"...because Hunches and Guesswork are not enough!"

A Study on the IT labour market in the UK

Report commissioned by:

CPHC
The Council of Professors and Heads of Computing

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A Study on the IT labour market in the UK

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1 Executive Summary

At a time when the number of Higher Education students and graduations for "All Subjects" is at a record high, Higher Education Computing student numbers and graduations are falling.

➢ *Students:*
HE Computing students fell by 22.3% from 2003-04 to 2006-07 (from 137,650 down to 106,910), and are now at their lowest level since 1999-2000.
  ▪ Over the same period "All subject" student numbers increased by 5.1% (from 2,247,440 to 2,362,815)
➢ *Graduations:*
HE Computing graduations fell by 16.5% from 2004-05 to 2006-07 (from 37,445 down to 31,270), and are now at their lowest level since 2001-2002.
  ▪ Over the same period "All subject" graduations increased by 2.8% (from 633,045 to 651,060)

An even larger decline can be seen in the number of pupils studying A-Level Computing courses (down 46.8% since 2003). This can be seen as an indicator of a continuing decline in future applications for Higher Education Computing courses.

➢ The number of pupils studying Computing at A-Level has fallen every year since an all time high in 2003 (down 48.6% from 10,913 to 5,610).
➢ As A-Level subjects are chosen by students, the fall indicates a reduction in the popularity of Computing as a career path

Without significant intervention, the fall in the annual number of Computing graduates will continue for the next 3 years at least.

➢ The number of UCAS applications and acceptances for Computing courses has fallen for the last 6 years (UCAS applications hit their highest point in 2001 and lowest in 2007). This will result in a fall in the number of students graduating until at least 2010.
➢ Long term change is only possible if a major initiative is launched to increase Higher Education Computing student numbers.

Higher Education qualifications are of fundamental importance to employment in the IT labour market.

➢ In 2004, 54% of IT professionals had a degree, and 39% of IT professionals with a degree had a Computing degree.

The IT labour market is set to grow by 163,000 from 2007 to 2016 (from 1,069,000 up to 1,232,000).

➢ Continuing demand for staff in the IT labour market across a wide range of roles is leading to a net growth in the number employed.
➢ The single largest area of growth will be amongst Software Professionals, a role for which a high degree of technical knowledge, capability and training is required.

Executive Summary (continued)

A substantial number of IT labour market appointments are made each year.
- ➢ 179,800 appointments are made each year in the IT labour market, the majority (78.5%; 141,300) of which will go to "new entrants" (people who are not currently in the IT labour market).
- ➢ Of this annual requirement of 141,300, 26,800 will be joining direct from education. Only a proportion of this 26,800 will be Computing graduates.
- ➢ A decline in the number of computing graduates will result in fewer "new entrants" from Higher Education having the necessary deep-based technical skills.

The worst skill gap in the IT labour market relates to technical skills.
- ➢ 38% of IT Managers have a technical skill gap, as do 12% of Networking Staff, 10% of Programmers, and 10% of PC Support Staff.
- ➢ It is crucial to understand that technical staff and managers are the two areas where the largest employment growth will take place over the coming years.
- ➢ A technical skill gap amongst such people is a serious problem.
- ➢ A major initiative/focus is needed to resolve this technical skill gap

Other skill gaps exist, especially amongst IT Managers.
- ➢ 23% of IT Managers have a business skills gap, 22% have an interpersonal skills gap, and 22% have an "other" (undefined) skills gap.
- ➢ By contrast, the level of business skills gap and interpersonal skills gap amongst other IT roles is small (less than 10%).

In 2005, an IT "Skill-Shortage Vacancy" was experienced by 5% of all employers. This equates to 28% of all employers with a vacancy.
- ➢ This confirms skill shortages as a serious issue for employers.

Several potential solutions exist to the IT Skill Gap, only some of which are short-term.
- ➢ These include Offshoring, Graduate retention, Immigration, Postgraduate education and Commercial training.
- ➢ Government and employers are already working on several of these.
- ➢ Part of the solution is being guided by the UK Government's Knowledge Economy agenda, although more visible evidence of action is required.

A European paper identified a very similar set of solutions back in 2000.
- ➢ The year 2000 was just before the current decline in Computing student/graduate numbers.
- ➢ While many of the solutions proposed have been discussed for a number of years, to-date there have been very few actions based on these proposals.

2   Higher Education in the UK – All subjects & Computing

Key Takeaways

➢ Higher Education Computing student numbers and qualifications are falling.

➢ Higher Education Computing qualifications have declined since 2004-05, while "All Subjects" qualifications continue to increase.

➢ UCAS Computing applications have fallen by 48.2% since 2001.

➢ Due to a continued fall in student applications, Computing qualifications will continue to decline until at least 2010.

➢ The number of UK Higher Education Computing students & graduations is declining. (Figures 2 & 6)

  o *HE computing students fell by 22.3% from 2003-04 to 2006-07 (137,650 down to 106,910)*

  o *HE computing graduation fell by 16.5% from 2004-05 to 2006-07 (37,445 down to 31,270)*

➢ The number of students taking A-Level Computing courses has fallen even more sharply. (Figure 9)

  o *A-level computing students fell by 48.6% from 2001 to 2007 (10,913 down to 5,610)*

  o *A-level computing students fell by 33.9% from 2004 to 2007 (8,488 down to 5,610)*

➢ The number of UK Higher Education students & graduations (all subjects) is increasing. (Figure 1)

  o *HE students (all subjects) increased by 5.1% from 2003-04 to 2006-07 (2,247,440 up to 2,362,815)*

  o *HE graduations (all subjects) increased by 9.1% from 2003-04 to 2006-07 (595,640 up to 651,060)*

Higher Education (HE) in the UK is provided by a large number of institutions such as universities and Higher Education colleges. Taken together, these are termed Higher Education Institutions (HEIs).

2.1 Higher Education Qualifications Obtained in the UK

The number of Higher Education qualifications (all subjects) being obtained in the UK increased at a compound rate of more than 4.5% per annum from 1997-98 to 2006-07. During that period, the number of HE qualifications obtained increased every single year. It can be predicted that this will continue to increase. Figure 1 depicts the growing number of Higher Education qualifications being obtained in the UK.

Figure 1: HE Qualifications Obtained in the UK (1997–98 to 2006–07)

Source: http://www.hesa.ac.uk/
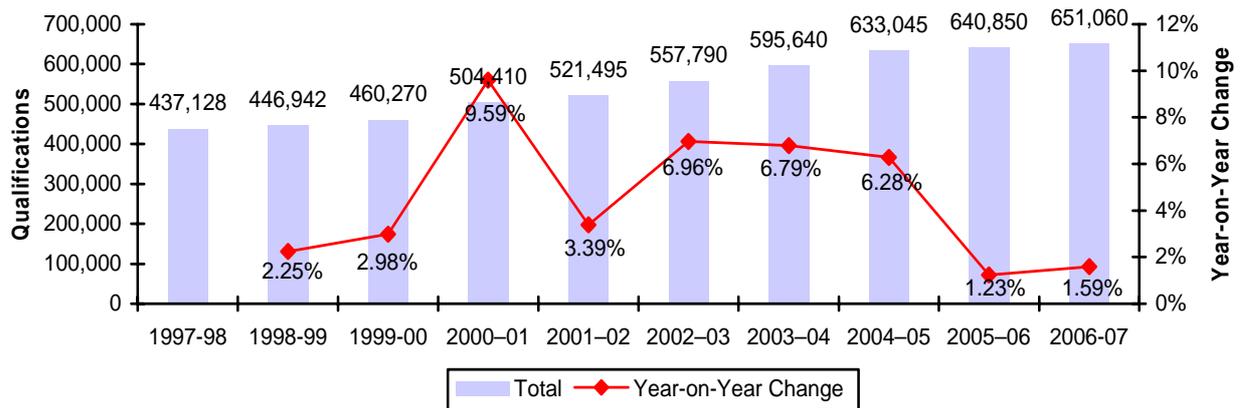
2.1.1 UK Higher Education Computing Qualifications

Figure 2 shows a consistent increase in the number of Higher Education Computing qualifications between 1997-98 and 2004-05. Since then, the number of Higher Education Computing qualifications has fallen significantly.

The number of Higher Education qualifications obtained in Computing more than doubled from 1997-1998 to 2004–05 (107% increase; 18,063 up to 37,445). This was followed by a 16.5% decrease from 2004–05 to 2006–07 (37,445 down to 31,270).

In 2006-07, the last period for which data is available, Higher Education Computing qualifications were at their lowest level since 2001-02.

As in Figure 1 these figures include qualifications obtained by full-time and part-time students.

Figure 2: HE Qualifications in Computing (1997–98 to 2006–07)
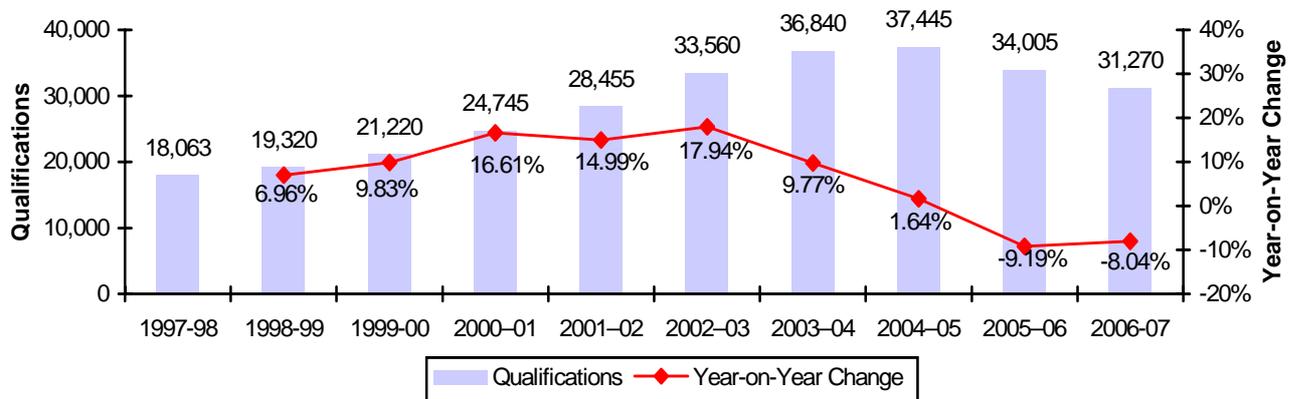
Source: http://www.hesa.ac.uk/dox/dataTables/studentsAndQualifiers/download/quals0506.xls, Research Insight Analysis

Figure 3 shows that Higher Education Computing qualifications obtained in the UK in 1997-98 were 4.13% of all Higher Education qualifications. This peaked at 6.18% in 2003-04 before falling to 4.80% in 2006-07.

In 2006-07, the last period for which data is available, Higher Education Computing qualifications formed the smallest percentage of all Higher Education qualifications since 1999-00.

As will be shown later, this situation is occurring at the same time as the annual demand for IT professionals is predicted to increase consistently.

Figure 3: Computing as a percentage of all HE Qualifications (1997-98 to 2006–07)
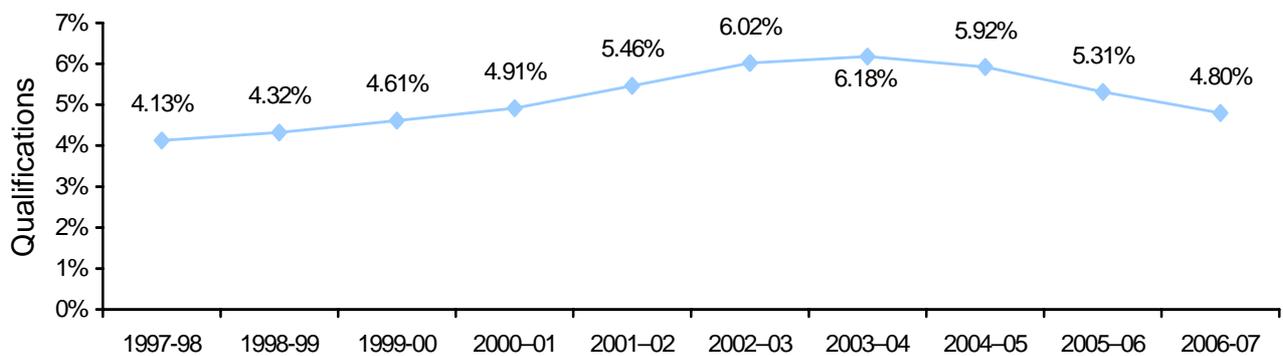
Source: http://www.hesa.ac.uk/, Research Insight Analysis

Figure 4 shows that, for the six years from 1998-99 to 2003-04, the number of Computing qualifications grew faster year-on-year than that for "All Subjects".

From 2004-05, however, the situation changed.

In 2004-05 the growth in Computing qualifications was a quarter (1.64% ÷ 6.28%) of that for "All Subjects". It then went into decline, while "All Subjects" qualifications continued to increase.

Figure 4: Year-on-year Change in HE Qualifications (1998-99 to 2006-07)
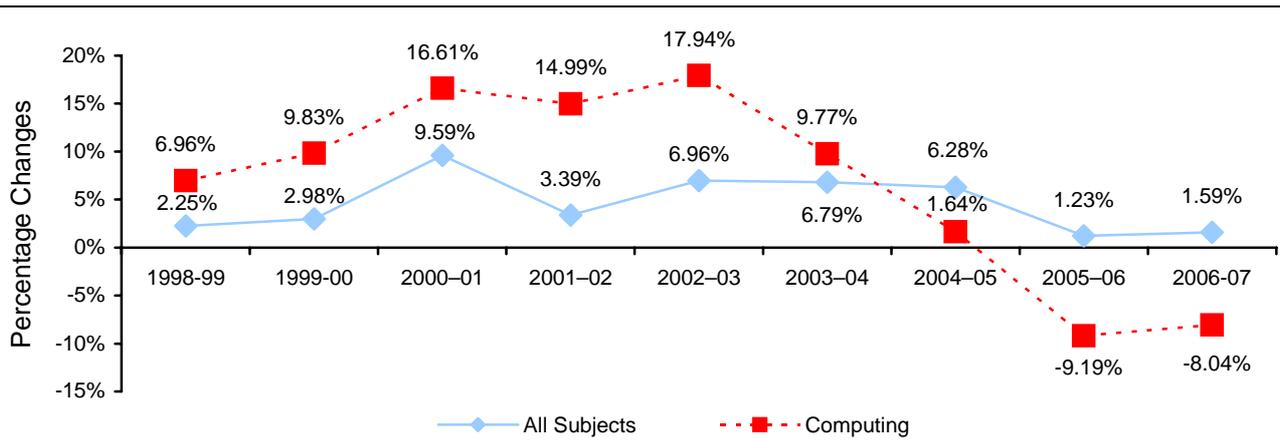
Source: http://www.hesa.ac.uk/, Research Insight Analysis

2.1.2   UK Higher Education Computing Students

UK universities attract a large number of students not only from the UK but from many EU and non-EU countries; approximately 2.3 million students were enrolled (studying) in Higher Education courses during 2006–07.[1] Figure 5 shows the number of students on all Higher Education courses in the UK.

Figure 5:   HE Students in the UK (1997-98 to 2006–07)

Source: http://www.hesa.ac.uk

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[1] Source: http://bookshop.universitiesuk.ac.uk/downloads/patterns7.pdf
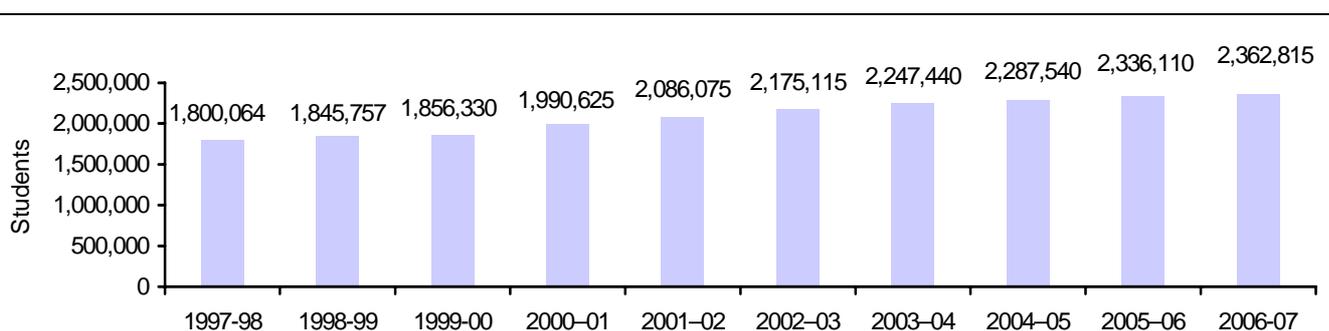
Figure 6 shows the number of students on Higher Education Computing courses during 1997-98 to 2006-07.

Figure 6:   HE Students on Computing Courses (1997-98 to 2006–07)

Source: http://www.hesa.ac.uk/, Research Insight Analysis
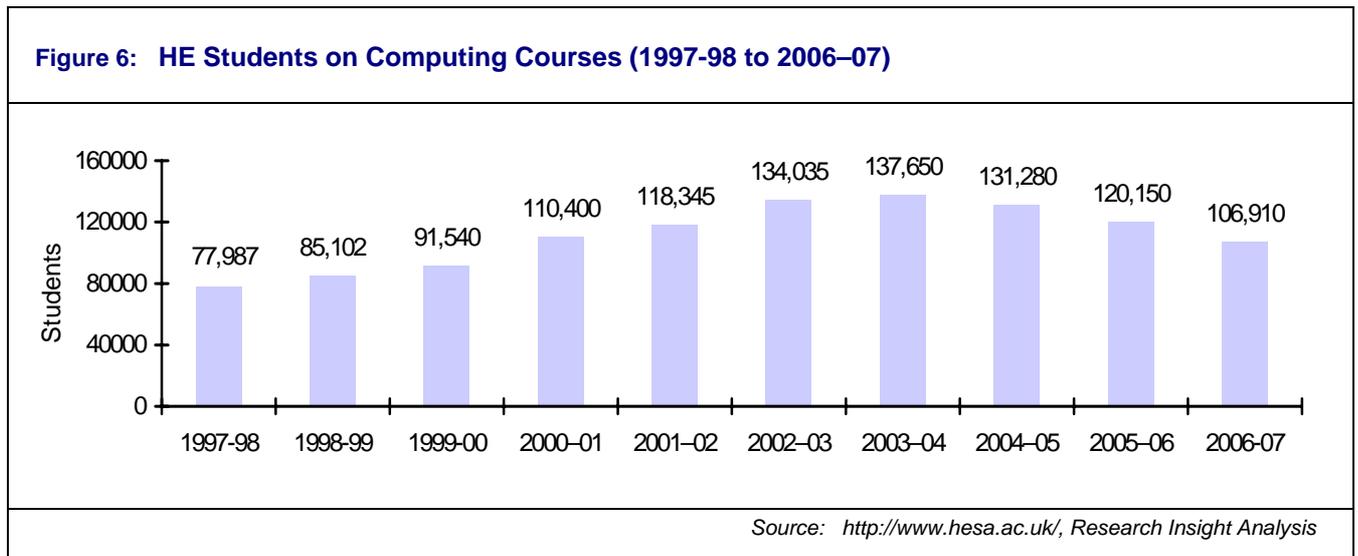
Overall the number of Higher Education qualifications obtained in Computing increased by approximately 50% from 1999–00 to 2003–04. This is followed by a decrease of approximately 22% from 2004–05 to 2006–07.

As expected, the general trend of the number of students on Higher Education Computing courses closely resembles that of qualifications gained.

Figure 7 shows the percentage change of students on Higher Education courses during 1997-98 to 2006-07. The number of "All Subject" students increased every year from 1998-99 to 2006-07, the highest year-on-year growth being 7.23% in 2000-01.

By contrast, the total number of Higher Education Computing students started falling year-on-year in 2004-05.

Figure 7:   Year-on-year Change in HE Student Numbers (1998-99 to 2006–07)

Source: http://www.hesa.ac.uk/, Research Insight Analysis
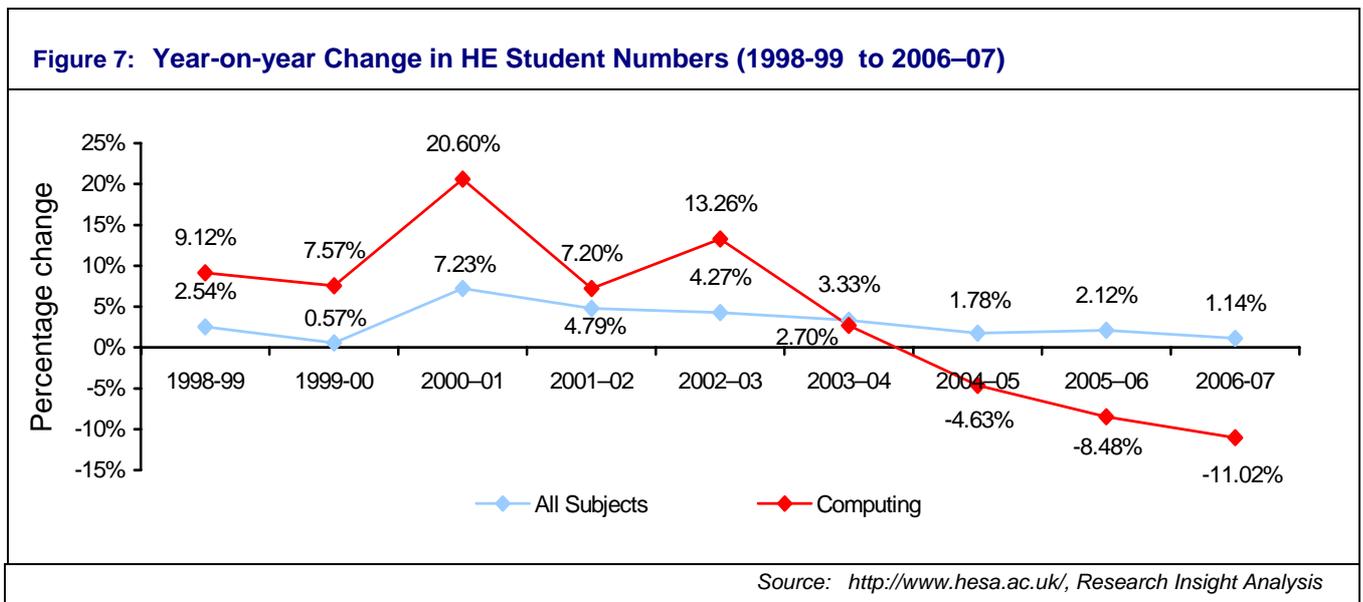
As has been shown earlier (see Figure 3), Higher Education Computing qualifications starting falling in 2004-05 as a percentage of all Higher Education qualifications.

In a similar way, Higher Education Computing student numbers starting falling in 2003-04 as a percentage of all Higher Education enrolments.

In 2006-07, Higher Education Computing students represented the lowest percentage of all Higher Education students since 1997-98.

Figure 8: Computing as percentage of all HE Student Numbers (1997–98 to 2006–07)
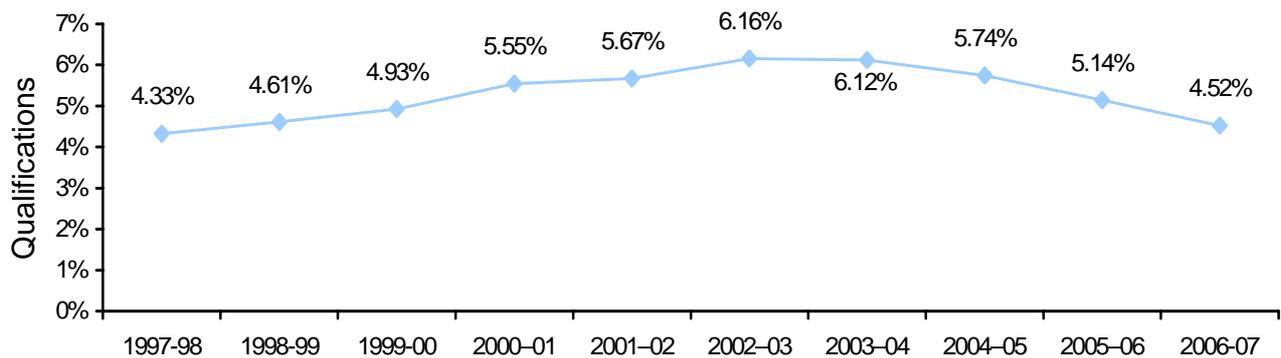
Source: http://www.hesa.ac.uk/, Research Insight Analysis

2.1.2.1   Higher Education Computing applications are falling

After five years of steady growth (90% growth from 1996 to 2001) the number of students applying for UK Computing undergraduate courses has fallen every year since 2001. Since 2001, applications have fallen 48.2%, from 29,477 (in 2001) to 15,258 (in 2007). This 2007 level is even lower than that achieved in 1996.

A similar pattern can be observed for acceptances onto Higher Education Computing courses.

Figure 9: UCAS Undergraduate Applicants & Acceptances for Computing Courses (1996–07)*
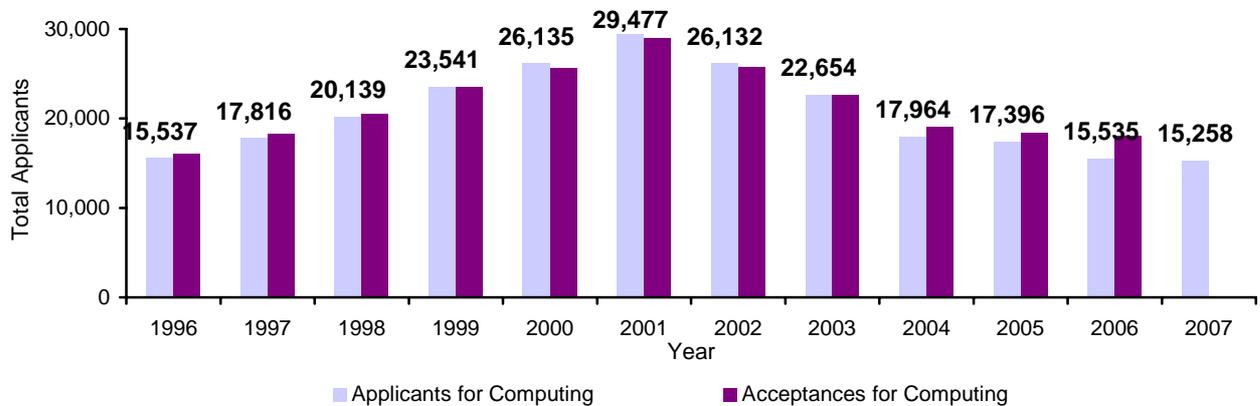
Source: http://www.ucas.ac.uk
Note : Labels refer to number of Applicants: Acceptances follow a similar pattern

This continuing reduction in the number of applicants and acceptances for Higher Education Computing courses suggests that Computing qualifications/graduations will continue to fall until at least 2010[2].

2.1.2.2 A-level Computing and ICT Courses

At about the same time as the number of Higher Education Computing students started falling, the number of students taking A-level Computing and ICT courses showed a similar decline.

As A-Level subjects are chosen by students, this fall in interest represents a potential indicator of a future reduction in the number of students applying for Higher Education Computing Courses.

Figure 10 shows that, from 2001 to 2007, the number of students in A-level Computing courses declined by 48.6%, and by 44.7% from 2003 to 2007.

After a period of significant growth in students taking ICT courses between 2001 and 2003, the number of students studying A-level ICT has fallen by 25.9% between 2003 (the high point for student numbers) and 2007.

While 2007 ICT student numbers are higher than that for 2001, the more important story is the decline since 2003.

Figure 10: Students in A-level Computing Courses (2001–07)[3]
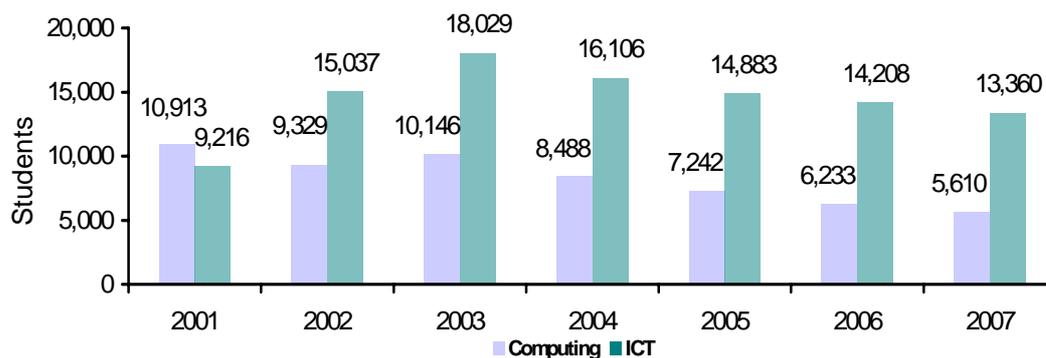
Source: Report on Technology Counts IT and Telecom Insights 2008 (e-skills UK)

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[2] This prediction is valid unless the number of overseas students and postgraduate students taking Computing courses more than counterbalances the decline in UK applications for Computing undergraduate courses.

[3] Source: HESA; Includes any combination of GCE A-level/A-level equivalent qualifications, SQA higher and equivalent qualifications plus GNVQ/GSVQ level 3, NVQ/SVQ level 3 and BTEC, and SQA National Certificate/Diploma (ONC/OND).

2.1.3 External Pressure on the Computing Industry

The Year 2000 saw the start of what has been labelled the "dot com bust" with high-tech share prices plummeting and several high profile businesses closing.

> *"The industry, accustomed only to glamour and success, is suffering its first-ever serious slump, as corporate buyers scale back their spending… Just over a year ago, high-tech shares slumped, as dot.com after dot.com went bust in a sharp and unexpected reverse of the heady boom of the late 1990s."*
>
> – **BBC News Online, 4 September, 2001**

Confidence levels in the wider computing industry were shaken, but the "dot com bust" did not reduce the IT labour market's demand for IT skills.

It can be observed that in 2001, at the peak of the Computing enrolments and qualifications gained, there was already a very real need for more IT skills in the Industry.[4]

> *"So how safe is your tech job? The good news is that if you live in Europe and you have marketable IT skills, there is no reason why you should find yourself out of work in the next twelve months. The shortage of skilled IT workers is so acute that even if you face the loss of one job will you will very easily find another."*
>
> **– Znet.co.uk, 29 March 2001**

In Europe at least, it appears that employer demand for Computing skills did not reduce, even though the common perception was otherwise.

However, while no direct link can be proven there is a clear correlation between a) the fall in the number of Higher Education acceptances onto Computing Courses and b) the challenges faced by the computing industry during this time. [5] [6]

It is clearly possible that concerns about business survival and employment in the high-tech industry had a knock-on effect that reduced enthusiasm for starting Higher Education Computing courses, despite a large part of the computing industry experiencing "business as usual".

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[4] http://news.zdnet.co.uk/internet/0,1000000097,2085373,00.htm

[5] Source: Telephone interviews with senior academic staff at Birkbeck University and the University of Ulster

[6] BBC News Online Tuesday, 4 September, 2001 - http://news.bbc.co.uk/1/low/business/1524820.stm

3   Supply of IT labour in the UK

Key Takeaways

➢ Higher Education degree qualifications are of fundamental importance to employment in the IT labour market.

➢ In 2004-05, 54% of IT Professionals have a degree.

➢ In 2004-05, 39% of those with a degree qualification had a Computing degree.

➢ The number of jobs in the IT labour market is expected to increase from 1,069,000 (2007) to 1,232,000 (2016), a growth of 163,000 or 15.2%.
  o This equates to approximately 18,000 new jobs each year requiring 3,500 more Higher Education Graduates each year

➢ After churn, a total of 179,800 appointments are expected to be made annually in the UK IT labour market.
  o *19% (26,800) are expected to be filled direct from Education*
  o *39% (70,900) are expected to be filled by those moving from non-IT/ICT roles*
  o *Just 21% (38,600) are expected to be filled by those already in an IT role*

➢ More vacancies are predicted for Software Professionals (46,900) than any other specialist area
  o *82% of these vacancies are predicted to be filled by "New Entrants"*

➢ Computing graduate "new entrants" to the IT labour market are more likely than other "new entrants" to be employed in technical roles (eg Software Professionals, Operations Technicians and IT User Support).

➢ "New entrants" to the IT labour market from non-IT/ICT positions are more likely than other "new entrants" to be employed in Management positions.

3.1   IT employment

In 2007, as shown in Table 1, it was estimated that a total of 1,069,000 people were employed in IT roles within the UK.

This is projected to increase by 1,232,000 by 2016, a growth of 163,000 (+15.2%) on 2007 or an average of 18,111 per annum.[7]

Table 1: IT and Telecom Professionals in the IT labour market by Occupation 2007–16

IT ROLES	NUMBER OF PROFESSIONALS		GROWTH IN POPULATION 2007-2016
	2007	**2016 E**	
Software Professionals	317,000	403,000	+86,000
ICT Managers	286,000	324,000	+38,000
IT Strategy & Planning	140,000	176,000	+36,000
IT Operations Technicians	125,000	134,000	+9,000
IT User Support	48,000	51,000	+3,000
Computer Engineers	37,000	35,000	-2,000
Others	116,000	109,000	-7,000
Total	**1,069,000**	**1,232,000**	**+163,000**

As evident from Table 1, the total number of IT professionals will increase from 1.06 million in 2007 to 1.23 million in 2016. The table also shows a shift towards 'high-level skills', since the majority of the growth in the number of professionals is witnessed in 'high-level skills' roles such as ICT Managers and IT Strategy profiles.

Figure 11 shows that in 2004-05, a total of 54% of IT professionals had a degree. A total of 21% had an IT/Computing degree, representing 39% of all those who are degree-qualified.

Higher Education degree qualifications are of fundamental importance to employment in the IT labour market.

Figure 11: Qualification level of IT Professionals – In All Industries (2004-05)

IT/Computing Degree 21%

No Degree 46%

"Other" Degree 33%
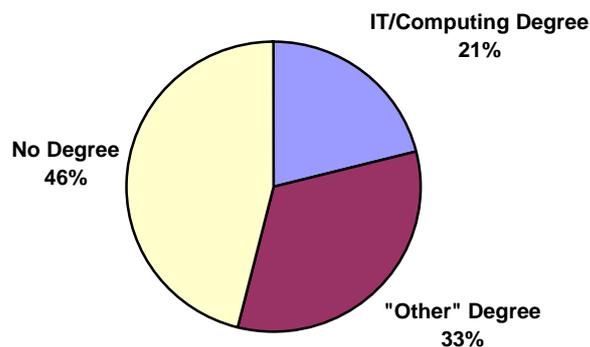
Source: Report on Technology Counts IT and Telecom Insights 2008 (e-skills UK)

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[7] Source: Experian 2008 growth rates applied to ONS LFS Jan-Mar 2007

As shown in Table 2, amongst the 54% of IT professionals who are degree-qualified, on average more than a third (39%) have a Computing degree.

Degree-qualified staff who fulfill technical roles are more likely than average to have a Computing degree. This is especially the case for IT Strategy/Planning Staff (44%) and Software Professionals (46%).

The importance of a Computing degree to those in technical roles is clear.

Table 2: Percentage of degree-qualified IT Professionals with Computing Qualifications (2006)

IT ROLES	% OF PROFESSIONALS WITH COMPUTING DEGREE
Software Professionals	46%
IT Strategy/Planning Staff	44%
Operation Technicians	38%
ICT Managers	28%
Total Workforce	**39%**

Source: UK ICT Enquiry, Q3 2006 – e-Skills UK

3.2   IT job appointments

It is estimated that, during 2008-12, an average of 179,800 IT appointments will be made each year (across all industries). [8]

Figure 12 shows that of those 179,800 jobs, approximately 38,600 are expected to be filled by those who are already in the IT labour market and changing jobs, and who are likely to bring specific IT/Computing expertise with them.

This leaves the majority - 141,300 - to be filled by people who are "new entrants" to the IT labour market.

Figure 12: Annual Average Job Appointments in the UK IT labour market (2008-2012 Estimates)

Moving within the IT industry, 38,600

"New entrants" needed, 141,300
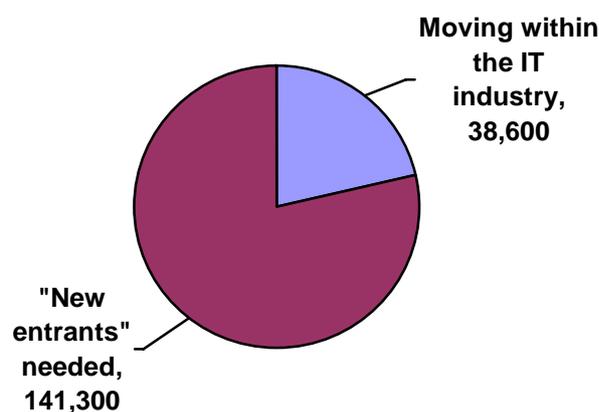
Source: Report on Technology Counts IT and Telecom Insights 2008 (e-skills UK)

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[8] Report on Technology Counts IT and Telecom Insights 2008 (e-skills UK). To reconcile the growth in the total number of IT jobs to 1,232,000 by 2016, it is estimated that 123,689 people (141,300 minus 18,111) will move from an IT role to a non-IT role each year. For 2007, this represents 11.6% of the total IT workforce. See paragraphs 3.1 and 3.2.

Figure 13 indicates the broad categories of sources for the 141,300 UK IT job appointments expected to be filled by "New entrants" (ie people who are not currently in an IT role):

Figure 13: Source of 141,300 Annual "New Entrants" to the UK IT labour market

43,600 (31%) from Other Sources

70,900 (50%) from Non-IT/ICT Roles

26,800 (19%) direct from Education

Source: Report on Technology Counts IT and Telecom Insights 2008 (e-skills UK)
Based on 2008-2012 estimates
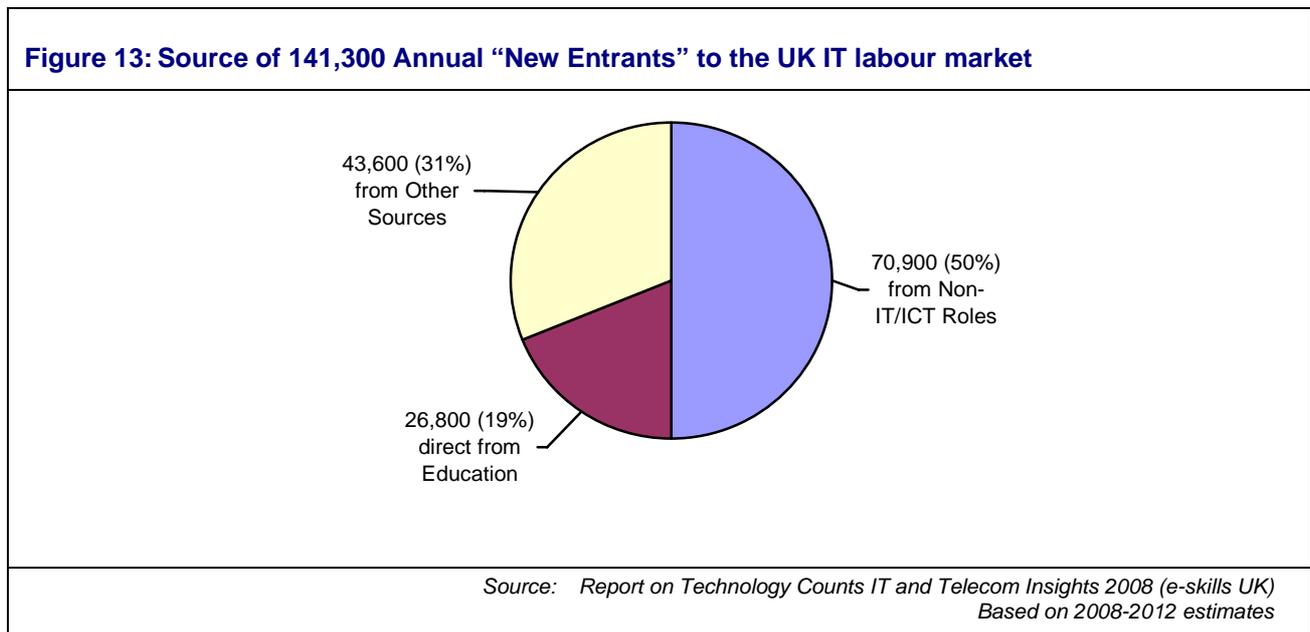
The 141,300 "new entrants" to the UK IT labour market are expected to be made up as follows[9] :

- **Higher Education Graduates**
    - 26,800 are expected to be from education (predominantly graduate level or higher).
    - "New entrants" are expected to be graduating from across a range of disciplines, not only Computing courses.

- **From Non-IT/ICT roles**
    - 70,900 are expected to be moving jobs from a non-IT industry and/or role.
    - These "new entrants" are expected to come from a wide range of backgrounds.

- **"Other" Sources.**
    - 43,600 are likely to be people re-entering the workforce (for instance, after a career break, early retirement or from unemployment).

It has not proved possible to establish how many of the 179,800 IT labour market "new entrants" will be filled from skilled and non-skilled sources.

Neither has it been possible to establish what proportion of the 114,500 (70,900 + 43,600) people entering from non-IT/ICT or "Other" roles are degree-qualified.

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[9] Source: Report on Technology Counts IT and Telecom Insights 2008 (e-skills UK)

3.3   Projected roles for New Entrants

Table 3 identifies the split of different roles that make up the 179,800 annual projected number of job vacancies.

Table 3: Estimated Annual Demand for IT Professionals (2008-12)[10]

JOB PROFILE	JOB VACANCIES (EVERY YEAR)	JOB VACANCIES EXPECTED TO BE FILLED BY	
		NEW ENTRANTS	MOVEMENT WITHIN IT WORKFORCE
Software Professionals	57,100	46,900	10,200
ICT Managers	37,800	26,000	11,800
IT Strategy & Planning	21,700	14,700	7,100
IT Operations Technicians	20,700	16,100	4,500
IT User Support	12,700	10,200	2,500
Computer Engineers	4,500	3,600	1,000
Others	25,300	23,800	1,500
Total	**179,800**	**141,300 (79%)**	**38,600 (21%)**

Report on Technology Counts IT and Telecom Insights 2008 (e-skills UK)

Two key points emerge from this table:
- A high proportion of vacancies are expected to be filled by "new entrants" to the IT labour market.
- Software professional roles are expected to need a full third (46,900 of 141,300) of all "new entrants".

Figure 14 shows that new entrants coming direct from Higher Education (all subjects, not just Computing) are more likely to be recruited into technical roles than those moving from an IT/ICT position. This is especially so for Software Professionals & IT Operations Technicians and, to a lesser extent, IT User Support.

By contrast, "New entrants" from outside the IT/ICT industry are more likely to be placed into Management positions than "new entrants" from Higher Education.

Figure 14: Roles for HE and Non IT/ICT "New Entrants" to the IT labour market 2008-12[11]

Source: Report on Technology Counts IT and Telecom Insights 2008 (e-skills UK)

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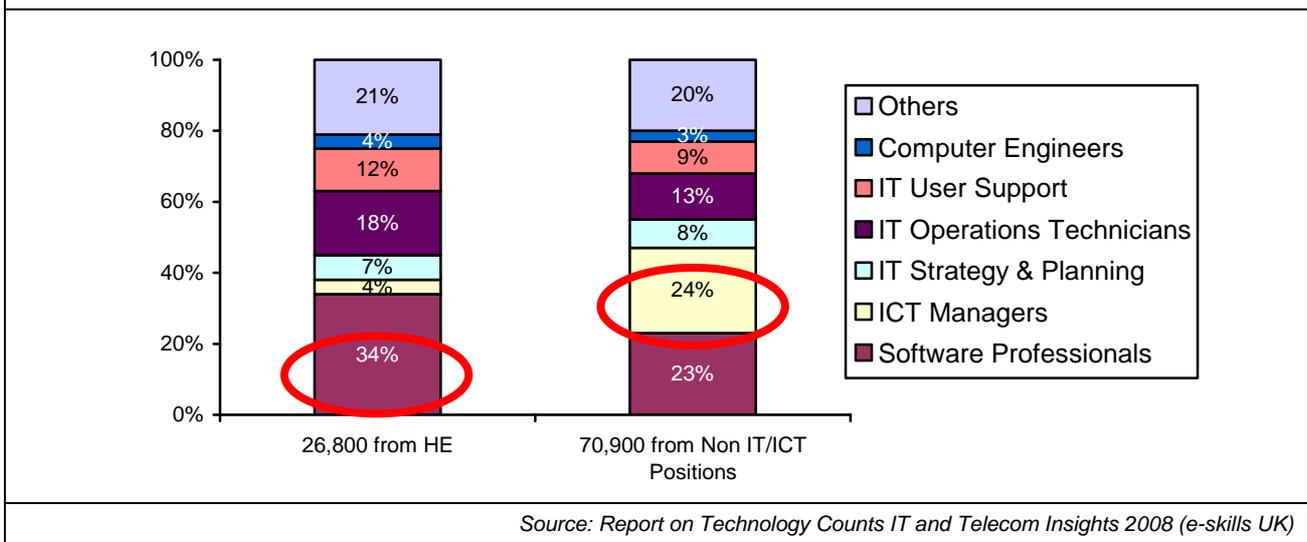
[10] Figures indicate requirement for IT as well as Telecom sector; however due to the low proportion of Telecom in this statistic, this has been assumed to be representative of the IT sector. NB Data has been rounded to the nearest 100.

[11] No data is available to profile the jobs that "new entrants" from "Other Sources" are likely to be placed into.

4 Destination after graduation

<div style="border: dashed">

Key Takeaways

➢ A substantial proportion of new graduates (from "all subjects") leave the UK after graduation

     o *In 2003-04, 46% of undergraduates and 61% of postgraduates*

     o *In 2003-04, 43% of undergraduates and 56% of postgraduates move/return to other EU countries*

➢ New Computing graduates appear to be more likely to stay in the UK than graduates from other courses

     o *In 2006, 67% Computing Undergraduates obtained employment in the UK*

➢ A majority of graduates enter the IT Labour Market with a Computing Qualification

     o *In 2004-05, 54% of new graduates entering the IT labour market had a Computing Qualification*

     o *10% entered the IT labour market with a Business and 9% with an Engineering Degree*

</div>

The number of new graduates from Higher Education entering the UK IT labour market is inextricably linked to the following criteria:

1. The number of people graduating from Higher Education[12];
2. The proportion that stay in the UK after graduation; and
3. The proportion of those who stay in the UK who take employment in the UK IT labour market

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[12] This has already been studied in Chapter 2.

4.1   Destination of UK HE Graduates – All Subjects

Figure 15 depicts the destinations of HE students who obtained qualifications 2003-04 from full-time courses.

Figure 15: Destination of Higher Education Students (all subjects) (2003–04)

Destination of Undergraduate Students	Destination of Postgraduate Students

Undergraduate: Outside the EU, 3%; UK, 54%; Other EU countries, 43%

Postgraduate: Outside the EU, 5%; UK, 39%; Other EU countries, 56%

Source: Destination of Leavers from Higher Education 2003/04 (HESA)
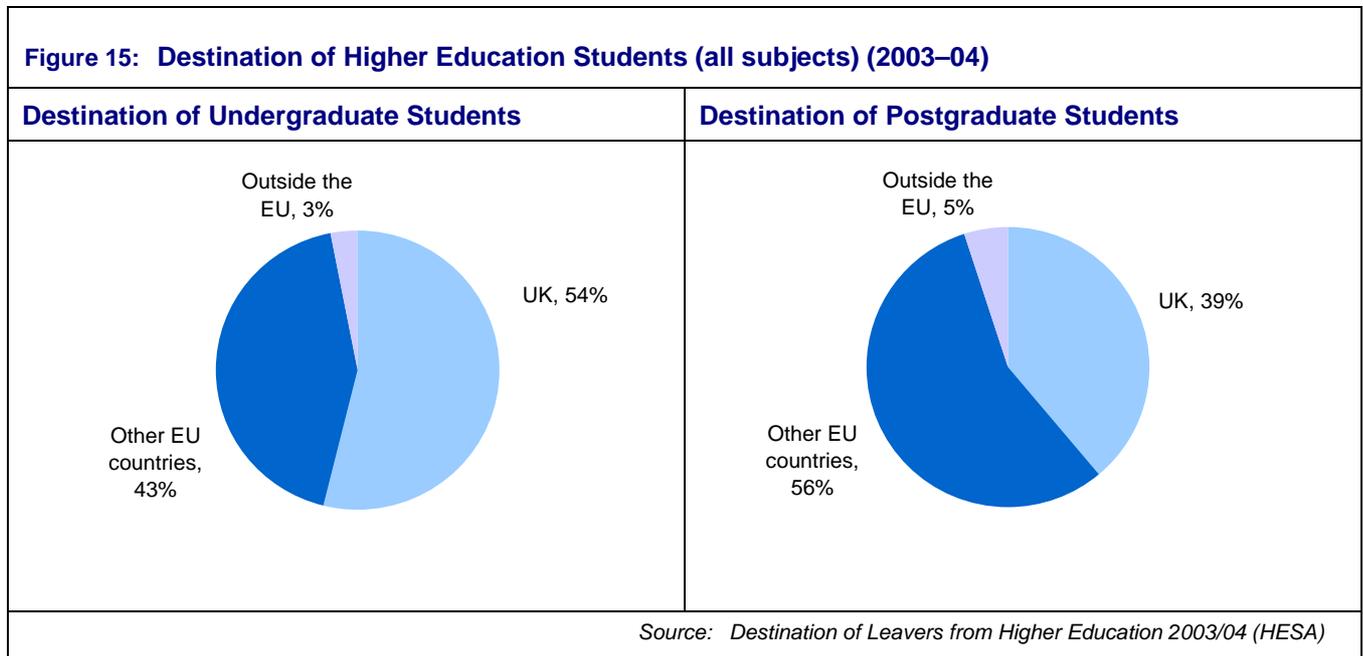
While the data refers to students graduating in 2003-04 (the latest such data available), this shows that approaching half of all undergraduates leave the UK after graduation, and that approaching two-thirds of all postgraduates leave the UK after graduation.

Clearly, this dramatically reduces the supply of new graduates into the UK labour market.

4.2   Destination of UK HE Computing Undergraduates

The situation for Higher Education Computing graduates appears to be different to that for all subjects.

Figure 16 depicts the destination of Higher Education Computing Undergraduates in 2006.[13]

Figure 16: Destination of Computing Undergraduates (2006)

Working and Studying in UK 6%
Employed Overseas 1%
Studying in UK 7%
Undertaking Training in UK 2%
Not Available for Employement 3%
Unemployed 10%
Other 4%
Employed in UK 67%

Source: http://www.prospects.ac.uk/; Research Insight Analysis
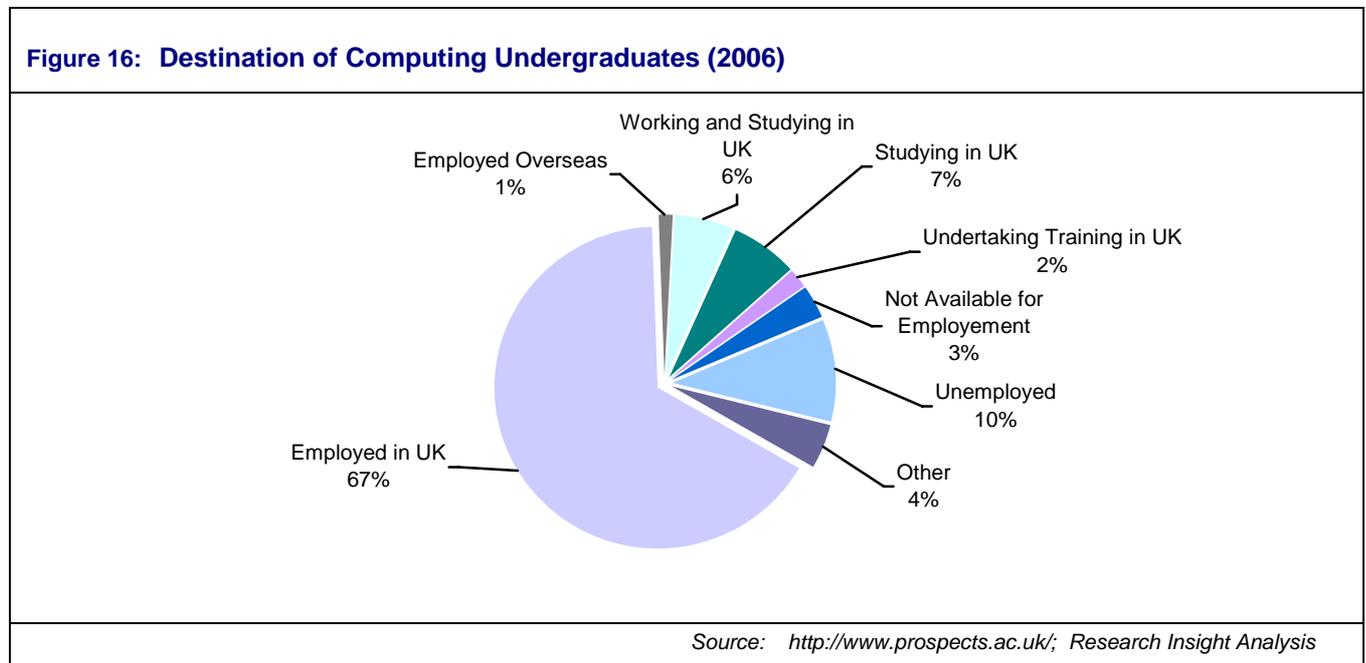
It appears that a clear majority of Higher Education Computing undergraduates continue to stay in the UK, with more than two-thirds entering employment in the UK.

This is one of the few pieces of good news identified relating to the supply of new Higher Education Computing graduates into the UK labour market.

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[13] It is important to understand that this data is based on a survey methodology by contacting new graduates. While British new graduates are generally easy to contact (eg via their parental home), overseas new graduates are more difficult to contact. This results in a lower response rate for overseas graduates than for British graduates. Because of this, it is very likely that the proportion of new graduates whose destination is overseas is understated.

4.3   Employment of UK HE Computing Undergraduates

However, while the majority of new Higher Education Computing graduates enter employment in the UK, only a proportion of new Computing graduates enter the IT labour market.

Figure 17 Shows that 54% of graduates entering the IT labour market have a Computing degree.

Figure 17: Qualifications Obtained by New Graduates Entering IT Roles – In All Industries (2004-05)

Other Degree Courses
23%

Creative Arts and Design
4%

Business and
Administrative Studies
10%

Engineering
9%

Computing
54%

Source: Report on Technology Counts IT and Telecom Insights 2008 (e-skills UK)
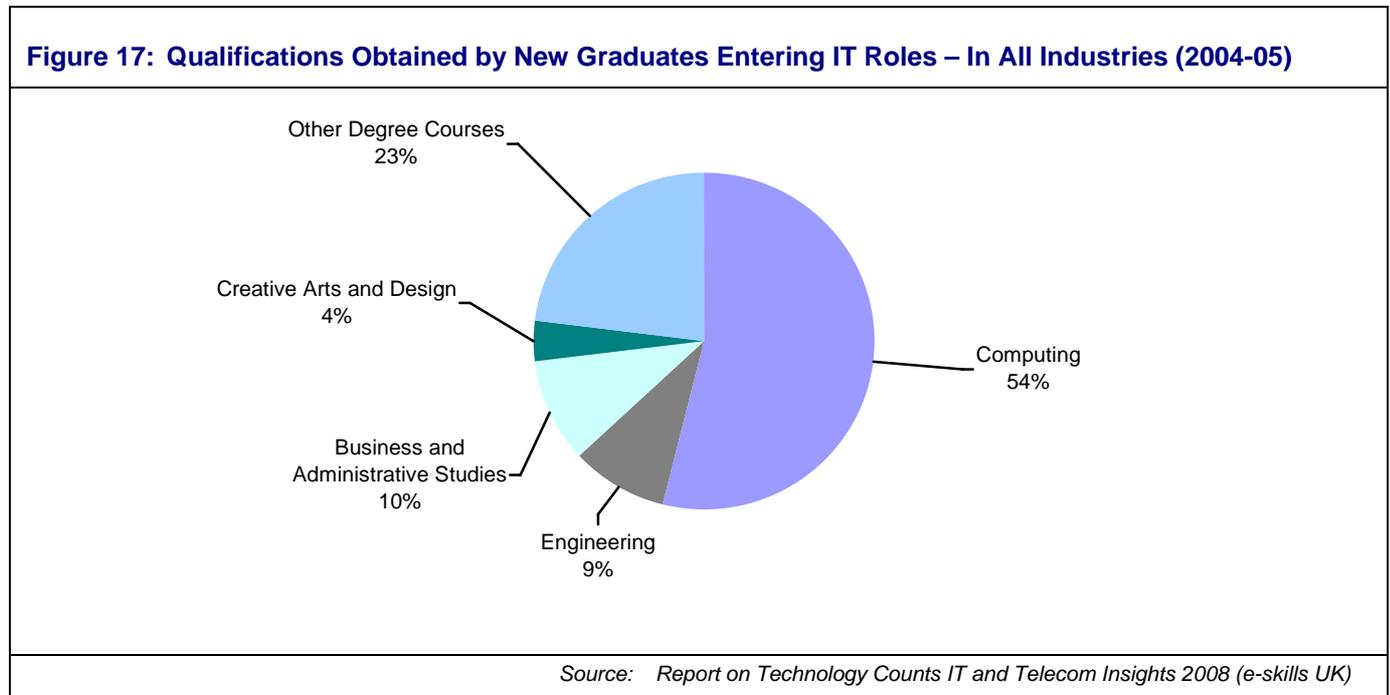
This chart demonstrates the importance of a reliable supply of Higher Education Computer graduates to the IT labour market.

The IT labour market demand for new entrants "direct from education" is predicted to continue at a level of 26,800 people per annum until at least 2012, and the number of Computing graduates is predicted to fall for the next 3 years at least.

For these reasons it is clear that, over the next few years, the IT labour market will be competing more heavily with other non-IT employers/roles for newly-qualified Computing graduates. In turn, this may also result in a smaller proportion of IT labour market "new entrants" from Higher Education having the necessary deep-based technical skills.

5 IT Skill Gaps in the UK IT labour market

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Key Takeaways

➢ Technical Skills represent the single largest skill gap in the IT labour market.

    o 38% of IT Managers have a Technical Skill Gap

    o 12% of Networking Staff have a Technical Skill Gap

    o 10% of Programmers have a Technical Skill Gap

    o 10% of PC Support Staff have a Technical Skill Gap

➢ IT Managers have the most serious skills gaps, across all four dimensions measured

    o 38% have a Technical Skill Gap

    o 23% have a Business Skill Gap

    o 22% have an Interpersonal Skill Gap

    o 22% have an "Other" Skill Gap

➢ In 2005, 5% of all employers, and 28% of all employers with a vacancy, had an IT "Skill-Shortage Vacancy".

➢ The ever-changing nature of the IT/Computing market requires a permanent and, arguably, increasing demand for trained staff.

➢ With the number of Computing graduates expected to fall for at least the next three years, the Technical Skills Gap will increase unless workable solutions are found immediately.

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As technology develops, so does the UK IT labour market's need for skills. It is critical to understand which skills are needed immediately by the UK IT labour market and where skilled "New Entrants" will be sourced from.

5.1   Skill Gaps by role

For the purpose of this report, a skill gap is defined as a "shortage of suitably qualified staff and/or applicants".

Figure 18 is evidence that clear skill gaps exist in the UK IT labour market.

Figure 18: Skill Gap by IT role [14]

Source: Report on Technology Counts IT and Telecom Insights 2008 (e-skills UK)

Note: Figures indicate trends for IT as well as Telecom sector; however due to the low proportion of Telecom in this statistic, this has been assumed to be representative of the IT sector.
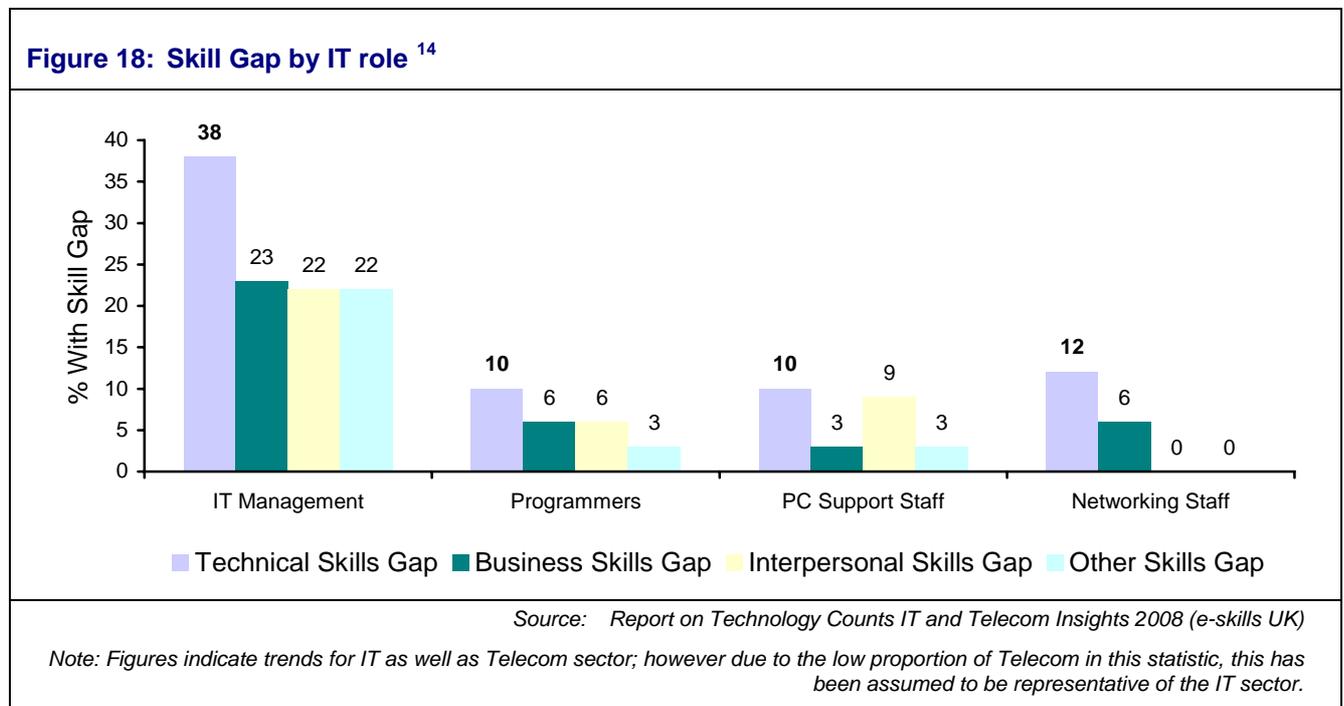
Specifically, it demonstrates that the largest gap relates to technical skills.

While approximately 10% of those employed as programmers, PC support staff and networking staff do not have the required level of technical skills, this increases to 38% amongst IT managers.

This is, in part, due to more managers being recruited from "new entrants" in non-IT/ICT positions (17,016 per annum) than from "new entrants" coming direct from Higher Education (9,112 per annum) [15].

It should also be noted that a significant technical skills gap also exists (albeit to a lesser extent) in the other three defined job roles.

An increase in the supply of new Higher Education Computing graduates would help to address this technical skills gap. Conversely, a decline in the supply of new Higher Education Computing graduates would exacerbate the technical skills gap problem.

The second message that emerges from this chart is that skill gaps exist in several areas amongst IT managers. Possible solutions to this problem will be explored later in this report.

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[14] Source: Technology Counts: IT & Telecoms Insights 2008, e-skills UK 2008; Note: Figures include IT and Telecom sector; however due to the low proportion of Telecom in this statistic, this has been assumed to be representative of the IT sector.
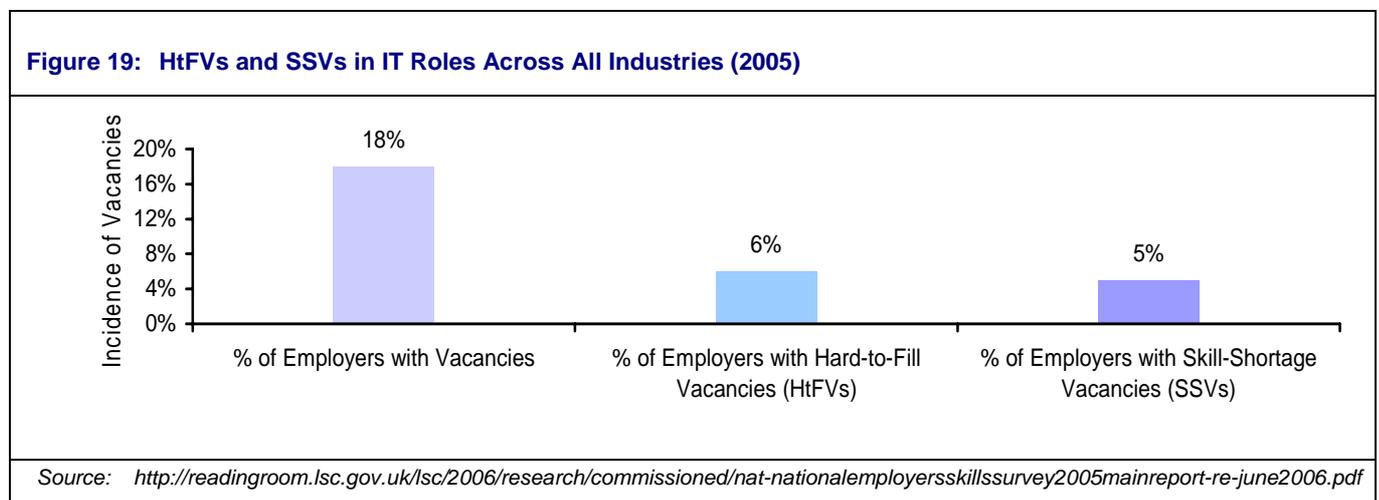
[15] 17,016 (24% of 70,900 "new entrants" from non-IT/ICT positions) vs 9,112 (34% of 26,800 "new entrants" direct from Higher Education) Figure 14.

5.2   Skill-Shortage Vacancies

Within all industries, problematic vacancies can be defined as:[16]

- **Hard-to-Fill Vacancies (HtFVs)[17]**
  A vacancy where there is a shortage of candidates having the required skill sets for that job. The skill sets required for the job are likely to be available in the labour market but, due to factors such as experience and remuneration, it becomes difficult to attract these candidates.

- **Skill-Shortage Vacancies (SSVs)[18]**
  A vacancy that exists due to a shortfall in the required skills currently in the labour market. These skills must be developed either through higher levels of education or sourced through off shoring or immigration.

Figure 19 depicts the HtFVs and SSVs in IT roles across all industries (not just the IT labour market), based on the Learning & Skills Council (LSC) National Employers Skills Survey 2005 report.

Figure 19: HtFVs and SSVs in IT Roles Across All Industries (2005)

Source: http://readingroom.lsc.gov.uk/lsc/2006/research/commissioned/nat-nationalemployersskillssurvey2005mainreport-re-june2006.pdf

Of all employers questioned, 18% had an IT Vacancy[19] and 5% said that they had a "Skill-Shortage Vacancy".

This suggests that, at any one time, more than a quarter (28%; 5% ÷ 18%) of employers with vacancies have a Skill-Shortage Vacancy.

Taken together, figures 18 and 19 are evidence that a clear skills shortage exists in the IT labour market.

Since the supply of new Computing graduates is falling (and will continue to fall for at least three years), it is fair to assume that the problem is deepening.

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[16] Source: National Employers' Skills Survey 2005 ; http://readingroom.lsc.gov.uk/lsc/2006/research/commissioned/nat-nationalemployersskillssurvey2005mainreport-re-june2006.pdf; These survey results are based on a survey commissioned by the Learning and Skills Council, and conducted amongst a cross-section of English employers/industries. The survey was conducted during July-September 2005. The survey was, therefore, conducted when the number of UK Higher Education Computing qualifications was at its peak (37,445). This number has fallen significantly since then (down by 16.5% to 31,270 in 2006/7).

[17] Defined as "Vacancies that are hard to fill due to the shortage of candidates having suitable experience/qualifications and/or because of poor job location and pay conditions".

[18] Defined as "Vacancies that are hard to fill because of a shortage in the required skills (in terms of the qualifications and skills required by the IT industry)".

[19] This triangulates well with the e-skills UK report that states that 20% of companies have an IT vacancy.

5.3   A Moving Target

As both IT and Non-IT companies implement new technology their need for IT Skills constantly changes. Two examples of how IT skills remain a "moving target" are as follows.[20]

- **Dynamic Industry and Skill Profiles**
  Owing to the ever changing dynamics in the IT labour market, IT professionals are required to be 'life-long learners', and constantly upgrade their technical skills. While Employers need to support their employees (through commercial/vocational training) this development is likely to be narrow and cater to company specific systems. To protect future employment opportunities the responsibility to "re-skill/up-skill" lies with those currently employed in IT roles.

- **Demand for a mix of 'High-Level Skills'**
  For those currently working in IT roles there has been a shift towards needing higher-level skills, such as those required for business analysis, IT service management and high-quality, high-value technology and software development.

This emphasises the importance of three key points:

- Reliable supply of trained "new entrants" into the IT labour market;

- Investment in training of "new entrants" in additional (especially technical) skills;

- Investment in re-skilling and/or up-skilling those already employed in the IT labour market.

5.4   Fewer Computing Graduates – Predicting a Growing Problem

The level of Computing skills amongst the annual requirement of 26,800 "new entrants" (direct from Education) to the IT labour market is directly correlated to the proportion that have a Computing qualification.

Since a) the number of Computing graduates is falling, b) the 26,800 requirement is predicted to remain stable, and c) all 26,800 positions are expected to be filled each year, it is likely that an increasing proportion of graduate "new entrants" will not have a Computing qualification.

This highlights a growing problem that those interested in the IT labour market will need to address.

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[20] Source: Report on IT Insights: Trends and UK Skills Implications (2004)

6 Possible solutions to address the IT Skill Gap

Key Takeaways

➢ Measures to address the UK IT Skill Gap include the following:

- o **Off-Shoring**:
  Outsourcing IT functions to other countries that have an abundance of highly skilled labour.

- o **Retention of UK and Overseas Computing Graduates**:
  Increasing both the proportion of Computer graduates staying in the UK IT labour market and encouraging those from overseas to stay in the UK to work after graduation.

- o **Immigration**:
  Bringing people into the UK from other countries that have the full set of skills needed.

- o **Post Graduate Education**:
  Encourage those within the Industry (both employers and employees) to re-skill/up-skill

- o **Commercial Training**:
  Increasing the amount spent on Commercial Training
  (currently an average of £3,300 per person per year)

➢ A report released in 1999/2000 on the Skill Gap in Europe identified a very similar set of solutions. This indicates that concern about the Skill Gap has been present for a significant amount of time.

The UK IT labour market has a number of sources from which to fill its need for skills. Not all of these will benefit the industry in the long term. Solutions for the IT Skill Gap need to address both short and long term need.

6.1   Addressing the Skill Gap

The purpose of this report is to define and summarise the trends within, and the implications for, the UK IT labour market.

There is no evidence that a single initiative will solve the UK IT Skills Gap.

It is, however, clear from this study of the IT labour market that the following solutions should be considered.

6.1.1   Offshoring

One solution is to increase the number of offshored IT Roles to countries that have an abundance of highly skill IT Professionals. There is great debate as to whether this represents a short term solution or causes a larger problem in the long term however evidence suggests that it affects the IT Supply Gap in only a minor way[21]. For instance, in November 2004, the British Computer Society is quoted as saying:

> *"The growth in offshore outsourcing is naturally of concern to IT professionals in the UK, especially now that the IT job market is at a low point. Ovum Holway has forecast that between 20,000 and 25,000 jobs may be lost in the UK IT industry over the next few years as a direct result of work moving offshore."*
>
> **British Computer Society Position Statements and Responses - position on offshore outsourcing**
> **November 2004**

If the above estimate is true and not increasing exponentially, this would represent just over 2% of UK IT jobs being lost over several years.

6.1.2   Retention of UK and Overseas Computing Graduates

A significant proportion of undergraduates and postgraduates leave the UK after graduation. Reducing the flow of new Computing graduates away from the UK would increase the supply of skilled "new entrants" available to the UK IT labour market.

Similarly, a significant proportion of UK Computing Students do not work in the UK after graduation. If the proportion that enters the UK IT labour market can be increased, this would directly impact the UK IT Skills Gap.

6.1.3   Commercial Training

The IT Industry invests on average £3,300[22] per person each year on Commercial Training. Just 16% of IT professionals received technical training, of which 49% was training that would be recognised externally.

With the fall in the number of Computing Graduates leaving Higher Education Institutions, investing in commercial training becomes more important to bridge the Skill Gap.

Whether funded by government or business, an increase in commercial training would help to address specific elements of the Skill Gap.

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[21] http://www.bcs.org/server.php?show=conWebDoc.1174

[22] Report on Technology Counts IT and Telecom Insights 2008 (e-skills UK)

6.1.4 Immigration

A number of solutions are only feasible on longer time frames. IT-specific training typically requires more than two/three years to acquire skills and proficiency to target more specific roles.

A short-term solution that the UK IT industry is already exploring (with help from the government) is encouraging people from other countries with the desired IT skills to join the workforce in the UK. As an example, a total of 110,000 work permits were issued during 2001-04 for IT occupations. [23]

6.1.4.1 UK Highly Skilled Migrant Programme (HSMP)[24]

2007 saw the introduction of the government's new points-based immigration system which is expected to narrow the IT Supply and Capability Gaps by recruiting a significant number of skilled workers from overseas. Under this system, points will be awarded to visa and work permit applicants based on qualifications, experience and age, and applicants who achieve the target points will be issued work permits.

6.1.4.2 UK Science and Engineering Graduate Scheme (SEGS)[25]

The Science and Engineering Graduate Scheme (SEGS) was announced in 2003 to encourage foreign students to study in the UK and fill the skills gap in selected sectors (e.g. engineers and computing). Eligible courses include only first-degree and research postgraduate courses on (JACS Code G4) subjects.

6.1.5 Post Graduate Courses

As technology drives the needs of the IT labour market, it is essential to encourage both employers and employees to continually develop their skills. One solution is to promote Postgraduate Computing courses. Postgraduate courses play two important roles:

- They enable established IT professionals to upgrade their knowledge and skills to a deeper level than other knowledge bridging courses.
- They make it easier for non-Computing graduates to enter the IT labour market by bridging their skill gap. Non-Computing graduates may have complementary business skills, and when equipped with IT skills acquired through Commercial Training, can effectively contribute to the IT labour market.

6.1.6 European Suggestion from 1999/2000

A European paper prepared in 1999/2000 to answer similar questions to the ones raised in this document make the following suggestions shown in Table 2 below.

Table 4: Policies to Mitigate the IT Skills Shortages

SKILL REQUIREMENT	SHORT-TERM DEMAND	LONG-TERM DEMAND
Highly-skilled IT Personnel	Immigration / offshoring to non-EU countries with a highly qualified labour force	Increased output of tertiary education
Medium-skilled IT Personnel	Immigration, off-shoring, training and retention activities	Increased output of secondary education
Low-skilled IT Personnel	Training and re-qualification activities	Increased computer and Internet literacy in primary and secondary education

Source: http://ec.europa.eu/enterprise/enterprise_policy/competitiveness/doc/competitiveness_report_2001/chapter_3_annex_1.pdf

These suggested policies indicate that the "IT Skill Shortage" has been an issue for a significant period of time.

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[23] Source: http://ec.europa.eu/enterprise/enterprise_policy/competitiveness/doc/competitiveness_report_2001/chapter_3_annex_1.pdf;
Leitch Review of Skills. "Prosperity for all in the global economy – worldclass skills" December 2006

[24] Source: http://management.silicon.com/careers/0,39024671,39157050,00.htm?r=53

[25] Source: http://www.workpermit.com/uk/science_engineering_graduate_scheme/eligible

7 Appendix

7.1   Research Methodology

The research was conducted in the following stages:

7.1.1.1   Literature Review

We reviewed publicly available research reports and articles from professional bodies and industry associations on Computing students and the IT workforce in the UK. In addition, reports published by the sector skills organisation **(e-skills UK)** were also reviewed.

Other research methods included, but were not limited to, the following:

Internet Research – General Internet search was carried out to collect macro-level information on the topics. Research sources included company websites, industry association websites, reports and articles.

Database Research – The proprietary databases used for the research included company information databases (Hoover's Pro Plus, OneSource and Kompass) and market research databases (Dun and Bradstreet (D&B), DialogPRO, OneSource and Factiva).

7.1.1.2   Primary Research

Primary research was conducted to gain first-hand, detailed information on the topics that were not available on general public information sources. Interviews were conducted by referring to questionnaires based on the gap analysis from our literature review to understand the market perception of the defined issues.

Primary research conducted with the academia includes interviews conducted with senior faculty members of universities across the UK. These faculty members are typically professors/lecturers at the Computing/IT departments of respective universities – this makes these faculty members the best 'set' of respondents on the education scenario in Computing.

7.2   Definitions

Higher Education (Higher Education)
Higher Education students in the UK are those enrolled in programs with a level of instruction above Level 3 of the National Qualifications Framework of the UK.

Joint Academic Coding System (JACS)
Joint Academic Coding System is the classification of Higher Education courses in the UK in which each subject is a part of a principal subject group. JACS defines 19 subject groups with each containing further subjects:

- **A** Medicines and Dentistry
- **B** Subjects allied to Medicine
- **C** Biological Sciences
- **D** Veterinary Sciences, Agriculture and Related Subjects
- **F** Physical Sciences
- **G** Mathematical and Computer Sciences
- **H** Engineering
- **J** Technologies
- **K** Architecture, Building and Planning
- **L** Social Studies
- **M** Law
- **N** Business and Administrative Studies
- **P** Mass Communications and Documentation

- **Q** Linguistics, Classics and Related Subjects
- **R** European Languages, Literature and Related Subjects
- **T** Eastern, Asiatic, African, American and Australasian Languages, Literature and Related Subjects
- **V** Historical and Philosophical Studies
- **W** Creative Arts and Design
- **X** Education

Computing

Computing and IT-related courses include courses with the following as principal subjects:
- Computer Science (G4)
- Information Systems (G5)
- Software Engineering (G6)
- Artificial Intelligence (G7)

There are some Electronic and Electrical Engineering (H600) courses that may be similar to computer systems/networking courses; however, they have not been included in our definition of Computing and IT-related courses.

Computing Graduates

Any student with Higher Education in any one of the above-defined Computing/IT-related courses has been termed as a Computing graduate or IT graduate.

The term Computing graduate is typically used in the context of HEIs, and IT graduate in the context of the graduate workforce.

Full-time Equivalent (FTE) Students

FTE students are those attending HEIs for more than 24 weeks during a year of the study programme. During this 24-week period, students undertake study-periods/other study work of at least 21 hours per week.

IT/ICT Jobs Joined by Computing Graduates

- IT support staff
- IT/computer managers
- Analysts
- Software engineers
- Programmers
- Software development staff
- Consultants
- Web development staff
- Designers – Multimedia/web
- Help-desk staff
- Database staff
- Systems developers
- Technicians
- Networking staff
- IT teachers and tutors
- Computer/software testers
- Computer engineers
- Computer sales staff
- Research and development (commercial)
- Research (academic)
- Systems administrators
- e-commerce managers

IT and ICT jobs are similar in their skills requirement and are referred to as IT jobs for the purpose of this report.