its success in subsequently securing employment in ICT and related sectors for many of these trainees motivates the reflections in this section of the report.

The technology sector is a 'broad church'

The technology sector is widely associated with its requirements for, and aspiration to recruit, more graduates of STEM subjects (science, technology, engineering, and maths – particularly honours maths). However, this is far from a full representation of its requirements or of the employment opportunities it has open. While there will continue to be a strong requirement for academic achievers, the findings of the Skills Audits suggest a significantly larger and growing requirement for technical acumen and application, enhanced by project management, employability and customer facing skills. The technology sector in Ireland is, in fact, a 'broad

church' and its appetite for 'Smart People with Smart Skills' encompasses a wide spectrum of talents and attributes. It is a stereotype to regard the sector as chiefly requiring 'geniuses' or 'nerds' who enjoy spending long hours in front of computer screens doing 'heady' programming.



since its inception, FIT and FE providers have facilitated in excess of 13,000 people to participate in programmes up to Level 6 certification...

People with developed ICT skills are not just needed in the ICT sector itself (the specific focus of the Audit). More and more Irish jobs require various levels of proficiency in ICT skills, a trend which is likely to continue as more companies apply and adapt the digital technologies to manage their activities, market their products, communicate with their customers, increase productivity, etc. So it is prudent that all - even those who do not wish to become 'IT practitioners' - hone their IT skills - as technology more profoundly impacts how we work and live. The enhanced capacity emerging within the Internet of Things (IoT) paradigm will result in the emergence of new roles, skill sets and careers paths yet to be defined across all sectors of the economy.

Through the wide range of courses that FIT has designed and helped deliver for people to use ICT in a variety of different economic sectors and settings, it can confidently say that the technology sector today provides a multitude of different and interesting jobs for both women and men – for the technically minded in setting up, configuring and securing networks and infrastructure; for the arithmetically minded in building programmes and creating apps; for the creative and artistic working in the sphere of online media, marketing and design; for the ‘people minded’ in building relationships in sales, customers services and support; for the entrepreneurs in trading online; as for the geographers they are helping us navigate the globe in the comfort of our cars; and so on it goes.

50% of European jobs
will necessitate
medium skill levels...

Advanced economies will continue to have a healthy demand for workers with intermediate and entry level skills

There is a wide awareness and consensus that the future course of economic development will entail a particularly strong growth in demand for high-skilled and professional workers. But it is important not to confuse rates of growth with absolute numbers, or to forget that most job openings arise from replacement demand rather than expansion demand. In developed economies, it is estimated that only one-third of the job opportunities arising over the

coming years will be in high-skilled occupations and that, in absolute terms, there is and will remain significantly more job opportunities at lower levels of the skills ladder. For example, CEDEFOP estimates that just 35% of jobs in European economies over the coming years will necessitate high level skills, while 50% will need medium level skills and 15% low level skills. Similarly, it is noted in relation to the future skill needs of the US economy in a high tech world that two thirds of all jobs will be in the mid-to-low skills range (Holzer & Lerman). The FIT ICT Skills Audit, therefore, is not alone in uncovering a healthy demand for workers able and willing to take entry-level and middle-level positions though it is striking that it finds this to be the case even in as technologically-driven and fast-evolving sector as ICT. FIT operational activity developing and facilitating industry-focused technology programmes over the last fifteen years would concur with this finding.

The view, therefore, that the future labour market is developing to primarily require graduates should be debunked. The economy needs more than graduates. Too great an emphasis on higher education as essential for decent employment can cause many casualties - disappointed graduates who take jobs below their potential or emigrate, credentialism where degrees are required to apply for jobs that do not need them, non-degree holders being pushed off the labour ladder, downward pressures on standards in HE and, perhaps most seriously of all, the de-motivation and lesser status of those who do not have a higher education.

At the same time, the baseline skills and competencies required for entry-level and intermediate skilled jobs is not negligible and is rising. This reinforces the view that some form of post-secondary education or training is now essential for every young person and that to directly enter a job that does not involve training after finishing the Leaving Certificate or its equivalent, today constitutes in effect, 'early school leaving'. This is both a challenge and a golden opportunity for SOLAS, the ETBs and other FE providers.

A significant part of the skill requirements of the Irish economy are within the reach of further education to provide

Employers have a central role to play in ensuring that FET providers are aware of the specific skills that are in demand and of value in the workplace. At the same time employers, government, parents, students and, indeed, education providers in the public sector need to be better informed and have greater confidence in the calibre and capacity of vocational education and training to meet the high demands and expectations of industry. Equally students and job seekers need greater access to quality career guidance services.

There is a major need to boost the quality of FE provision at Levels 5 and 6 by designing and delivering courses in closer consultation with employers so that all school completers who are not advancing to higher education (still almost one-half of school completers [DES, 2013]) acquire employment footholds in enterprises and sectors where there are good

prospects of on-the-job learning and mobility. The review and improvement in recent years of FE Certification under the Common Awards System (CAS) overseen by QQI is bringing a new calibre of awards into the FET sector that is more robust and better aligned to the emerging needs of industry and the demands of the modern work-place. In tandem the recognition of proven international qualifications such as City & Guilds and industry certification within the National Framework of Qualifications and their adoption by FE will lead to higher quality provision.

As a priority, SOLAS should seek to increase the number of courses at this level that have a strong employer involvement and ensure that they are based on the real employment prospects awaiting those who successfully complete them. This implies a recalibration of current FE provision and in particular current Post-Leaving Certificate provision. The Momentum programme (now in a second round), and further programmes that stimulate innovation and reward the achievement of clearly-specified outcomes across public, not-for-profit and private sector providers equally, also deserve a much greater emphasis.

Raising the status of vocational education is a challenge for more than just the sector itself

The polarity that currently exists between FE and HE within tertiary education needs to be addressed. Influenced by Victorian perspectives on class and occupations, vocational education came to be more associated with particularly applied formats of learning and accorded a lesser standing than abstract reasoning. In truth however, all tertiary education is largely vocational and the common goal across the continuum of FE and HE is to impart the skills, knowledge and competencies necessary to participate in the economy and the information society. The persistence of a strong distinction today between vocational and academic education is intrinsically linked to the status of occupations. Accordingly the responsibility for reappraising and communicating the value Level 5 and Level 6 awards attained within FE and HE respectively lies with industry as much as it does with educationalists.

People have different styles of learning and there should, correspondingly, be diverse learning paths along which they can develop their potential and acquire in-demand knowledge and skills. Not just in Ireland, but more so than in many other countries, vocational education struggles to enjoy equal respect to that accorded academic education. Choosing vocational preparation through further education after completing school rather than higher education can even be regarded as a route that only 'weaker' students travel (in effect, not a 'choice' at all) and accorded a low status (City and Guilds, 2013). The belief is still prevalent that academic learning is the prerogative of higher education institutions and that, for example, targeting Level 6 in the further education sector implies 'missing out' on a superior offering in higher education.



in Ireland, vocational education struggles to enjoy equal respect to that accorded academic education...

This can make it more difficult for young people who prefer learning by doing to make the post-secondary choices that best build on their aptitudes and interests. It is in all likelihood contributing to the high non-completion rates at Level 6 in the higher education sector (HEA, 2014). It may also be making higher education graduates reluctant to undertake Level 6 FE courses, including those certified by industry, even though these courses could make a significant difference to their employability.

It is important that the further education and higher education 'pillars' cooperate in correcting negative or distorted views of each other and that academic achievement, learning-by-doing, vocational preparation and a welcome for each other's former students is fostered in each sector. Only the successful partnership of further and higher education will ensure that all learners, of diverse interests and capabilities, progress across and through the educational system with ambition and confidence and acquire the competencies and skills that the economy requires.

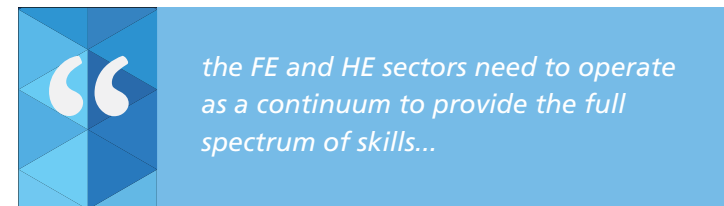
Conclusions & Recommendations

Existing and emerging skills shortages in key areas of the economy such as ICT and other sectors, if left unaddressed, could slow economic growth and the reduction in unemployment even more. It is insufficient and, indeed, unwise for policymakers and industry to rely principally on increasing the number of HE graduates in the workforce to supply the skills that the economy will need. The courses and qualifications taken by young people and job seekers across the continuum of tertiary education that is FE + HE provision need to better match the requirements of employers and critically learners' needs for subsequent employment.

Addressing the skills agenda is receiving more intense debate both at home and abroad. There are predictions that the shortage of workers with technical skills could exceed 3.4 million in the UK by 2020, with multiples of that demand across Europe. Growth sectors such as pharmaceuticals, digital technology, advanced manufacturing and green technology in the leading global economies are articulating a strong demand for mid-level technical skills, as opposed to general degree-level qualifications. This demand is for technicians who possess vocational qualifications that include Levels 5 and 6 as well as higher levels on the Irish qualification framework.

As evolutionary and revolutionary technologies emerge and are mainstreamed they are continuously reformatting the needs and demands of the labour market and, consequently, redefining the skills requirements. Technological advances in the 80s and 90s, particularly in ICT-led sectors, created a strong demand for graduate-level qualifications as enterprises adapted and deployed the new technologies in the workplace.

Over time, these once radical advances in technologies have resulted in the standardisation of some roles previously regarded as highly skilled. Evidence of such evolution today can readily be seen in particular technologies such as web infrastructure, software development tools and content management systems. At the same time, fresh technological advances kick-start new paths of deployment requiring new and varied skills sets across the qualifications spectrum.



In Ireland as in other countries, it is also important to remember that a large number of job openings (and, in many countries, much the larger number of jobs to be filled) are not new jobs created by business expansion but replacement jobs that need to be filled as older workers retire. The average age of the workforce in sectors of the economy that currently employ large number of lower and medium skilled workers, and the reasons other than retirement why people move permanently from their current jobs, is important to study (as the annual National Skills Bulletin is now doing). Factoring in the need to fill replacement jobs as well as those that are wholly new reinforces the argument that the future belongs not just to graduates but that the future economy will continue to require a broad spectrum of skill levels spanning general, technical and high-skilled occupations. The FE and HE sectors need to be planned and operate as a continuum to provide the full spectrum of skills that is needed to underpin balanced economic growth and social cohesion.

FIT believes that the data presented in this skills audit has important implications for the Irish education system. It is, certainly, the case that the jobs market, particularly in the technology and similar knowledge-intensive exporting sectors, will continue to create a strong demand for degree-holders. However, the 'human capital' requirements of even these sectors would appear to be significantly broader and it embraces people with a range of technical as well as general skills that can, in-part, be facilitated within FE provision.

Many of the roles and skills-sets in demand lend themselves to vocational forms of study. Accordingly, within the current restructuring of FE provision in Ireland, renewed focus should be given to strengthening vocational education and training, and to promoting its attributes to learners particularly, those with applied learning styles, and to encouraging employers to avail of the quality skills provided.

Recommendation 1 – EXCELLENCE: improve the quality of FE provision at Levels 5 and 6, and redirect it to where employers are prominently engaged and employment prospects are best assured.

The extent of demand and the current scale and composition of vacancies in the ICT sector is a particular opportunity and challenge to SOLAS, the ETBs and other FE providers to bring more people to participate in and complete FE. This will reduce unemployment among young people and adults who do not have higher education. While FIT is pleased that it has been encouraged to pilot a new ICT Associate Professional programme and confident that it will be successful, it believes much more can be done.

There is a major need to boost the quality of FE provision at Levels 5 and 6 by designing and delivering courses in closer consultation with employers so that all school completers who are not advancing to higher education (still almost one-half of school completers [DES, 2013]) acquire employment footholds in enterprises and sectors where there are good prospects of on-the-job learning and mobility. The review and enhancement in recent years of FE Certification under the Common Awards System (CAS) overseen by QQI is bringing a new calibre of awards into the FET sector that is more robust and better aligned to the emerging needs of industry and the demands of the modern work-place.



renewed focus should be given to strengthening vocational education and training, and to promoting its attributes to learners...

As a priority, SOLAS in tandem with ETBs should seek to increase the number of courses at this level that have a strong employer involvement and ensure that they are based on the real employment prospects awaiting those who successfully complete them. This implies a thorough recalibration of FE work-orientated provision and in particular current PLC provision. The Momentum programme (now in a second round), and further programmes that stimulate innovation and reward the achievement of clearly specified outcomes across public, not-for-profit and private sector providers equally, also deserve a much greater emphasis.

Recommendation 2 – INFORMATION: engagement between tertiary education providers and employers needs to be more systematic and granular.

Recommendation 3 – COLLABORATION: research into employer's skills needs should encompass what both FE and HE is capable of supplying. The dichotomy between further and higher education should be lessened and the two developed as a continuum.

Ireland's skills advisory infrastructure is a work in progress. There is a need to construct a more effective and systematic dialogue between tertiary education providers (FE and HE) and employers in each of a broad range of sectors in the economy so that the particular needs and circumstances of each sector can be addressed in the required detail. Much lip service is paid to the value of greater engagement between tertiary education providers and employers but the practice is difficult. Meaningful engagement is an investment and each party legitimately expects a return, viz., providers want good employment for their students and employers want employees able and equipped for the demands of the workplace. Much of the engagement to date is at the national level, bypasses regional and local actors and then lacks the intermediaries and procedures at those levels necessary for testing and adjusting the import of the high-level recommendations.

The FIT ICT Skills Audit is a proven process that facilitates 'hard listening' to employers in a specific sector. Carrying out similar granular skill needs analyses in other emerging growth sectors (green energy, pharma, medical services / devices, advanced manufacturing etc.) would enable many more employers to articulate the full breadth of their skills needs and their capacity to absorb a wide range of people in employment.

The FE sector is on the cusp of a new era with the establishment of SOLAS, the formation of the ETBs and the adoption of the first ever five-year strategy for the sector a whole. This new strategy is clear about the potential and need of the sector to be a major player in meeting the skills needs of the economy, and – on behalf of the sector – it articulates the determination that this will be a reality by 2020. It has to be acknowledged, however, that the higher education sector will continue to have the stronger institutions and procedures for identifying and responding to the skills needs of the economy for some time, procedures which it is committed to improving.



providers want good employment for their students and employers want employees able and equipped for the demands of the workplace...

There is scope and need for much greater coordination between the FE and HE sectors in how they engage with employers and develop and use labour market intelligence to identify the emerging skills needs of specific sectors. It would be ironic if the creation of new institutions and capabilities in the FET sector were to result in parallel and separate strategies rather than in the development of strong partnership which enabled each to tap synergies from their cooperation and jointly to provide a significantly enhanced and more comprehensive service to employers and learners.

Recommendation 4 – VARIETY: develop associate professional programmes or similar dual-education learning opportunities for a number of different occupations.

The options for young people completing secondary school who want to enter dual-education programmes that combine classroom and workplace learning need to be widened. This can be done by developing new apprenticeships but also by the greater use of industry-certified programmes and other dual-education learning opportunities that are designed with and for specific business sectors such as logistics, retail, restaurants, hotels, medical devices, bio-pharma/ pharma-chem, financial services, green energy, etc. FIT respectfully recommends that its ICT Associate Professional dual-education pilot programme be studied by the new Apprenticeship Council, the EGFSN and others to help speed the development of new dual-education programmes and increase the supply of quality places.

Recommendation 5 – VALIDATION: opportunities for work-based learning and work experience should become much more prevalent in tertiary education.

Opportunities for work-based learning and work experience contribute hugely to learner's subsequent success in entering employment. Employers want that candidates for employment should be able to demonstrate that they can apply what they have learned and that they should also have core employability skills required in the modern workplace. There is a growing consensus, nationally and internationally, that work placement and internship opportunities enhance college-based learning and should

be viewed as normal components of education provision across the continuum of FE/HE. Such work-based and experiential learning opportunities are key to the honing and successful application of many skills and an effective guarantor that key employability skills are also developed (reliability, self-management, team-working, communication, problem solving and – for people in intermediate and higher level positions – critical thinking, leadership and project management skills). In fact, it appears that employability skills are difficult for many people to acquire through stand-alone programmes but more easily acquired in the context of acquiring occupation-specific knowledge and skills.



work placement and internship opportunities enhance college-based learning and should be viewed as normal components of education provision...

Work experience and internships, finally, are also seen to make a tangible difference to acquiring and sustaining employment by affording both jobseekers and employers the opportunity to 'test each other out' and ensure both parties find what they are looking for.

FE providers, HE providers and employers should collaborate to provide as many students as possible with work experience and opportunities to learn while in a workplace. This exposure needs to be of appropriate duration, taken seriously by both employers and education providers and students/trainees should be formally required to reflect on their experience.

Recommendation 6 – FOCUS: all further and higher education programmes should be employment-proofed.

Core to all tertiary programmes across FE and HE must be regard for the needs and aspirations of learners for employment which therefore requires informing course curricula with the actual skill demands of employers to ensure learners career prospects are satisfactorily realised.



it may be necessary and beneficial to widely introduce the concept of Employment Proofing of courses...

To ensure that programmes lead to job placement, complementary to the skills attained, it may be necessary and beneficial to widely introduce the concept of Employment Proofing of courses whereby, all work-oriented education and training programmes, would have to satisfy a range of criteria: which demonstrate employer demand, relevance of content, methodology of provision, timescale, anticipated employment outcomes while demonstrating a regard for necessary generic and employability skills.

Recommendation 7 – DIRECTION: Young people aged 15 and over should be offered appropriate skills inventories and aptitude assessments, full information on the range of educational pathways and professional guidance to deliberate the best route and style of learning to realise their aspirations - be it an academic track or technical / vocational route, or a pathway that combines the best of both.

More can and needs to be done to ensure that job seekers, particularly young people planning to commence careers, are given accurate and informed information about the pathways within adult education and on the relevance and appropriateness of particular qualifications with regard to pursuing career aspirations and competing for jobs. From the FIT experience a key component to successful completion and effective progression from technology programmes is determining prospective candidate's interest, aptitude and aspiration from the outset.

In this regard it is vitally important that career guidance supports are adequately equipped and resourced. Society and the modern economy expects it to ensure shared prosperity, socio-economic cohesion and regard for human talent in all its formats. Recent reports on HE student's participation and progression with tertiary education suggest this needs to be addressed as a priority.

Appendix 1: FIT Skills Audit Questionnaire

Respondents were asked to map the main skills needs / vacancies in their organisations and to indicate the level of skill required for each skill listed within the applicable disciplines.

DISCIPLINE: Programming / Development Support Skills

Job Opportunities (current vacancies):

Existing Core Staff:

No.	Skill	Expert	Competent	Entry	Total
1	Java Programming				
2	Objective C				
3	C+ Programming				
4	C++ & Delphi				
5	C#				
6	.Net				
7	SQL Database Programming				
8	Visual Basic.Net				
9	Windows Server and Windows Client Editions				
10	PHP				
11	Python				
12	Ruby				
13	Oracle ADF				
14	Team Foundation Server (TFS)				
15	Project Management				
16	Soft Skills				
17	Customer Facing				
	Other Skill (Specify)				
	Other Skill (Specify)				
	Other Skill (Specify)				

DISCIPLINE: Mobile Technology / Development Platform

Job Opportunities (current vacancies):

Existing Core Staff:

No.	Skill	Expert	Competent	Entry	Total
1	Android				
2	Windows Phone				
3	iOS				
4	BlackBerry				
5	Phone Gap				
6	Xamarin				
7	HTML5/CSS/JavaScript/Jquery				
8	Windows 9				
9	Mac iOS				
10	Project Management				
11	Soft Skills				
12	Customer Facing				
	Other Skill (Specify)				
	Other Skill (Specify)				
	Other Skill (Specify)				

DISCIPLINE: Games Development

Job Opportunities (current vacancies):

Existing Core Staff:

No.	Skill	Expert	Competent	Entry	Total
1	Game State Management (GSM)				
2	Object Orientated Development				
3	3D Graphics Theory				
4	Game Logic & Design				
5	HTML5/CSS/JavaScript/Jquery				
6	Web-based Architectures & Technologies (REST, XML, JSON)				
7	C++ / Java / .Net				
8	MEL				
9	Project Management				
10	Soft Skills				
11	Customer Facing				
	Other Skill (Specify)				
	Other Skill (Specify)				
	Other Skill (Specify)				

DISCIPLINE: Web Development / Technologies

Job Opportunities (current vacancies):

Existing Core Staff:

No.	Skill	Expert	Competent	Entry	Total
1	PHP				
2	SQL				
3	MySQL				
4	Ruby				
5	Web Page Development (HTML5/CSS/JavaScript/Jquery)				
6	ASP.NET				
7	Java Web Frameworks (Spring, Hibernate, JSF/JSP etc)				
8	XML and RSS Technologies				
9	EpiServer				
10	Photoshop				
11	Dreamweaver				
12	Flash				
13	Adobe EDGE				
14	ADO.Net				
15	Project Management				
16	Soft Skills				
17	Customer Facing				
	Other Skill (Specify)				
	Other Skill (Specify)				
	Other Skill (Specify)				

DISCIPLINE: Software Development Tools and Methodologies

Job Opportunities (current vacancies):

Existing Core Staff:

No.	Skill	Expert	Competent	Entry	Total
1	Object Orientated Design & Development Tools				
2	Experience with Open Source Tools				
3	SDLC -Software Development Life Cycle				
4	Object Orientated Development				
5	OO Design using UML				
6	Standard Revision Control (SVN) & Defect Tracking Tools (JIRA)				
7	Software Testing				
8	Project Management				
9	Soft Skills				
10	Customer Facing				
	Other Skill (Specify)				
	Other Skill (Specify)				
	Other Skill (Specify)				

DISCIPLINE: Cloud Computing

Job Opportunities (current vacancies):

Existing Core Staff:

No.	Skill	Expert	Competent	Entry	Total
1	Virtualisation				
2	PAAS				
3	SAAS				
4	IASS				
5	Support Engineer (Linux - Redhat, Debian, Ubuntu)				
6	Support Engineer (Windows)				
7	Exposure to Shell/Perl/Python /PHP scripting				
8	Virtualisation Technologies				
9	VCP – VMware Certificate Professional				
10	CompTIA Network +				
11	VMWare				
12	Amazon Web Services				
13	Sphere				
14	Web Services SOAP, REST				
15	Azure				
16	HyperV				
17	IBM Storwize V7000				
18	Project Management				
19	Soft Skills				
20	Customer Facing				
	Other Skill (Specify)				
	Other Skill (Specify)				
	Other Skill (Specify)				

DISCIPLINE: Platform Administration

Job Opportunities (current vacancies):

Existing Core Staff:

No.	Skill	Expert	Competent	Entry	Total
1	Windows Server System Administration				
2	Linux Administration				
3	Exchange Server Rollout and Administration				
4	VBScript/PowerShell/C# scripting				
5	Windows Server Administrator				
6	Windows Server Active Directory, Configuring				
7	Windows Server Network Infrastructure Configuring				
8	Support Engineer (Linux - Redhat, Debian, Ubuntu)				
9	Support Engineer (Windows)				
10	Information Technology Infrastructure Library (ITIL)				
11	Audio / Video Recording				
12	Project Management				
13	Soft Skills				
14	Customer Facing				
	Other Skill (Specify)				
	Other Skill (Specify)				
	Other Skill (Specify)				

DISCIPLINE: Digital/Creative Media

Job Opportunities (current vacancies):

Existing Core Staff:

No.	Skill	Expert	Competent	Entry	Total
1	Object Orientated Design				
2	3D animation				
3	3DLive				
4	MXRToolkit				
5	ARToolkit				
6	flARToolkit				
7	Silverlight				
8	Papervision 3D				
9	InDesign				
10	Illustrator				
11	Firework				
12	After Affects				
13	Photoshop				
14	Project Management				
15	Soft Skills				
16	Customer Facing				
	Other Skill (Specify)				
	Other Skill (Specify)				
	Other Skill (Specify)				

DISCIPLINE: Networking & PC Maintenance

Job Opportunities (current vacancies):

Existing Core Staff:

No.	Skill	Expert	Competent	Entry	Total
1	CISCO CCNA				
2	Microsoft MCITP				
3	IP Networking				
4	Comptia A+ Certification				
5	CWNP Certification (Wireless Networks)				
6	Comptia Linux+				
7	Network Security				
8	Wireless Networking				
9	Digital Rights Management				
10	Project Management				
11	Soft Skills				
12	Customer Facing				
	Other Skill (Specify)				
	Other Skill (Specify)				
	Other Skill (Specify)				

DISCIPLINE: CRM

Job Opportunities (current vacancies):

Existing Core Staff:

No.	Skill	Expert	Competent	Entry	Total
1	Oracle				
2	SAP				
3	Salesforce				
4	PeopleSoft				
5	Dynamics CRM				
6	Sureskills				
7	Knowledge of Data-base Design				
8	Sugar CRM				
9	MS Access/Excel				
10	SharePoint				
11	Hana				
12	TrackWise				
13	Project Management				
14	Soft Skills				
15	Customer Facing				
	Other Skill (Specify)				
	Other Skill (Specify)				
	Other Skill (Specify)				

DISCIPLINE: Call Centre/Contact Centre Support

Job Opportunities (current vacancies):

Existing Core Staff:

No.	Skill	Expert	Competent	Entry	Total
1	Proficient in relevant Computer Applications				
2	Knowledge of Customer Service Principles & Practices				
3	Knowledge of Call Centre Telephony & Technology				
4	Customer Service Experience				
5	Good Data Entry/Keyboard Skills				
6	Knowledge of Administration & Clerical Processes				
7	Relevant Product Knowledge				
8	Appreciation of E-Commerce / Cloud Technologies				
9	Contact Centre Metrics				
10	Project Management				
11	Soft Skills				
12	Customer Facing				
	Other Skill (Specify)				
	Other Skill (Specify)				
	Other Skill (Specify)				

DISCIPLINE: Digital Marketing

Job Opportunities (current vacancies):

Existing Core Staff:

No.	Skill	Expert	Competent	Entry	Total
1	Engine Optimisation (SEO)				
2	Pay Per Click (PPC) Advertising (Google Adwords etc)				
3	Google Analytics				
4	Email Marketing				
5	Inbound Marketing				
6	Social Media Planning				
7	Social Media Marketing (Facebook, LinkedIn, Twitter etc)				
8	Social Media Monitoring, Online PR & emerging s/m trends				
9	E – commerce				
10	Digital Display Advertising				
11	Mobile Marketing				
12	Affiliate Marketing				
13	Planning and Implementing a Digital Marketing Strategy				
14	Project Management				
15	Soft Skills				
16	Customer Facing				
	Other Skill (Specify)				
	Other Skill (Specify)				
	Other Skill (Specify)				

DISCIPLINE: Big Data

Job Opportunities (current vacancies):

Existing Core Staff:

No.	Skill	Expert	Competent	Entry	Total
1	NoSQL (Not only SQL) /NoSQL14 (and variants...)				
2	Oracle				
3	Java				
4	SQL				
5	Linux				
6	Apache Hadoop (Pig in particular)				
7	MySQL				
8	C++				
9	JavaScript				
10	UNIX				
11	Python				
12	Project Management				
13	Soft Skills				
14	Customer Facing				
	Other Skill (Specify)				
	Other Skill (Specify)				
	Other Skill (Specify)				

DISCIPLINE: Softskills

Job Opportunities (current vacancies):

Existing Core Staff:

No.	Skill	Expert	Competent	Entry	Total
1	Communication Verbal				
2	Communication Written				
3	Presentation Skills				
4	Leadership				
5	Customer Focus				
6	Self-starter				
7	Teamwork				
8	Multi-tasking				
9	Prioritisation				
10	Project Management				
11	Soft Skills				
12	Customer Facing				
	Other Skill (Specify)				
	Other Skill (Specify)				
	Other Skill (Specify)				

DISCIPLINE: Project Management

Job Opportunities (current vacancies):

Existing Core Staff:

No.	Skill	Expert	Competent	Entry	Total
1	Prince II				
2	Agile / Scrum / Kanban				
3	IBM DevOps				
4	Six Sigma / Lean				
5	SAP Business Suite				
6	SAP ERP				
7	Knowledge of Project Management Techniques & Tools				
8	Experience in Project Management Capacity				
9	Experience in People Management				
10	Experience in Strategic Planning				
11	PMP				
12	Comptia Project +				
13	Oracle E-Business Suite				
14	Oracle ERP				
15	Project Management				
16	Soft Skills				
17	Customer Facing				
	Other Skill (Specify)				
	Other Skill (Specify)				
	Other Skill (Specify)				

Job specifications /vacancies which are most difficult to fill?

No.	
1	
2	
3	
4	

Does the Company avail of Government Programmes?

		No	Yes
A	JobBridge		
B	Springboard		
C	Momentum		

Key request to Government on the Skills Agenda?

Key request to Government re: doing business Ireland?

Would the company support the introduction of a dual-education initiative (ICT Associate Professional) as a complement to existing provision?

Other comments

Appendix 2: List of Participating Companies

Abydos Games	Excite	RTS Remote Technology Services
Accenture	Fidelity Investments	SAP
Akari Software Limerick	FINEOS Corporation	Skillsoft
AOL	Fujitsu	Sisk Healthcare
AQMetrics	IBM	Solar Winds
Camara	ICON	Southwestern (SWS)
Carl Stuart Group	IT Force	Storm Technology
Central Bank	KantanMT	Strata IT
CISCO	Lionbridge	Sugra Games
CIX (Cork Internet Exchange)	Mater Hospital	Sun Life Financial
Codec-dss	Maxim	Suntico
Conappsol	McKesson	Symantec
Concern	Microsoft	Tekenable
CPL	Northwood	Trilogy Technologies
DCS	Novartis	Version 1
DCU ISS	O2 - Telefonica	Webworkhouse
Educe	Openjaw Technology	Zartis
Ergo	PFH	Zynga Games

A number of other companies who responded to the survey requested not to be included in this table but agreed to have their responses / data included in the analysis / report.

Extracts from the Report

The technology sector is widely associated with its requirements for, and aspiration to recruit, more graduates of STEM subjects (science, technology, engineering, and maths – particularly honours maths). However, this is far from a full representation of its requirements or of the employment opportunities it has to offer. While there will continue to be a strong requirement for academic achievers, the findings of the Skills Audits suggest a significantly larger and growing requirement for technical acumen and application, enhanced by project management, employability and customer facing skills. The technology sector in Ireland is, in fact, a 'broad church' and its appetite for 'Smart People with Smart Skills' encompasses a wide spectrum of talents and attributes. It is a stereotype to regard the sector as chiefly requiring 'geniuses' or 'nerds' who enjoy spending long hours in front of computer screens doing 'heady' programming.

The polarity that currently exists between FE and HE within tertiary education needs to be addressed. Influenced by Victorian perspectives on class and occupations, vocational education came to be more associated with particularly applied formats of learning and accorded a lesser standing than abstract reasoning. In truth however, all tertiary education is largely vocational and the common goal across the continuum of FE and HE is to impart the skills, knowledge and competencies necessary to participate in the economy and the information society. The persistence of a strong distinction today between vocational and academic education is intrinsically linked to the status of occupations. Accordingly the responsibility for reappraising and communicating the value Level 5 and Level 6 awards attained within FE and HE respectively lies with industry as much as it does with educationalists.

The technology sector today provides a multitude of different and interesting jobs for both women and men – for the technically minded in setting up, configuring and securing networks and infrastructure; for the arithmetically minded in building programmes and creating apps; for the creative and artistic working in the sphere of online media, marketing and design; for the 'people minded' in building relationships in sales, customers services and support; for the entrepreneurs in trading online; as for the geographers they are helping us navigate the globe in the comfort of our cars; and so on it goes.