



Whitehorse Strategic Group

Final Report to Review ICT Courses for Victoria University

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About Whitehorse Strategic Group Ltd.

Whitehorse Strategic Group Ltd. is an Australian owned management consulting practice founded in 1987 with a well established reputation in helping Industry and Government achieve success through strategies designed to maximise existing investments and capture efficiencies from new technologies. The Whitehorse Research Services Division produces the 'Top 250' *ICT Industry Research Report*, widely recognised as the leading creditable indicator of trends in the Australian ICT industry, and conducts detailed analysis and reporting on Information Technology, and equivalent Reports on the Biotechnology Industry. Whitehorse principals specialise in the areas of ICT and Biotechnology Market Research, eGovernment policy and strategy, Business Process Management, and Economic and Community Development.

About the Centre for Innovative Industries Economic Research Inc

CIIER is an Asia-Pacific Centre, formed to create a facility, repository, and think-tank for consistent, competently researched, up-to-date, and analysed data on employment, markets, revenue streams, R&D, processes and management methods, specifically focussed on high technology, innovative, and emerging industries.

TABLE OF CONTENTS

Background to the Consultancy	4
Executive Summary	6
Key Findings and Recommendations.....	8
Market Knowledge	10
Market indicators	21
Course Comparisons	29
Course Offerings/ Market Match	35
Emerging Market Trends	40
Government Policies.....	44
Appendices	45
Acknowledgements.....	47

Background to the Consultancy

Senior Management of Victoria University commissioned Whitehorse Strategic Group Limited, to carry out a review of the ICT course offerings across the whole of their educational facilities, i.e. Higher Education and TAFE.

The Terms of Reference as set out in the Victoria University brief identified a 2 stage approach. The following report covers only the first stage, which covered:-

A market based analysis that examines and advises on:

- Industry trends including relevant technological change and changing applications.
- Labour market trends for relevant skills groups.
- Competitor analysis including market gaps and opportunities that VU might capitalise upon.
- Victoria University's position and reputation in the market

Victoria University, like many tertiary education providers in Australia has experienced a significant downturn in demand for its ICT related courses in the last few years. In part at least this seems to have resulted from a perception amongst potential students that job and career prospects for graduates are not good. Victoria University now wishes to undertake a review of its course offerings in this area and the organisational arrangements appropriate to deliver a targeted range of outcomes relevant to the needs of industry and students and which cover both TAFE and Higher Education.

Victoria University is one of a handful of institutions in Australia that offers both TAFE and Higher Education programs. In both streams there is more than one organisational unit that is currently offering ICT related programs. This creates the potential for duplication

The past 4 years has seen a steady decline in the number of students applying for, enrolling in and commencing ICT courses, not only at Victoria University but also all other Universities in Australia and, indeed, other countries. This decline has placed a great strain on the framework of the institutions leading to actions being taken to compensate for the decline in numbers of students. These actions have so far been relatively minimal but the longer term view would suggest that further and more drastic actions may ensue.

There has been a lot written about the cause of this decline and the subsequent reactions however there is no one reason that can be attributed to this phenomenon. The main reasons as identified by research and anecdotal data are:-

- No ICT jobs on graduation
- Negative image portrayed by the media, even some ICT focussed journalists
- The “nerd” image of an ICT worker
- The narrow view of the ICT industry by parents, teachers and other influencers of students
- The perception that the ICT industry has no career potential

All of these play a part in the decision of students to enrol in another course.

The reality is that the ICT industry impacts all industries and thus jobs exist and there is a demand for qualified people to take these. Current recruitment predictions for 2007 are positive with the view (expressed by some recruitment companies) that graduates will obtain jobs although not necessarily in their preferred role.

It is clear from anecdotal data and business experience that those graduates with some industry experience, i.e. those who have participated in a work integrated learning program will find it easier to be employed than others.

Executive Summary

Victoria University is currently facing the same issues as all other Victorian and Australian Universities, continually declining enrolments, staff resources and falling Government funding. The Information Communications Technology (ICT) education sector is one of the hardest hit by these issues and Whitehorse Strategic Group Ltd was contracted to assess how the university can address and overcome these major issues.

The Government funding issue is one that is not going to go away. The decrease in funding on an annual basis means that more income must be derived from other sources. How does Victoria University address this?

The declining enrolments are the result of a number of factors that individually would probably have lesser impact but together the impact is enormous. These include:-

- General student perception of the future jobs market
- General student perception of a lack of career in ICT (even more so if the student is female)
- Parents perception of the ICT jobs market
- Overall perception that ICT is only Word Processing, Spreadsheet, Internet access and students already know all this
- General lack of understanding as to where ICT sits in the business world

This in turn leads to the staffing issue; if enrolments and commencements are low do you need the current staffing levels? In addressing this issue the university management is faced with a number of questions that must be asked and answered. If we cut staff now can we cope when the enrolment numbers increase? What impact will this have on the university's reputation and the morale of the remaining staff?

There are a number of recently completed research projects that lend credence to the view that Victoria University should focus on its strengths in the marketplace and pursue those streams that are the cornerstone of the University: Health, Education and Logistics.

However there is also a body of research, carried out by Diversiti¹ that indicates one of the key hiring influences for ICT positions is a tertiary qualification. The more interesting finding from the same report is that the Bachelor of IT or a combined IT and Business degree were the most favoured, followed by a Bachelor of Computer Science. Any Software Engineering qualification was not seen to be relevant.

There is strong support for vendor or industry certifications to be an intrinsic part of faculty offerings and Victoria University may well consider the inclusion of a project management tool such as Prince2. Prince2 is a commercial Project Management product created in the UK and used extensively by contractors on Government projects. A recent internal report by Melbourne University for the ACS highlighted the shortage of Project Management skills. Although the sample size was small it does lend support to other anecdotal data found by the consultants.

In seeking course differentiators Victoria University would do well to look at Prince2 and other products to fulfil this aim.

¹ Diversiti Hiring Influence Report 2006.

The consultants believe that Victoria University was not recognised as readily in the general marketplace as other universities and whilst this was not a major cause for concern the issue needs to be addressed. (See key finding 5)

The recent research by Diversiti indicated that the actual institution where the qualification was gained was the least influential in the graduate selection process.

These survey results are, given the authoring company, predictably putting a positive spin on all the information and must be read in conjunction with that thought.

However recent supporting data from Monash University indicates a positive move in half yearly student intake when compared with the same period last year

In apparent opposition to the Diversiti views on popular degrees, and therefore job opportunities, Ambition² in their report state that software engineers together with .NET, Java and J2EE programmers were in high demand in 2005. This is an interesting result as the most common task going offshore over the past 5 years has been software development.

The promise of reduced costs for large software development projects has been the key driver in the decision to go offshore. However the Diversiti report suggests that costs are increasing in popular offshore destinations. Thus the demand for programmers may see it becoming a question of whether to go (offshore) rather than where to go.

During the course of the consultancy a number of overseas surveys were identified that highlighted the issue of skills shortages and skills gaps. The most recent and probably the most detailed was carried out by e-skills uk³. This quarterly survey collated interview data from 1000 organisations but interestingly did not address questions toward graduate employment or educational issues. It did identify that job advertisements rose by 2% in the fourth quarter 2005 this increase whilst low indicates an increasing demand. One of the more interesting results was that 97% of the respondents said they did not offshore ICT activities and did not intend to in the next 1-2 years.

In a recent report by the Federal Education Minister⁴ said she would look favourably on those universities that were thinking innovatively about how to differentiate themselves from others in order to attract students and remain viable in the future. Whilst not elaborating on the extent of this favourable view it does suggest that universities may be given more latitude in expanding their income producing methods.

² Ambition: Technology Recruitment Market Trends & Salaries Report 2006

³ e-skills uk ICT Inquiry

⁴ Australian Financial Review 8th May 2006.

Key Findings and Recommendations

The consultancy program included an extensive interview program of Victoria University personnel involved in the delivery of ICT course material in Higher Education and TAFE.

Key Finding 1 One finding was that the majority of personnel believed there needed to be much closer links between the individual faculties and schools to maximise the overall teaching capabilities of the University.

Recommendation 1

It is recommended that steps be taken to ensure duplication of course material is, where practical, eliminated or, reduced.

Key Finding 2 Research and empirical data indicates that work experience continues to be a major influencing factor in the ability of a graduate to gain employment. This lends support to the argument for more courses to include an industry year as an integral part of the degree course.

Recommendation 2

That Victoria University review the current approach to work integrated learning programs to provide graduates with an advantage in the job seeking race.

Key Finding 3 An analysis of data provided by Victoria University staff indicates a number of courses appear to lack student numbers in order to be considered viable. (Refer to table xx)

Recommendation 3

That Victoria University address the issue of those courses that appear to be low in enrolments with the view to focussing on those courses that attract the most students and which provide the best opportunities for employment on graduation.

Key Finding 4 During the interview process it was quite clear that staff felt the Victoria University was easily identified as a leading provider of education both at TAFE and HE level.

The public view is different and strikes at the issue of student first preferences particularly for ICT and ICT related courses. The response to the question “What do you know about Victoria University?” was often met with silence or a hesitant counter question “Isn’t it a TAFE?” This was unstructured, random questioning of non education sector people, not students, thus should only be taken as such however it is a message that probably needs to be heard.

A search of the Web for media articles (on all topics) by University revealed the following monthly average:-

Monash	38 articles
Melbourne	29
RMIT	14
VU	11

Whilst this does not necessarily represent the market perception of Victoria University as an educational institution, it does indicate a level of public exposure for each of the respective universities.

Recommendation 4

Further work on the promotional collateral would assist in expanding the market view by breaking down this lack of knowledge about a university that does deliver courses that rate with the best.

Key Finding 5 Research shows that female employment in the ICT sector is 30% but female course enrolment is well below that figure and thus equals an obvious market gap.

Recommendation 5

That Victoria University focuses ICT courses in a manner attractive to female students, concentrating on Health, Education and Logistics and in focussed areas of Information Technology. Although women currently represent around 25% of the Victorian ICT workforce this figure will reduce as departures increase (through retirement, marriage, etc) and lower enrolments of the past few years will start to take effect.

Market Knowledge

It is well recognised that the ICT industry in Australia is a key productivity enabler for other industries, but direct ICT employment, both in total and relative to other industries, shows that the ICT industry is also a major employer.

By the broadest definition, ICT employment accounts for nearly 5.5% of total Full Time Equivalent (FTE) employment in Australia, more than many other Australian industry sectors, including Mining; Electricity, Gas and Water supply; Banking and Finance; and TV, Radio, Media.

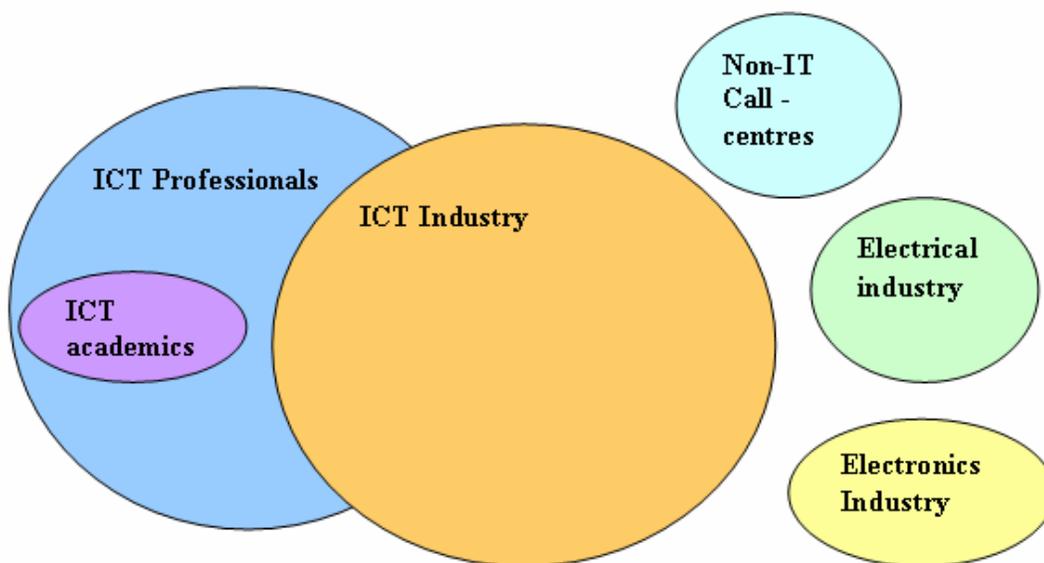
The ICT industry is also a significant source of export revenue, and accounts for nearly 80% of ICT R&D performed in this country.

New "ICT Worker" Model

One of the significant difficulties in understanding ICT in Australia is the frequent confusion between analysis of the ICT work-force in labour market terms (e.g. what job the individual performs), and analysis of the ICT work-force in Industry terms (e.g. what kind of organisation the individual worked for).

ICT broad employment occurs in a number of groupings. These include:

- The providers of ICT goods and services (usually called the ICT industry).
- The purchasers and users of ICT goods and services including the government and private sectors which also employ a large number of specialists to manage the use of the purchased technology.
- The trainers, teachers and researchers into ICT who generally (but not always) operate within the universities and colleges.
- People who provide technical support to ICT, but who might, more properly, be categorised as electrical or electronics specialists
- People working in call-centres, or in desk-top publishing and graphics design



This "bubble" diagram illustrates some of these elements.

Table 1

There is a significant percentage of ICT professionals in the ICT industry, but ICT industry employment includes not only those professionals but also many ICT non-professional technical, sales, logistical and administrative staff.

ICT Career Opportunities

Victoria has a highly skilled ICT workforce, an innovative environment and an outstanding research base. There are clusters of excellence in:

- Telecommunications - software and services for fixed and wireless networks with strengths in R&D and technology commercialisation
- Creative content - content developed for new media, games, digital design, film and television
- Specialist ICT manufacturing - design and niche manufacture (microelectronics)
- Interactive applications - application software services. E-commerce systems and data management.

Victoria leads Australia in a broad range of industry sectors, including biotechnology, automotive, food processing, multimedia, as well as communications and information technology. The software requirements in these sectors open up an interesting array of business opportunities for qualified workers. There is an interesting range of niche clusters that

have developed global recognition. However one needs to look at the employment numbers in each of these niche markets, match the number of graduates produced each year from all sources against the total employment opportunities and decide the viability of a course(s).

Photonics

There is a vibrant photonics cluster in Victoria which has a global reputation for being a pioneer in photonics research. The cluster has strong links with local universities that share research projects and provide a broad range of photonics related courses.

Games

Victoria is the regional centre for interactive entertainment. The cost of game production is very low in Victoria in comparison to the USA or UK/Europe and hundreds of games have been developed in Victoria.

Film & TV

Victoria's facilities are acknowledged as amongst the best in the world and the new Central City Studios precinct in Melbourne's centre caters for both domestic and international film and television production. The synergies with local creative content and games development expertise offer an interesting array of investment and career opportunities.

N.B Despite the success of Australian companies in the above three markets each employs only a small number of ICT professionals and have therefore a similarly small turnover of personnel. Tertiary institutions must be aware of this when determining whether to offer a specific program that focuses on them. It should be noted that due to the small size of these three industries the DEWR statistics do not show numbers.

Electronics

Victoria is home to a large electronics cluster. Applications across automotive, communications, medical equipment, security, instrumentation and process automation offer both investment and career opportunities.

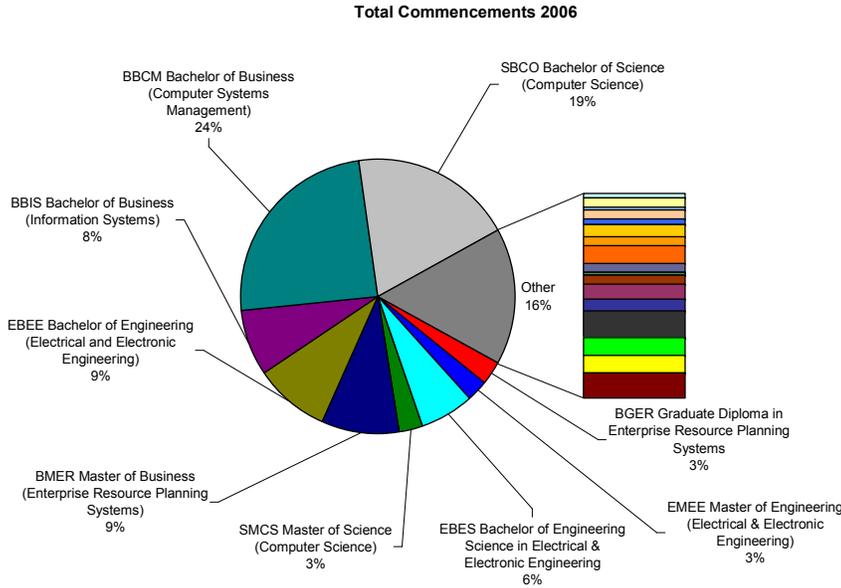
Intelligent Transport Systems

With the ever increasing cost of moving goods from place to place comes the need to provide sophisticated, reliable systems for goods tracking, cost monitoring and overall business management. There is a strong presence in Victoria of companies where software development in this field has been at the cutting edge for several years with a number of products gaining global acceptance.

Student Numbers

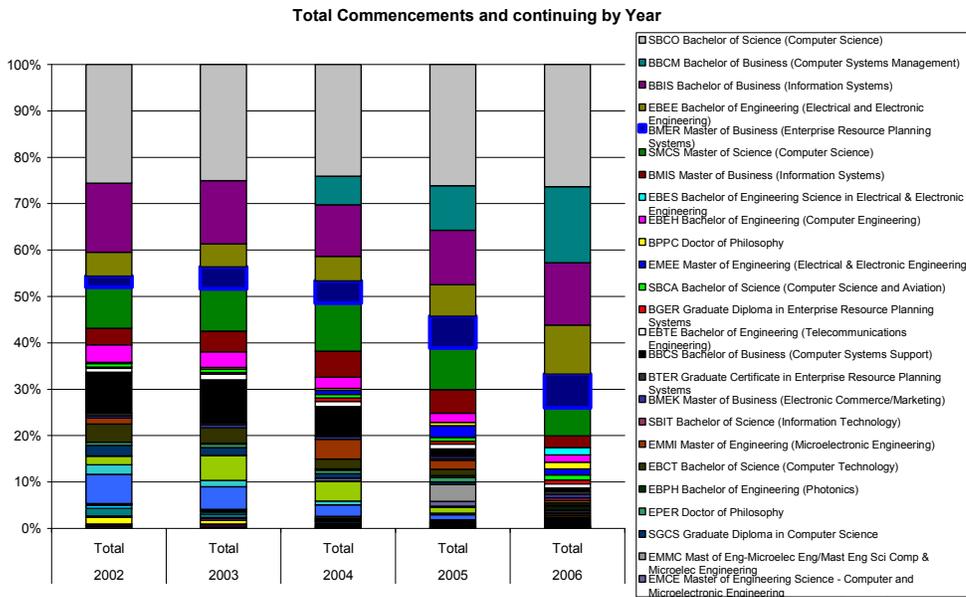
Table 2

Review of Victoria University Higher Education statistics



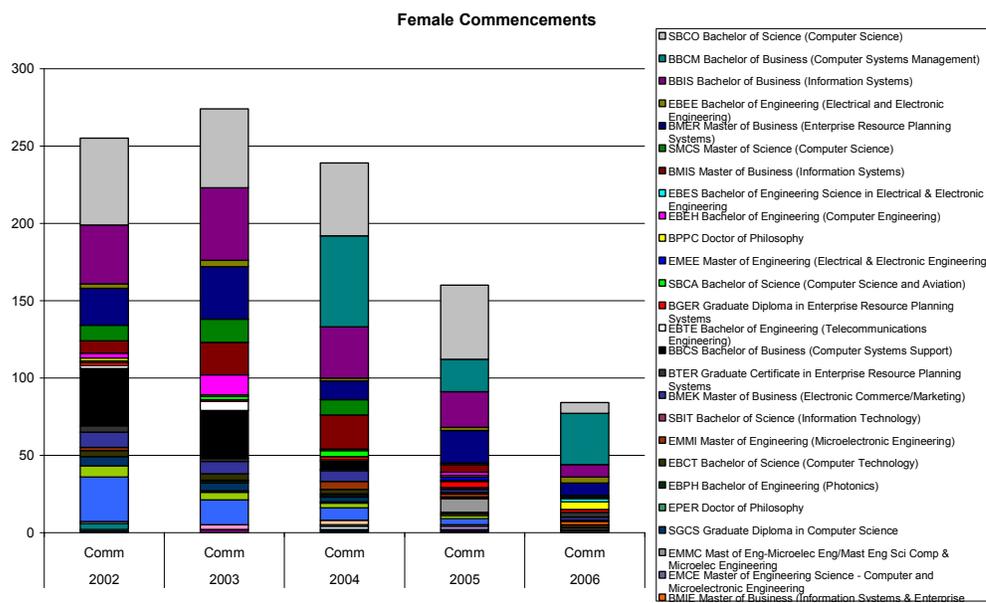
Over 50% of all 2006 commencements were in one of only three courses of the 58 listed. Six courses represent over 75% of all students.

Table 3



This is not a new phenomenon. As the chart above shows, regardless of the diminution in enrolments, almost the same group of courses have represented similar percentages of total student numbers over the last five years.

Table 4

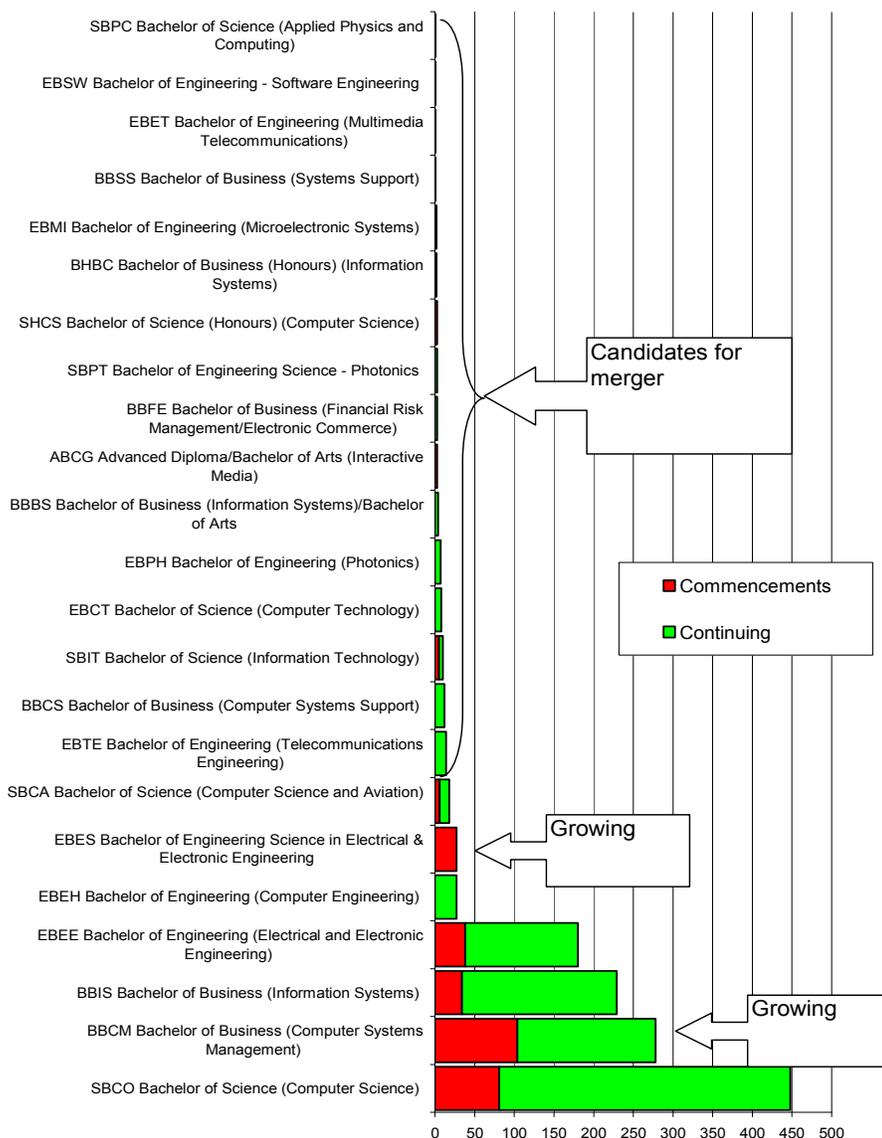


Female commencements, whilst declining even more sharply than totals, show very similar concentrations to the same courses.

This leads, inevitably, to a conclusion that the fragmentation of courses into more specialised foci has not been in response to any market demand, and has thus created a confused product offering. Amalgamation of courses, based around the critical mass groups already in place, would seem to offer the best option for maximising numbers in a cost-effective way.

Table 5

Undergraduate courses 2006



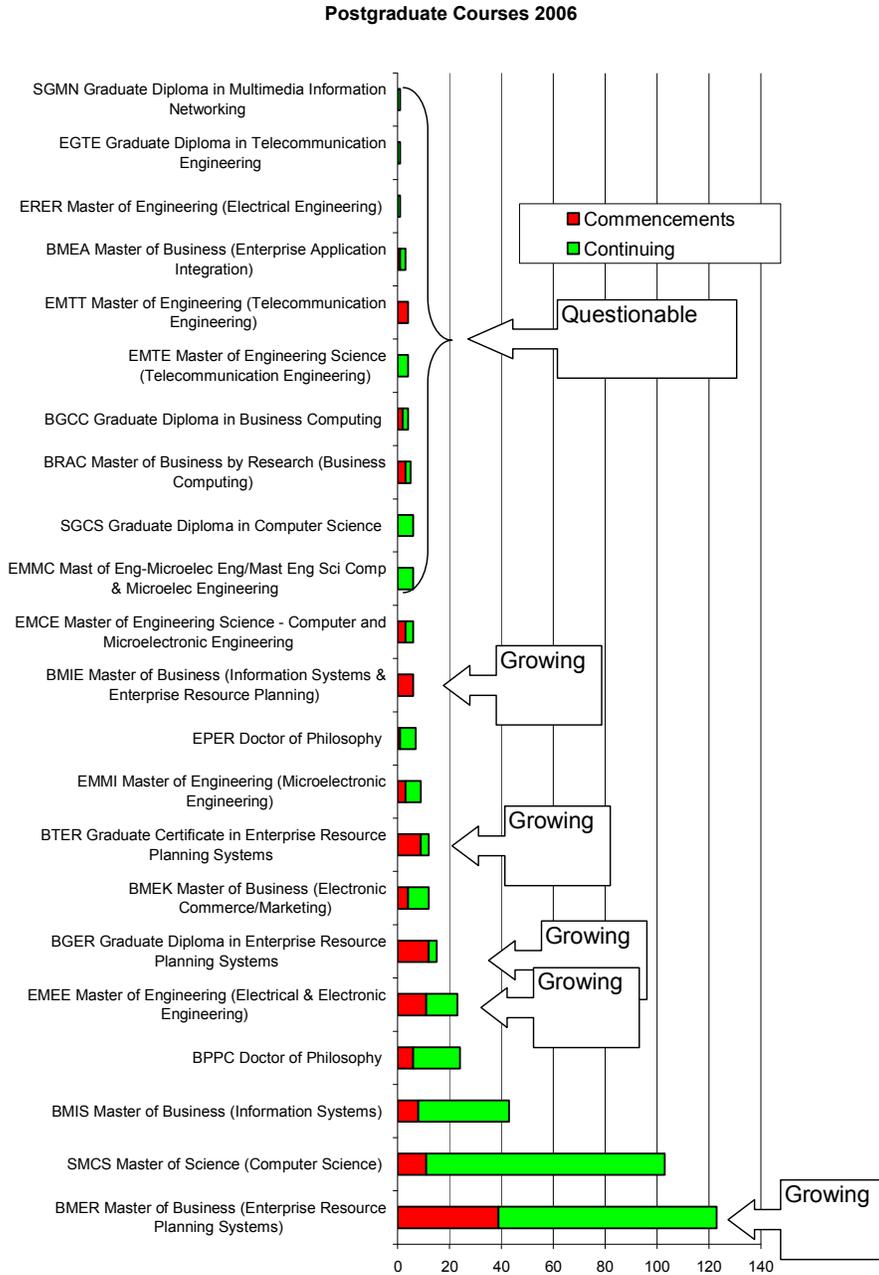
The red bar represents commencements for 2006 whilst the sum of the red and green bars represents the total student cohort across all years for that course.

Undergraduate courses are evaluated here both in terms of total numbers, and commencements.

Some courses have both critical mass, and, importantly, are continuing to grow. Others lack either or both, and should be considered candidates for consolidation/merger with other courses/ or discontinuance.

It is interesting to note that the Diversiti research showed that one of the three degrees most widely regarded as “employment influencers” was the Bachelor of Science (Computer Science) an indicator reflected in the table above. The Diversiti report identifies employment influencers as those attributes of the applicant that give him or her the best chance of a positive employment decision, eg qualifications, experience, communications skill, etc.

Table 6



As shown above the red bar represents the actual commencements for 2006 whilst the sum of the red and green bars represents the total across all years for that course. Surprisingly, there appear to be a greater number of "growth" post-graduate courses.

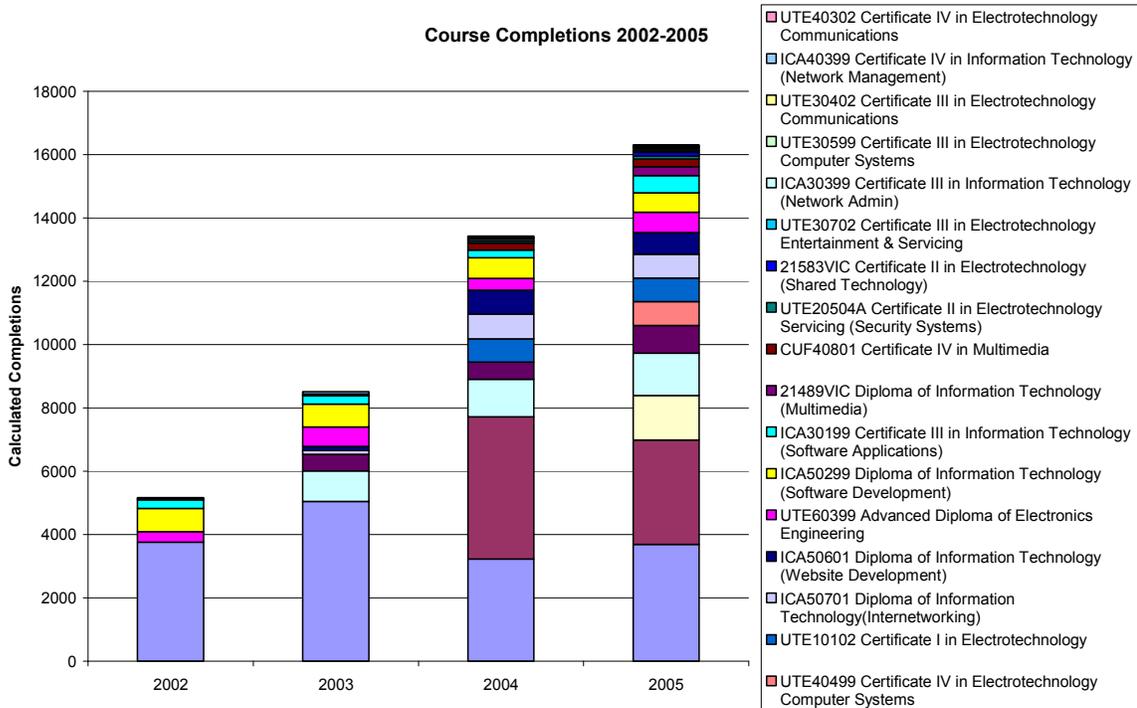
Whilst smaller course-numbers may be tolerated in post-grad studies, continuance of some of these courses, especially those focussed on low-growth employment outcomes, may also be open to question.

It is understood that the new Commonwealth government funding regime for higher education means that small standalone post graduate coursework programs are likely to be less viable than that have been in the past.

The data for the above charts was supplied by Victoria University as "**Victoria University TAFE Enrolments 2002-2005 in ICT Courses**" with columns headed "Comm" and "Cont" which we have interpreted as commencing and continuing.

Table 7

Victoria University TAFE course analysis

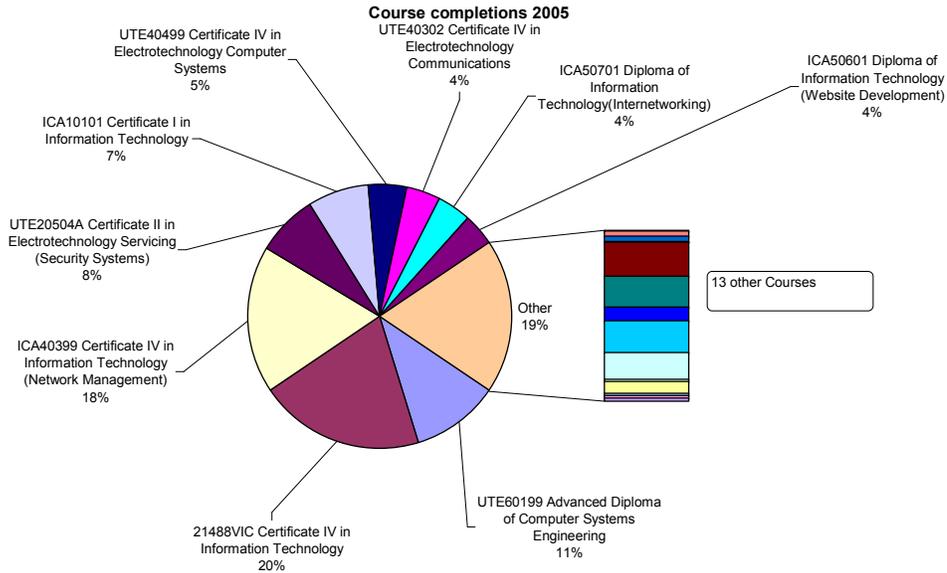


TAFE course completions have grown steadily, but are, similarly to higher education courses, strongly focussed on a limited number of courses.

With reference to the TAFE tables we believe that the most meaningful data from the industry analysis viewpoint are commencements and completions. Contact hours is a less relevant analysis in this context, and would be inconsistent with all of the other analysis. We note further that, whilst contact hours is a useful measure to assess teaching resource needs and

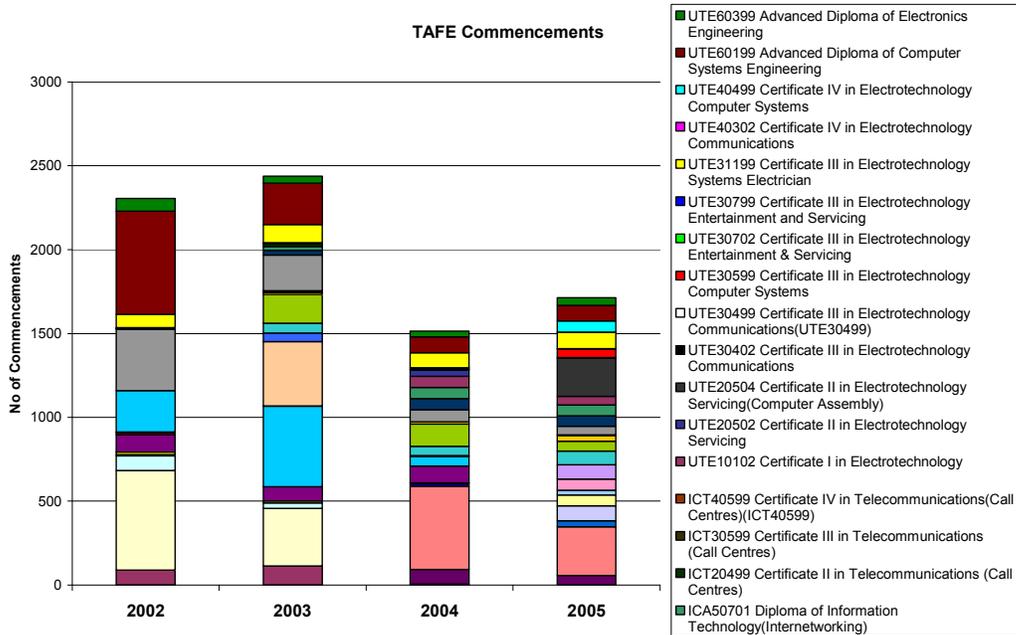
educational process, our report is not focussed on that issue, but on the labour market for completing students.

Table 8



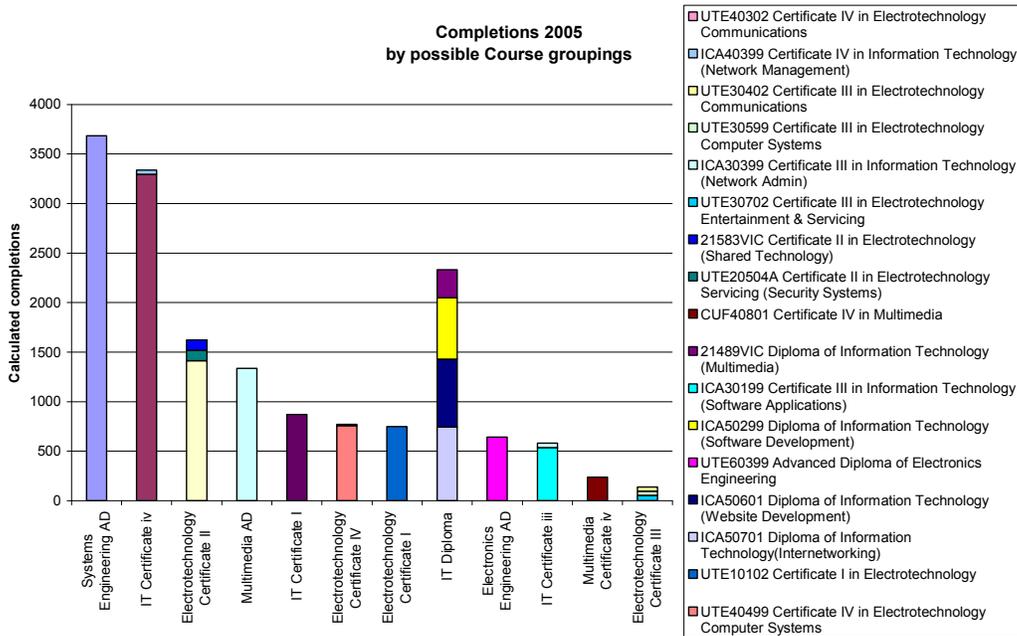
This is illustrated in this pie chart, where 9 courses comprise over 80% of all completions.

Table 9



Commencements confirm this trend, and, whilst dipping significantly in 2004, have commenced recovery, but with what appears to be a slightly different course focus to that which previously applied. It appears that it might be feasible to consider course completions, for this analysis, in related groups, rather than in isolation. This consolidation presents a slightly different picture, as we aggregate more closely related courses (in theory) into more significant critical mass.

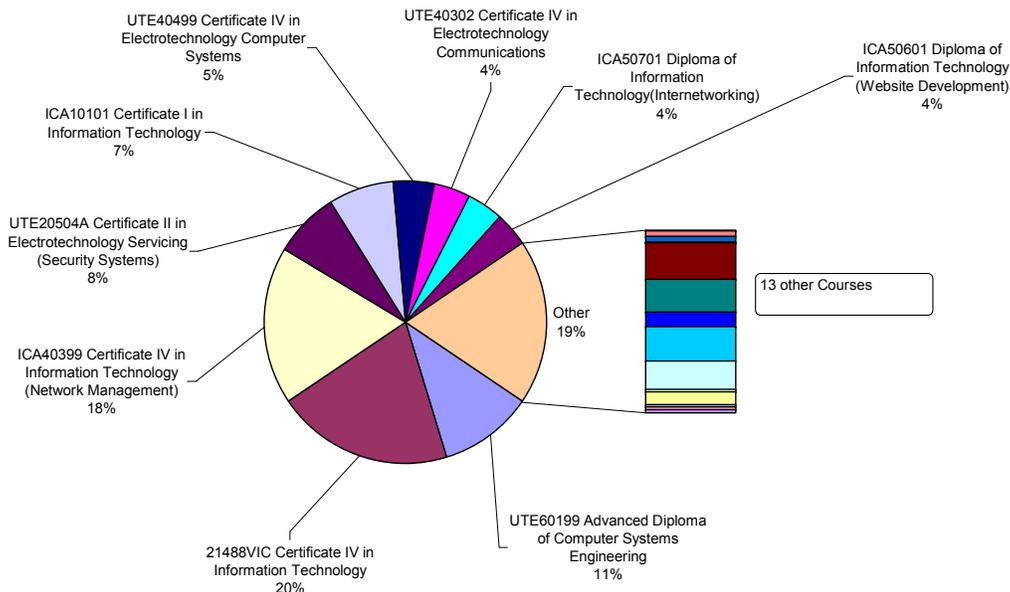
Table 10



Using this approach, almost every current TAFE course lifts to over 500 completions.

Table 11

TAFE Student Numbers



The above analysis of student numbers by course groupings clearly shows which courses are attracting the most students.

When attempting to analyse TAFE institutions within Victoria for comparative purposes there is a lack of readily available data. NCVER⁵ reports annually on a national basis with data presented by State and Course only at a high level. To obtain more detailed data would require a significant amount of red tape to be cut through and the timeframe does not permit this. In the annual report no employment data is presented, which suggests that this was not collected

The following extracts of national data are included for reference. Subtracting Victoria University's known figures gives a picture of other Victorian TAFE enrolments.

Table 12

Extract of student numbers by relevant courses 2000–05

	2000	2001	2002	2003	2004	2005		2004–05
	('000)	('000)	('000)	('000)	('000)	('000)	%	% change
Field of education								
Information technology			82.3	72.5	62.1	57.5	3.5	-7.4
Engineering and related technologies			268.3	260.9	257.8	262.9	16.0	2.0
Health			87.8	103.4	81.0	77.7	4.7	-4.0
Education			56.2	58.1	51.0	47.9	2.9	-6.2

Table 13

Total students by state and territory 2000–05

	2000	2001	2002	2003	2004	2005		2004–05
	('000)	('000)	('000)	('000)	('000)	('000)		% change
New South Wales(a)	638.0	570.5	553.3	588.4	517.5	562.1		8.6
Victoria	468.2	471.1	496.8	511.2	480.7	459.1		-4.5
Queensland(b)	266.5	298.3	298.6	297.6	278.8	290.4		4.2
South Australia	132.6	128.7	127.6	112.7	111.3	115.7		4.0
Western Australia	128.7	135.4	131.9	130.4	126.5	130.1		2.9
Tasmania	32.0	32.6	32.6	35.8	38.5	39.7		3.0
Northern Territory	21.7	21.8	22.4	19.9	19.7	21.3		8.2
ACT	20.2	20.7	19.7	21.8	22.3	23.0		2.9
Australia	1 707.9	1 679.1	1 682.9	1 717.8	1 595.2	1 641.3		2.9

⁵ National Centre for Vocational Education Research

It can be seen from this table that the decline in student numbers between 2003 and 2004 was halted in 2005 with an increase overall of nearly 3%. The Victoria University enrolments did not reflect the overall State's decline which is apposite sign.

Market indicators

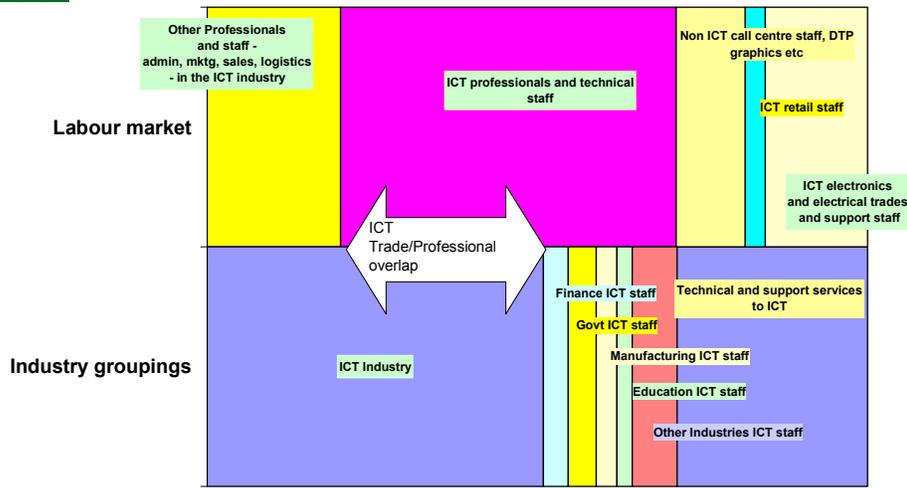
There are two main dimensions to the market for new graduates; these are industry/employment growth and replenishment.

The significance of the ICT industry to this equation can be seen in this diagram, which proportionally represents the national allocation of ICT skilled and technically qualified workers across industries. Nearly 60% of all professional and technically qualified ICT workers in Australia work in the ICT industry. Other major groups can be found in finance, government (including public health), manufacturing and education.

Table 14



ICT Workers in Australia, - by Industry and by Labour market ,
 Source ABS Labour force Feb 2006, ABS ICT Satellite account, Mar 2006, CIER/Whitehorse T250 Dec 2005, DEWR Employment by State Dec 2005, Some data unpublished. CIER modelling based on ABS paradigms. Copyright CIER Inc 2006



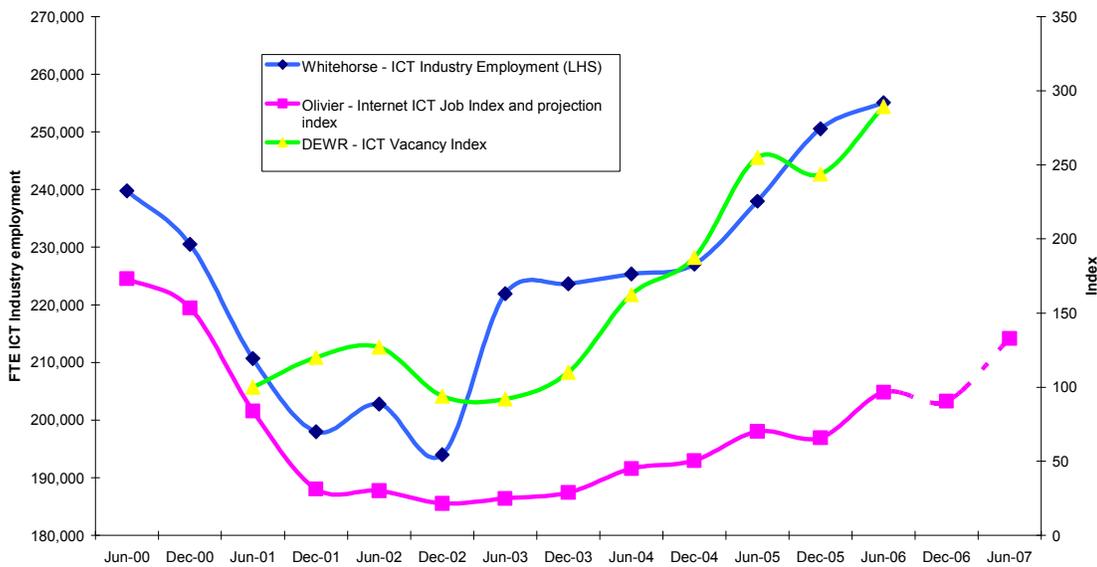
It is also important to understand that 44% of ICT employment in the ICT industry is in software and services companies, 25% in distributors of mainly software and imported hardware, with 27% in telecommunications companies, and that the telecommunication sector proportion has been falling consistently for many years. Most industry growth is in software and services, and most of these are small companies.

ICT industry growth

There is a popular misconception that the ICT industry suffered a major downturn as a result of the collapse of the "dot.com" era. In fact, in Australia at least, most of this was a collapse of inflated profit expectations rather than of commercial reality.

There has been sustained ICT industry national employment growth since December 2002, but some States have been more "bumpy", (notably NSW and SA). Cumulative national ICT industry employment growth since June 2000 is around 25%.

Table 15



There was, however, a fall in ICT technical and professional employment outside the ICT industry, i.e. in the "users", in the period 2001-2002, driven by outsourcing/offshoring. Despite this, the overall employment of ICT technical and professional staff has also risen steadily since June 2002. The general ICT employment trend is illustrated here, in which 3 key indices are compared over the period January 2000 to the present⁶. Each index underscores the strong employment growth since the low points around 2001-2. All indicators suggest that this trend will continue, although there have been, and will continue to be, variations between States and industry sectors.

⁶ Department of Employment and Work-Place Relations ICT vacancies, Olivier ICT recruitment index, and the Whitehorse ICT industry employment measure.

ICT employment growth in other industries

In general, ICT employment in other industries reflects the overall growth/health of the industry concerned, and major changes in technology which affect it.

Of the larger ICT employer sectors (Finance, government, manufacturing, education), manufacturing employment is in decline, finance is growing, but had had a strong tendency towards outsourcing, and, increasingly to offshoring, and education ICT employment, (which is a combination of technical support and teaching), has been declining due to reductions in teaching staff.

Government ICT employment has been growing, as previously outsourced processes are re-evaluated, and as more and more services fall into the e-government category. One of the major growth areas in Government ICT is in public health and community welfare, indicated by the major commitments to Health ICT infrastructure spending by both Commonwealth and Victorian Governments. To this needs to be added further growth in private sector Health and welfare ICT, driven by increasing demand for Aged-care facilities.

Impact of ICT Employment growth

Whilst there is no doubt that ICT student numbers have diminished significantly, in Victoria, Australia, and globally, there is absolutely no real market driven reason for this, as the demand for ICT skills continues to grow.

The current enrolment position already informs us that completions will continue to decline for the next few years, further exacerbating the position. This will simply support the agenda of those agitating for more "457" visa temporary workers to be permitted into Australia, but the global shortage of qualified ICT entrants is starting to diminish this source of new supply as well.

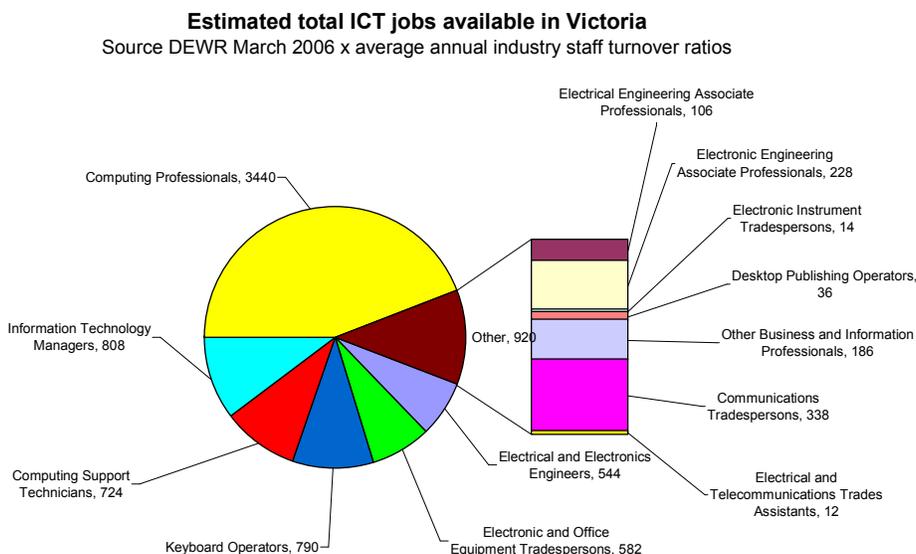
Longer term there is no market logic evident to support exiting this market, however this "pause for reflection" does create the opportunity to restructure the outcomes from Victoria University to correlate more closely to market needs, and for Victoria University to establish preferred differentiators for its market offering.

Another consequence of a tight employment market is an increased demand for skills enhancement in people filling other jobs. This can occur due to unavailability of the skill, or because it has become more expensive to acquire externally. This will, we consider, increase the demand for TAFE courses geared to specific transferable skills, and vendor-certified capabilities.

Replenishment

This chart calculates the likely replenishment requirement for specific DEWR ICT technical and professional job categories in Victoria, based upon current levels of employment. The 7,800 probable jobs per year categorised are derived by analysing the current job population and the average turnover ratios within them.

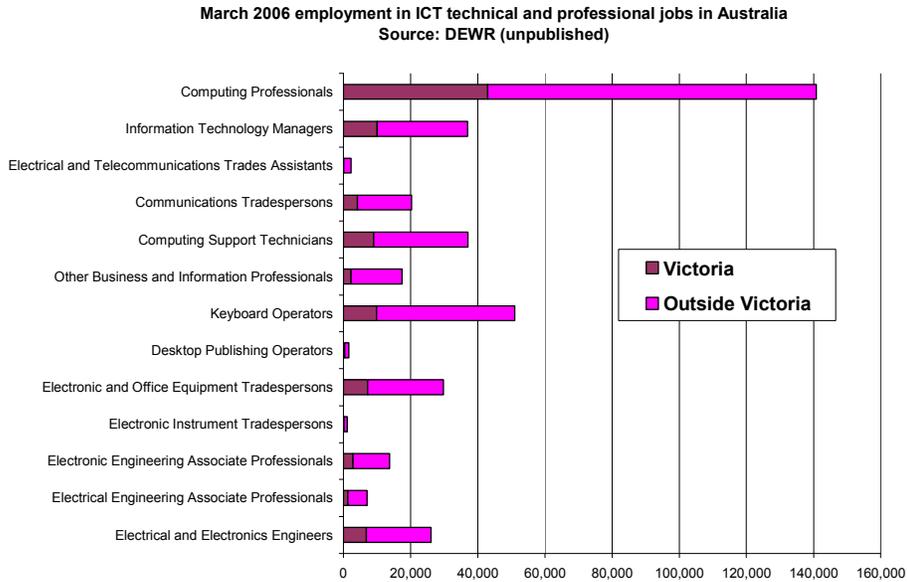
Table 16



Some of these likely jobs will, of course, be filled by job function changes, some by promotions, some by migrants (either interstate or overseas), but a proportion will be filled by new graduates, and a proportion of these by Victoria University graduates. The job numbers are therefore, excluding growth, upper limits to demand. The proportionality of the job groups to each other is therefore of more significance when relating course outcomes with job potential.

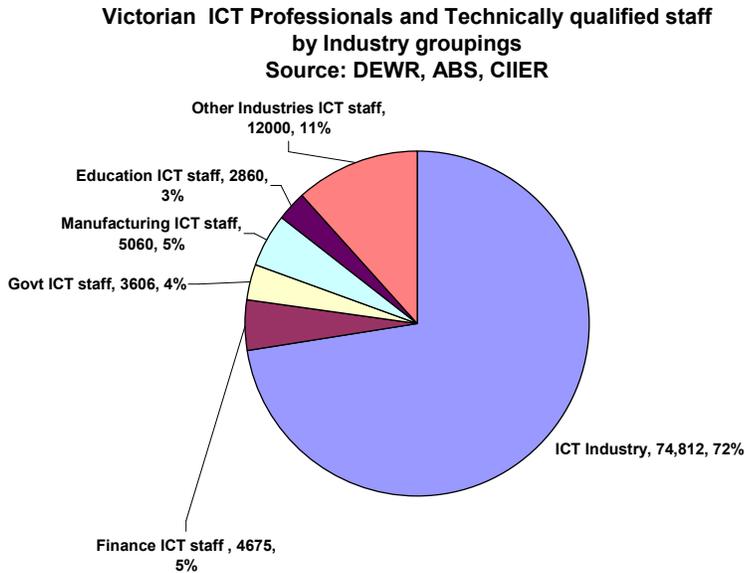
In the absence of up to date ABS data the ICT industry recognises DEWR data as being current and representative. It should also be noted that a considerable amount of work has been done over the past 3 years to create a standard nomenclature for the ICT industry. This will in turn be used by ABS to ensure a greater depth of analysis when census data is collected.

Table 17



This chart contrasts the data above with interstate information, in order to identify any National to Victorian anomalies. In general, the analysis shows that the Victorian percentage of potential ICT jobs is proportional to Victoria's overall share of the jobs market, or slightly higher, so there is no huge overhang of potential interstate jobs evident.

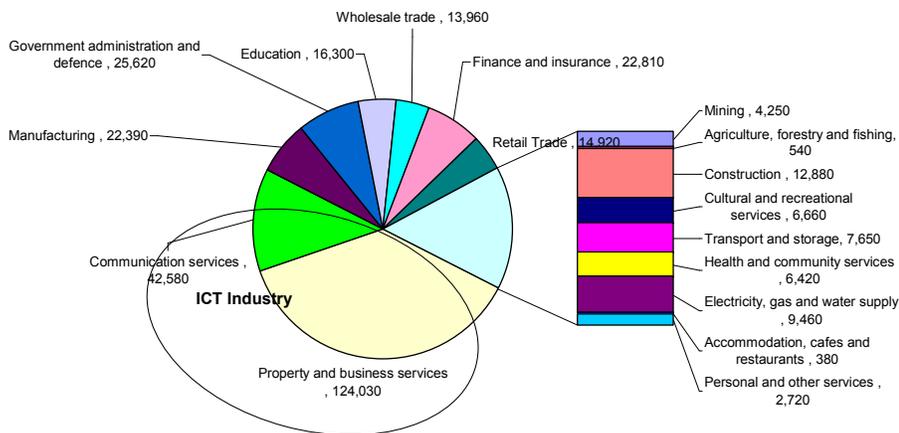
Table 18



This chart looks at where these jobs are found, and reinforces the national analysis that most are in the ICT industry. In fact, In Victoria, the percentage of ICT jobs in the industry, at 72%, is even higher than the national average.

Table 19

Detailed Australian ICT professional and technical Employment by Industry sector
Source ABS Aug 2005



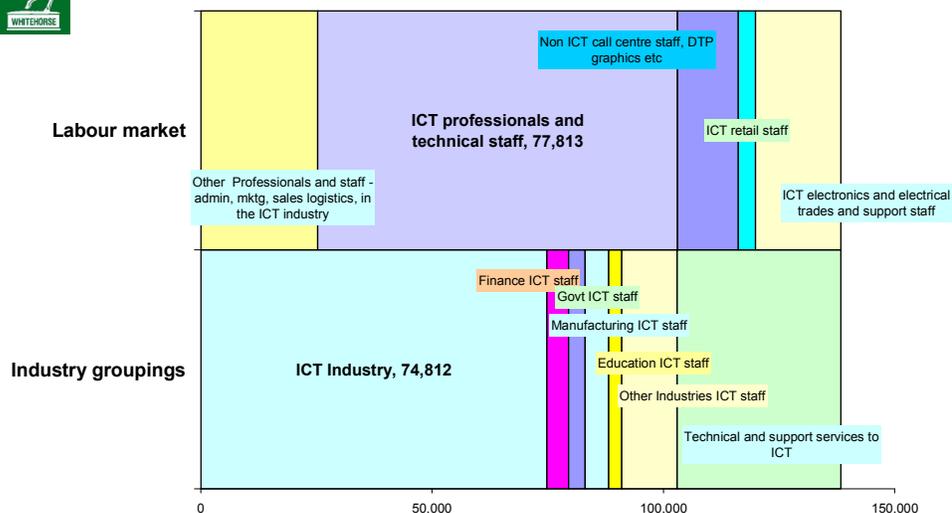
This chart draws upon an alternative database from ABS, using ASIC classifications of industry sector, and illustrates the current ICT technical and professional employment national position with some further detail on some of the smaller industry sectors that may be of interest to Victoria University.

These all lead to this market reconciliation model below, which contrasts labour market analysis (what the job does), with industry analysis (which kind of employer) for all ICT workers in Victoria.

Table 20



138,000 ICT Workers in Victoria,- by Industry and by Labour market ,
 Source ABS Labour force Feb 2006, ABS ICT Satellite account, Mar 2006, Whitehorse T250 Dec 2005, DEWR Employment by State Dec 2005, CIER modelling of States based on ABS paradigms.



The above diagram is the Victorian representation of the National version earlier in this report. The key point to remember when looking at the number of ICT workers in the ICT industry is that the majority are employed in a Small to Medium Enterprise (SME). An SME is defined as an organisation that employs less than 100 people although other definitions vary this number.

Nonetheless it is indicative of the environment that graduates will be entering into and this places more pressure on the ability of Victoria University to produce job ready graduates. This applies to both TAFE and Higher Education graduates.

In the above analysis the “other industries” segment includes the health and logistics sectors, each of which employs a small but highly educated and innovative group of ICT professionals.

In a recent report commissioned by the Department of Communications, Information Technology and the Arts (DCITA)⁷ and carried out by CIER, the Health and Education sectors were analysed in great detail from the software perspective.

One of the key findings was that health IT is advancing on several fronts, which are all underpinned by a need to share health data between different organisations, systems and applications right across the sector.

The various software application segments can thus be categorised into broad groups, including:

Clinical (e.g. clinical systems, GP systems)

Clinical support and other (e.g. pharmacy, pathology, radiology, allied health, therapies, nutrition);

⁷ The Australian software industry and vertical applications markets

Patient administration (e.g. PAS systems, GP practice management);

Finance, supply and administration (e.g. procurement and supply, payroll, claims processing);

Infrastructure (e.g. security, messaging); and

Medical devices (e.g. hearing aids, scanning microscopes, imaging and image manipulation).

Each of these relies on the supply of software developers keeping pace with demand from the healthcare professionals for new and innovative products. The demographics of the global population clearly shows that need for hospitals, diagnostic capabilities and aged care facilities is growing and will continue to grow over the coming decades.

These current and future requirements will place high demands on both the medical, as well as the ICT, professional. There is a need for a higher level of computer literacy amongst medical professionals and para-professionals to meet these demands and thus creating another opportunity for Victoria University to structure courses that will benefit both parties as well as the community.

On the education front, the report identified that e-learning was seen as a growth market pointing to opportunities for software developers. The key areas are improving the functionality, and integration, of the various systems elements. In the areas of learning tools there are major players already in the marketplace and with the push for life long learning there, again, opportunities for Victoria University to set itself apart from its competitors.

Remote learning is a capability that has been in the marketplace for many years but has yet to become an intrinsic part of all universities courses.

Victoria University is in a good position to benefit from the growth in the Intelligent Transport systems arena with its degree offerings in local and global transport both within Victoria and offshore. When this is put into the context of the Victorian logistics and transport sector leading software development with such systems as Citylink, (developed here and now exported) there is little doubt that great opportunities exist for Victoria University.

Course Comparisons

Higher Education

An analysis of the ICT course offerings across all Victorian universities indicates considerable duplication.

Victoria University

School of Information Systems

- Bachelor of Business (Information Systems)/Bachelor of Arts
- Bachelor of Business (Computer Systems Management)
- Bachelor of Business (Electronic Commerce)
- Bachelor of Business (Electronic Commerce/International Trade)
- Bachelor of Business (Electronic Commerce/Retail Management)
- Bachelor of Business (Electronic Commerce)/Bachelor of Science
- Bachelor of Business (Electronic Commerce/Transport and Logistics)
- Bachelor of Business (Electronic Commerce/Music Industry)
- Bachelor of Business (Information Systems)
- Bachelor of Business (Electronic Commerce)/Bachelor of Arts (Multimedia)
- Graduate Diploma in Business Computing
- Graduate Diploma in Enterprise Resource Planning Systems
- Bachelor of Business (Honours) (Information Systems)
- Master of Business (Enterprise Application Integration)
- Masters of Business (Electronic Commerce)
- Master of Business (Electronic Commerce and Marketing)
- Master of Business (Enterprise Resource Planning Systems)
- Master of Business (Information Systems and Enterprise Resource Planning Systems)
- Master of Business (Information Systems)
- Master of Business (Network Management)
- Doctor of Philosophy
- Master of Business by Research (Business Computing)
- Graduate Certificate in Enterprise Resource Planning Systems

Faculty of Health, Engineering and Science

School of Computer Science and Mathematics

- Bachelor of Science in Computer Science and Aviation
- Bachelor of Science in Computational Financial Mathematics
- Bachelor of Science in Computer and Mathematical Sciences
- Bachelor of Science in Computer Science
- Bachelor of Science in Internet Technologies and Applications
- Bachelor of Science in Information Technology
- Graduate Diploma in Computer and Mathematical Sciences
- Graduate Diploma in Computer Science
- Graduate Diploma in Multimedia Information Networking
- Graduate Diploma in Software Engineering
- Bachelor of Science (Honours) in Computer and Mathematical Sciences
- Bachelor of Science (Honours) in Computer Science
- Master of Science in Computer and Mathematical Sciences
- Master of Science in Computer Science
- Master of Science in Software Engineering
- Master of Science (Research)

Coursework Programs

The School offers a range of coursework programs at postgraduate level:
Graduate Diplomas in:

- Computer Science
- Computer and Mathematical Sciences
- Multimedia Information Networking
- Software Engineering

Master of Science in:

- Computer Science
- Computer and Mathematical Sciences
- Software Engineering

**Faculty of Health, Engineering and Science
School of Electrical Engineering**

- Bachelor of Engineering/Bachelor of Business Electronic Commerce
- Bachelor of Science (Honours) in Computer Technology
- Master of Engineering Science in Computer & Microelectronic Engineering (Coursework)
- Master of Engineering in Microelectronic Engineering/Master of Engineering Science in Computer and Microelectronic Engineering

The Melbourne University ICT Courses

- Bachelor of Information Systems
- Bachelor of Commerce/Bachelor of Information Systems
- Bachelor of Science/Bachelor of Information Systems
- Bachelor of Geomatic Engineering/Bachelor of Information Systems
- Diploma in Information Systems

Ballarat ICT Courses

- Applied Computing
- Games Technologies
- Information Technology
- Information Systems
- Engineering/Computing Technology Teaching
- Information Technology (Professional Practice)

Monash University

- Bachelor of Software Engineering
- Bachelor of Multimedia and Digital Arts
- Bachelor of Computer Science
- Bachelor of Business Information Systems

**La Trobe Information Technology
Melbourne**

- Bachelor of Computer Network Engineering
- Bachelor of Computer Science
- Bachelor of Computer Science in Games Technology
- Bachelor of Computer Systems Engineering
- Bachelor of Computer Technology
- Bachelor of Information Systems
- Bachelor of Software Engineering

Bendigo

- Bachelor of Information Technology (Software Development)
- Bachelor of Computing
- Bachelor of Information Technology (Computer Networks)
- Bachelor of Information Technology (Information Systems)

La Trobe Melbourne

- Bachelor of Bioinformatics/Bachelor of Science
- Bachelor of Cognitive Science/Bachelor of Computer Science
- Bachelor of Computer Science (Honours)/Bachelor of Electronic Engineering
- Bachelor of Computer Science/Bachelor of Commerce
- Bachelor of Computer Science/Bachelor of Mathematical and Statistical Science
- Bachelor of Information Systems/Bachelor of Business
- Bachelor of Laws/Bachelor of Information Systems

La Trobe Bendigo

- Bachelor of Applied Science/Bachelor of Computing
- Bachelor of Business/Bachelor of Computing

Swinburne ICT Courses

- Bachelor of Information Technology
- Bachelor of Business Information Systems
- Bachelor of Business Information Systems /Bachelor of Business
- Bachelor of Science (Professional Software Development)
- Bachelor of Computing
- Bachelor of Computing (Network Design and Security)
- Bachelor of Engineering (Telecommunication and Network Engineering)
- Bachelor of Engineering (Robotics and Mechatronics)/Bachelor of Science (Computer Science and Software Engineering)
- Bachelor of Engineering (Telecommunication and Network Engineering)/ Bachelor of Science (Computer Science and Software Engineering)
- Bachelor of Engineering (Electronics and Computer Systems)/ Bachelor of Science (Computer Science and Software Engineering)
- Bachelor of Multimedia (Games and Interactivity)/Bachelor of Science (Computer Science and Software Engineering)

RMIT ICT Courses

- Communications Engineering/Computer Science – Bachelor of Engineering/Bachelor of Applied Science (Double Degree)
Communications Engineering/Computer Science; Computer Systems Engineering/Computer Science; Electronic Engineering/Computer Science - Bachelor of Engineering/Bachelor of Applied Science (Double Degree programs)
- Computer Science – Bachelor of Applied Science (Honours)
- Computing and Internet Technology – Bachelor of Applied Science
- Computing and Internet Technology – Bachelor of Applied Science (Honours)
- Electronic Engineering/Computer Science – Bachelor of Engineering/Bachelor of Applied Science (Double Degree) Engineering – Bachelor of Engineering (Biomedical Engineering / Communication Engineering / Computer Systems Engineering / Electrical Engineering / Electronic Engineering / Network Engineering / Software Systems Engineering)
- Geometrics/Computer Science – Bachelor of Applied Science (Double Degree)
- Information Technology – Associate Degree in Applied Science
- Information Technology – Bachelor of Applied Science
- Mathematics/Computing – Bachelor of Applied Science/Diploma of Technology (Dual Award)
- Multimedia Cartography – Bachelor of Applied Science
- Physics/Electronic Engineering – Bachelor of Applied Science/Bachelor of Engineering
- Software Engineering – Bachelor of Applied Science

Australian Catholic University ICT Courses

- Graduate Certificate in Electronic Commerce
- Graduate Diploma in Information Systems
- Master of Information Systems (Advanced)
Master of Information Systems
- Postgraduate Diploma in Information Systems
- Postgraduate Certificate in Information Systems

TAFE Course Comparisons

Victoria University

School of Human Services, Science and Technology
Department of Information Technology

- 21488VIC Certificate IV in Information Technology
- School of Engineering, Construction and Industrial Skills
- Department of Electro technology and Computer Systems
- Certificate II in Electro technology [Shared Technology]
- Certificate III in Electro technology Computer Systems [Networks]
- Certificate IV in Electro technology Computer Systems
- Advanced Diploma of Computer Systems Engineering

RMIT TAFE ICT Courses

- Computer Science – Advanced Diploma
- Computer Systems Engineering – Advanced Diploma
- Information Technology – Diploma incorporating Cert IV
- Network Management – Certificate IV in Information Technology

Swinburne TAFE ICT Courses

- Advanced Diploma of Computer Systems Engineering
- Diploma of Information Tech (Network Engineering)
- Diploma of Information Tech (Software Development)
- Diploma of Information Tech (Multimedia Integration)
- Diploma of Information Tech (Website Development)
- Advanced Diploma of Computer Systems Engineering
- Diploma of Information Technology (Software Development)
- Advanced Diploma of Computer Science (Multimedia, Instrumentation, Software Development)

NMIT - Information Technology

- Certificate I in Information Technology
- Certificate II in Information Technology
- Dual Qualification - Certificate IV in Information Technology (Networking) & Certificate IV in Information Technology (Programming)
- Advanced Diploma of Information Technology (Network Security)
- Advanced Diploma of Information Technology (Systems Process & Improvement)
- Certificate II in Multimedia
- Certificate III in Multimedia
- Certificate IV in Multimedia
- Advanced Diploma of Multimedia
- Certificate II In Electro technology Servicing (Computer Assembly)
- Advanced Diploma of Computer Systems Engineering

Box Hill - Computing, ICT and Information Technology Courses

- Certificate III in Information Technology (Software Applications)
- Certificate IV in Library/Information Services
- Diploma of Information Technology (Website Development)
- Diploma of Library/Information Services
- Advanced Diploma of Computer Systems Engineering
- Advanced Diploma of Electronic Engineering
- Advanced Diploma of Information Technology (E-Security)
- Advanced Diploma of Library/Information Services
- Graduate Certificate in Information and Communications Technology
- Associate Degree in Computer Systems (Networking)
- Associate Degree in Software Development
- Bachelor of Computer Systems (Networking)
- Courses for continuing students only
- Certificate IV in Information Technology (Software, Networking and Website Development Streams)
- Diploma of Information Technology (Software)
- Diploma of Information Technology (Network)
- Diploma of Library and Information Services

Kangan Batman

- Certificate II in Information Technology (Applications)
- Certificate III in Information Technology (Software Applications)
- Victorian Certificate of Applied Learning (Senior or Intermediate) (It & Multimedia)
- Advanced Diploma of Computer Systems Engineering
- Diploma of Information Technology
- Certificate IV in Information Technology (General)

Course Offerings/ Market Match

Skills Needs analysis

This section of the report analyses skills needs in the marketplace. The charts contrast data obtained from analysis of ITCRA members' information, in 2003-5, with ICT industry survey data from May-Jun 2006. Approximately 2-3000 jobs per year are involved. The data is proprietary to ITCRA⁸ and CIER⁹.

ITCRA is made up of recruitment companies, so the jobs concerned come from those advertised by a wide range of employers. The ICT industry data is purely from companies involved in the provision of ICT goods and services and is derived from the Whitehorse T250 analysis. Some differences of emphasis are obviously present, eg ICT sales and account management jobs are entirely within ICT industry, so have not been included in this comparison.

For the purpose of the analysis below, ICT skills have been categorised into a standardised structure, developed originally for the Victorian Government ICT Skills Snapshot project, but since applied to a number of other ICT labour market studies. Whilst not identical to the new ANZSCO structure that will be adopted by both DEWR and ABS, it is sufficiently similar to be able to be used as a template for the later correlation of course outcomes to potential job groupings.

Correlation of employment trends to the courses which can provide the necessary job-skills, and the consequent quantification of potential demand, both in replenishment and growth, related to such courses, is not a trivial exercise, and is outside the scope of this phase of the project.

Whilst the course title provides some guidance in such a process, each course would need to be further assessed in terms of its skill outcomes, and then mapped against identified demand.

This would not be a "one-to-one" map, as a number of courses may develop similar skill outcomes, and some jobs may advantageously require both higher education and specific Tafe course skills. It may be feasible to group some courses in this analysis, in a similar way to that used for the aggregation of student numbers in "like" courses.

This could lead to more effective course structures relating both to a critical mass of students, and to a defined series of skill outcomes capable of being directly related to job-market trends and paradigms.

Such analysis could not only assist in improving delivery efficiency, but could also provide a marketing advantage for the University, by improving the understanding of potential students and their advisors of the job market opportunities opened up to them by particular courses.

The following table is included so that the charts following may be more appropriately interpreted. The more detailed skills designations in the right hand column are included within the similarly colour coded Skill categories and subcategories to the left for upper level analysis purposes. This analysis does not drill down into the specific operating or technical environments that pertain to these jobs, eg SAP, Java, .NET which could apply to a number of job skill categories.

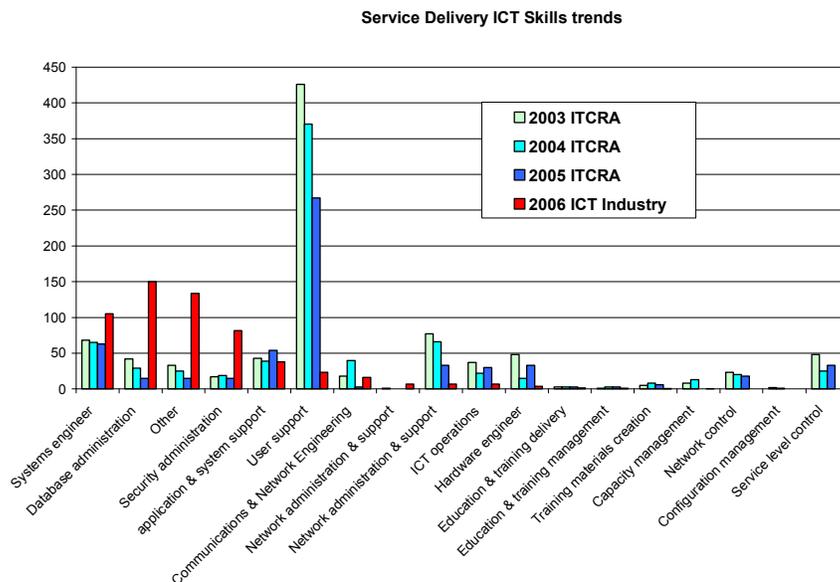
⁸ Information Technology Recruiters Association

⁹ Centre for Innovative Industry Economic Research Inc

Table 21

Skill Category	Subcategory	Skill designation	
Development & implementation	Human factors	Documentation	
	Installation & integration	Systems installation/decommissioning	
		Systems integration	
	Systems development	Analyst Programmer	
		Business analysis	
		Data analysis	
		Database design	
		Media and Content	
		Programming/software development	
		Systems design	
		Systems ergonomics/design	
		Systems testing	
		Technical authority	
Management & administration	Project management	Programme management	
		Project management	
		Project office	
	Quality management	Compliance	
		Quality assurance	
		Quality management	
	Resource management	Asset management	
		Education & training management	
		ICT management	
		IS co-ordination	
		Service delivery management	
		Systems development management	
	Supply management	Contract management	
		Procurement	
	Sales & marketing	Sales and marketing	Account management
			Marketing
			Sales support
Selling			
Service delivery	Education and training	Education & training delivery	
		Training materials creation	
	Engineering	Communications & network engineer	
		Hardware engineer	
		Systems engineer	
	Infrastructure	Capacity management	
		Configuration management	
		Network control	
		Security administration	
		Operation	Application & system support
		Database administration	
		ICT operations	
		Service level control	
	User support	Network administration & support	
		Other	
User support			
Strategy & planning	Business/IS strategy and planning	Business process improvement	
		Business risk management	
		IS strategy & planning	
	Information management Advice	Consultancy	
		Information resource management	
		Technical specialism	
	Technical strategy and planning	Business continuity planning	
		Change control	
		Emerging technology monitoring	
		Methods and tools	
		Network planning	
	Systems architecture		

Table 22



The chart contrasts calculated demand for specified skills categories from ITCRA showing whole of industry placement data for 2003-2005, with 2006 data obtained from the Whitehorse ICT industry Survey.

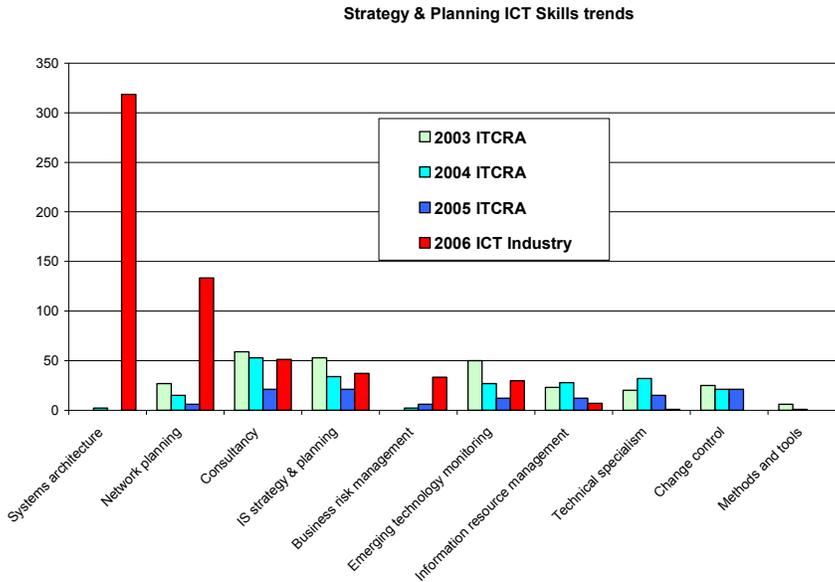
Service delivery jobs are important to graduates as, in the main, they provide more entry level employment opportunities.

Many of these jobs are in the "user-support" category, including lower level network support, trouble-shooting of operational problems, help-desks and the like. While such jobs are often filled by higher education graduates, many of the relevant skills are more appropriately considered to be TAFE base skills.

It can be seen quite clearly that the ICT industry continues to require systems engineers, database administrators, and security administrators; however the strong user support requirements demand identified by ITCRA in previous years shows significant decline from 2003, and is not reflected in the 2006 ICT industry analysis.

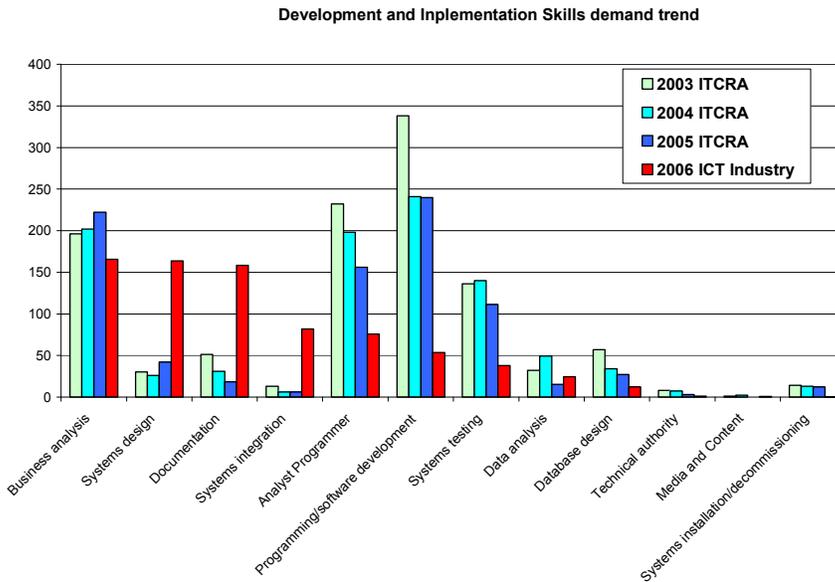
We believe that this decline is related, in part, to increased outsourcing/offshoring of "help-desk" functions, but also to a realisation that such support has often not been efficacious in practice.

Table 23



Job demand in Strategy and planning skills is far higher in the ICT industry, which needs systems architects and network planners, than it is in general industry. Most other strategy and planning requirements are at lower levels, reflecting the more specialised nature of these tasks, and, in many cases, higher levels of seniority. Whilst some TAFE courses may have relevance, these jobs would, in the main, be filled by higher education graduates.

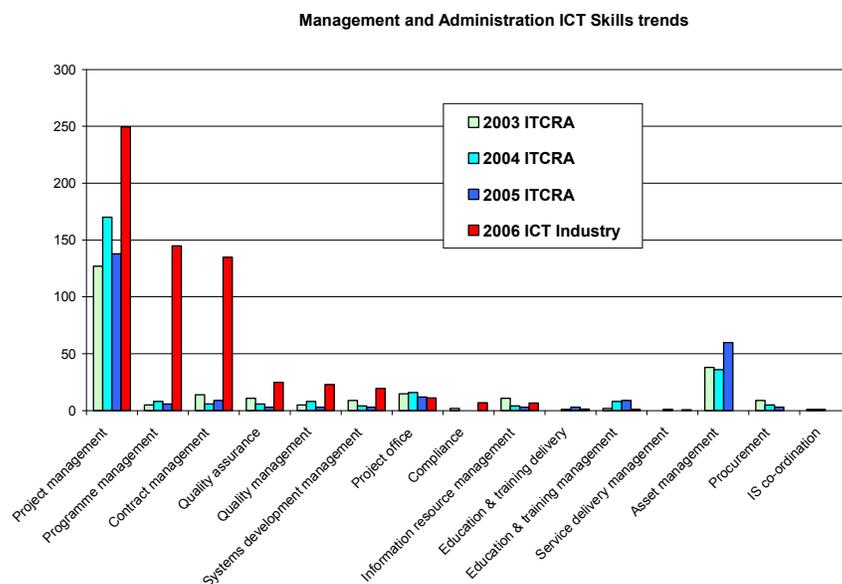
Table 24



Both the ICT industry and broader groups show sustained need for business analysts. The ICT industry, however, also sees the need for systems designers and systems documenters, whereas the broader market has a need for analyst-programmers and developers, however this has diminished from the 2002-3 levels.

Business analysts operate as the commencement phase of ICT activity, as they are responsible for identifying and defining client requirements, and the development of business cases for investment or commitment. Sustained demand for business analysts shows a readiness to commence new IT projects. The lower level of demand for analyst programmer and software development in the ICT industry is consistent with a "service" rather than "product" orientation to software, and/or a higher incidence of "package" software solutions.

Table 25



Project and programme management skills are in high demand both in the user community and in the IT industry, and are one the few groups in which demand is not only sustained, but also appears to be increasing.

Project management is the process following business analysis, and relates to the "constructional- implementation" phase of ICT projects. Sustained demand for project management indicates a climate in which investment is occurring, and new systems are being developed.

Whilst the ICT industry also wants skilled negotiators in contract management; the user community is not indicating a similar need. This may also illustrate a more competitive ICT services market, in which sales success now requires more complex contract structures.

Table 26

Emerging Market Trends

Australian ICT	June 2006	Trend
Total ICT workers in Australia	502,000	Not previously measured
Companies in ICT Industry	25, 600	Steady increase
SME's in the ICT Industry(Below 20 staff)	24,400 (95%)	No significant change in % of SME's
Employees in ICT Industry	255,000	Steady growth, State and sectoral variations
Employees in large ICT Industry companies (+100 staff)	140,500 (55%)	No significant change in %
Female employees in the ICT industry	74,000 (29%)	Flat, slight dip in percentage nationally
Revenue of ICT Industry	\$77.5 Billion	Steady growth, sectoral variations
R&D of ICT Industry (T250 only)	\$586 Million	Long term sustained decline
R&D per capita	\$4,280	Flat in last six months, long term decline

The current trend in ICT recruitment indicates a growing confidence in the market in a number of key areas including Security now a key business issue, Project Management and some programming skill sets. It is of concern to Victoria University that the Diversiti report¹⁰ indicated a negative view of TAFE qualifications when presented as the only qualification. According to their survey data Victorian employers ranked these qualifications of least influence in hiring decisions.

It is interesting to note that the Victoria University TAFE experience shows a significant percentage of graduates gain employment easily.

As has been the case for many years female employment in the ICT sector remains below expectations. This provides an opportunity for Victoria University to promote relevant courses and careers in their promotional collateral.

ICT Industry Female Employment

There are two related questions.

- a. How many women are there in the total IT workforce?
- b. how many ICT technical and professional women are there in the IT industry?

A number of commentators have suggested recently that the rate of employment of ICT technical and professional females is declining, based, in the main, on falling ICT course enrolments by women.

The first question is complicated by the decision on who you include in the ICT work-force, as the inclusions and exclusions impact upon the female %.

¹⁰ Diversiti Hiring Influence Report 2006

For example if you include call-centres then female participation goes up, if you include electronics then it goes down.

DEWR data on the size of the ICT specific workforce from March 2006 indicates the following (all numbers in thousands), adding to 386,000.

Table 27

26.1	Electrical and Electronics Engineers
7.0	Electrical Engineering Associate Professionals
13.8	Electronic Engineering Associate Professionals
1.2	Electronic Instrument Tradespersons
29.9	Electronic and Office Equipment Tradespersons
1.6	Desktop Publishing Operators
51.0	Keyboard Operators
17.5	Other Business and Information Professionals
37.2	Computing Support Technicians
20.4	Communications Tradespersons
2.3	Electrical and Telecommunications Trades Assistants
37.0	Information Technology Managers
140.8	Computing Professionals

This total leaves out a further 116,000 workers in ICT peripheral occupations, illustrated in the CIIER model, leading to a total ICT related Work-force of around 502,000 nationally.

A more restricted data set from ABS, covering only ICT technical and professional employment and including:

Table 28

Information Technology Managers	Computing Professionals
Electronic Engineering Associate Professionals	Computing Support Technicians
Communications Tradespersons	Electronics Engineers

showed May 2005 data of 232600 males, 51,700 females, adding to 284,300 FTE.

This is only 18.2% female participation, and there appear to have been no significant variations in this percentage since August 02.

On question b., female employment in the ICT industry, we can be a lot more accurate.

ABS in their latest report on the ICT industry 2002-3 (ABS 8126.0 Sep 2004) had an ICT industry of 235,696, of which 32.3% were female.

The female % of "ICT employees", (i.e. technical and professional staff), was given as 24.1%, indicating that a higher % of admin and other non-professional staff are female.

Our own analysis suggests that the ABS overall data was a little overstated, possibly through the inclusion of some non-ICT call centres with a very significant female presence.

As of Dec 2005 we estimated, based upon a sample size of 46% of total Australian ICT employment (larger than the ABS sample) 74,000 women in an Australia ICT industry of 250,500, (29.54%), and we believe this to be slightly understated, as smaller firms tend to employ a slightly higher percentage of females.

Industry sectors also vary, with hardware manufacture the lowest at 21%, and Telcos the highest at 32% female work-force.

The conclusion therefore is that the ICT industry has a better track record on female employment than many other industries, with around 30% overall female staff. More importantly for female ICT professional development, the ICT industry employs around 24% female technical and professional staff, with higher percentages in software and consulting sectors. In contrast, other ICT technical and professional employers, in Finance, Government, Manufacture and other industries, employ around 100,000 ICT technical and professional staff between them, but by a process of reduction, we can calculate that only around 16% of these employees are female.

Based upon the evidence:

- The level of female participation in the ICT technical and professional work-force is higher in the ICT industry than it is in other industries that employ ICT professionals (Govt, finance, manufacture, education etc)
- Suggesting that bias against women is lower in the ICT industry than it is in other industries.
- ICT industry data and ABS data does not show any decline in female participation over the last three years, and recent data suggests the opposite
- ICT University course enrolments by women do show such a decline, which will inevitably translate into the work-force over time.

One of the criticisms of ICT course material is its' inherent technical and hence potentially boring content. Research and anecdotal data has shown that females do not participate in ICT because of a number of negative perceptions including boring day to day functions.

As stated in the Key Findings and Recommendations section, there is a great opportunity for the Victoria University to meet this challenge in an innovative manner if course material, and its presentation, can be more oriented toward females.

International Trends

Research into overseas trends has highlighted the predicted situation in the UK and Canada. These two countries have a great deal of synergy with the local market and the message is rather frightening.

Whilst it is of interest only, we have included an article that spells out the UK situation very succinctly.

“UK facing £20bn IT skills shortage”

Matt Chapman, vnunet.com 05 Jul 2006

The UK's software development industry will suffer the same decline as the country's manufacturing sector unless action is taken to tackle the skills shortage, according to a report released today.

A study conducted by [Microsoft](#), [Lancaster University Management School](#) and the [British Computer Society](#) found that those involved at the start of the UK software industry three decades ago are now moving towards retirement, and there are simply not enough graduates being trained to take their places.

Perhaps the most worrying figure is that the UK is turning out just 20,000 new IT graduates each year.

The study highlighted a 50 per cent drop in applications for computer related degrees in the past five years, with 47 per cent fewer systems engineering students and 60 per cent fewer software engineering students.

Even if the numbers of students recovers to previous levels, there will still not be enough to meet the demand for software developers.

"The UK faces an acute and growing shortage of high-end software skills," said Matthew Bishop, senior director of Microsoft's Developer Platform Group.

"With the same passion that young people enjoy the music players and computer games which the industry develops, they need to realise that their own futures can lie in creating the software that enables those experiences."

The report called for industry, academia and the UK government to work together to raise the profile of the industry and encourage more students to take computer science as a degree subject.

The study also found that insufficient numbers of UK software developers are being trained in the higher level skills that will be in demand in the future.

In comparison, Asian and Eastern European countries are producing hundreds of thousands of relevantly trained graduates every year.

The [Office for National Statistics](#) (ONS) puts the current value of software production to the UK economy at £20bn, up from £2.5bn in 2003.

The ONS calculated that the industry employs one million workers, which includes commercial developers and in-house software developers.

The Microsoft-backed study suggested that 200,000 basic IT jobs will be off-shored by 2010”
End of article.

It is unfortunate that negative situations always get the attention of the public and ICT “bad news” stories seem to get more attention than is warranted because on the positive side these predicted shortages in both of those markets provide a significant opportunity for Australian graduates and experienced ICT professionals.

Government Policies

State Government

The Victorian Government announced their ICT Industry Plan 2005-2010 in December 2005 defining their involvement in the local ICT industry for this period.

Amongst the initiatives announced were:-

The extension of the ICT Scholarship Program aimed at supporting the top postgraduate students in their research endeavours.

The ICT Industry Skills Scholarships Pilot Program providing funding for more students to undertake an industry-based project to become more job ready.

To work with industry, the higher education sector and other Australian Governments to pursue a co-ordinated approach to the promotion of ICT as a career.

Through their website for young people www.youthcentral.vic.gov.au provide a comprehensive reference tool for ICT careers

Work with the education sector to ensure secondary curricula remain in line with industry needs.

The Victorian Government has also encouraged the setting up of industry clusters. A cluster is a concentration of companies in a particular industry who share a common market and support base. Some of the clusters in the Victoria include:- Computer Games, eLearning, Photonics, Intelligent Transport Systems, Victoria.Net, Radio Frequency Identification (RFID) and Victorian Women in ICT.

A number of these correlate closely with Victoria University's strengths and should be kept in mind when reviewing courses and course content.

Federal Government

The Government announced it was committing \$29 million through SII for the proposed Australian Partnership for Advanced Computing Phase 2 (APAC2) over 2004–2006, the Minister has emphasised the strategic investment on the part of the Government to support world class research.

APAC Phase 1, established with Government funding of \$19.5 million over 1999–2003, now has an organisation in each State as well as the Australian National University and CSIRO. The partnership involves 27 Universities. The APAC Grid Programme of APAC2 will focus on the development, installation and operation of an 'industrial strength' grid, integrating the partner facilities, providing an infrastructure for Australian researchers to get seamless access to the computational and data resources in the National Facility as well as a new range of services to support research collaboration, nationally and internationally.

The total Higher Education funding for 2006 is \$m320.967 greater than 2005 this represents a 6% increase.

The Federal Government has formed a number of Working Groups over the past decade in an attempt to better assess the real skills needs for the future of the ICT industry. The most recent, The Skills Foresighting Working Group its report was released by the Minister in June 2006.

Appendices

The following extract from DEST publication¹¹ titled “Students 2004 [full year]: selected higher education statistics tables”. We have selected some data that we consider to be relevant to this project. The full publication has considerably more statistical information which will be useful in Stage II of the Victoria University project.

Appendix I

Extract from Table of Commencing Domestic Students by State, Institution and Broad Field of Education, 2004

State/Institution	Natural and Physical Sciences	Information Technology	Engineering and Related Technologies	Number of students in selected courses	% of Total
Deakin University	517	316	240	1073	8.19
La Trobe University	726	216	148	1090	8.32
Monash University	1,511	1,214	807	3532	26.95
R M I T	653	657	722	2032	15.50
Swinburne University	241	465	698	1404	10.71
University of Melbourne	1,702	311	774	2787	21.26
University of Ballarat	94	122	82	298	2.26
Victoria University	264	318	310	892	6.81
Total Victoria	5,708	3,619	3,781	13108	100.00

This extract from a much larger table shows the comparative numbers of students commencing study in 2004 for courses that are relevant to this project.

It does put the Victoria University numbers into perspective against the competition for these courses. However they do lend weight to the argument that Information Technology is not perhaps a cornerstone product for Victoria University.

¹¹ Department of Education, Science and Training Students 2004 [Full Year]: Selected Higher Education Statistics

Appendix II

Actual Student Load (EFTSU) for Commencing and All Indigenous Students by State, Institution and Gender, 2004

State/Institution	Commencing Load 2004			All Load 2004		
	Males	Females	Total	Males	Females	Total
Deakin University	26	61	87	68	145	213
La Trobe University	6	13	19	25	32	58
Monash University	7	15	22	24	38	62
R M I T	8	8	16	19	20	38
Swinburne University	1	2	3	4	5	8
University of Melbourne	28	35	63	66	108	174
University of Ballarat	1	2	3	3	7	9
Victoria University	4	4	8	13	11	24
Total Victoria	81	140	221	222	366	586
TOTAL Australia 2004	918	1,686	2,604	2,144	3,806	5,950
TOTAL Australia 2003	1,012	1,719	2,731	2,211	3,773	5,985
% Change on 2003	-9.3%	-1.9%	-4.7%	-3.0%	0.9%	-6%

This table is included as an indicator of the small number of indigenous students attending Victoria University

This in turn does provide a possible avenue for differentiation with Victoria University offering more scholarships for indigenous students.

Appendix III

Commencing and All Overseas Students by State, Institution and Onshore/Offshore Status, 2004

State/Institution	Commencing Students			All Students		
	Onshore	Offshore	Total	Onshore	Offshore	Total
Deakin University	2,516	424	2,940	5,094	1,394	6,488
La Trobe University	1,707	566	2,273	3,298	1,162	4,460
Monash University	4,900	2,304	7,204	11,042	6,035	17,077
Royal Melbourne Institute of Technology	3,428	3,284	6,712	7,201	7,931	15,132
Swinburne University	1,547	0	1,547	3,974	0	3,974
The University of Melbourne	3,789	23	3,812	9,135	80	9,215
University of Ballarat	2,209	788	2,997	2,997	1,350	4,347
Victoria University	2,006	968	2,974	3,811	2,286	6,097
Total Victoria	22,124	8,357	30,481	46,591	20,238	66,829
TOTAL Australia	81,929	25,213	107,142	164,535	64,020	228,555
TOTAL 2003	77,481	23,315	100,796	154,136	56,261	210,397
% Change on 2003	5.7%	8.1%	6.3%	6.7%	13.8%	8.6%

Appendix IV

Acronyms used in Report

ABS	Australian Bureau of Statistics
ASIC	Australian Securities and Investment Commission
ACS	The Australian Computer Society
AIIA	Australian Information Industries Association
ANZSIC	Australian and New Zealand Standard Industry Classification
CIER	Centre for Innovation Industry Economic Research
DCITA	Department of Communications Information Technology and the Arts
HE	Higher Education
ICT	Information Communications Technology
ITCRA	Information Technology Computer Recruiters Association
MMV	Multimedia Victoria
MNCs	Multi-national companies
NCVER	National Centre for Vocational Education Research
NICTA	National ICT Australia Limited
R&D	Research and development
RFID	Radio frequency identification device
SMEs	Small to medium enterprises
TAFE	Technical and Further Education
WSG	Whitehorse Strategic Group Limited

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