The ICT Industry Report

January 2008

Centre for Innovative Industry Economic Research Inc.

About the Australian Computer Society

As the professional body for practitioners in the ICT industry, the ACS plays a critical and growing role in establishing and promoting standards of excellence and maintaining members' expertise with access to quality education.

There are around 255,000 ICT professionals employed in Australia, with over 60% of those directly employed within the ICT industry, and the balance interacting with the ICT industry from their roles in business, government, and academia.

The continued, sustainable growth and prosperity of the ICT industry is therefore vital to the continuance of the ICT profession.

ACS is the leading professional body in ICT in Australia. Members of the ACS are professionally qualified and accredited.

ACS has in excess of 14,000 members nationally. Of these, some 50% are directly involved in the ICT Industry with 60% holding senior management positions. ACS also supports a large student membership.

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. CIIER 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 Reports on other high technology industries.

Whitehorse Strategic Group Ltd provided the analysis for this publication. Whitehorse. is an Australian owned management consulting practice specialising in ICT Market Research and analysis, ICT policy and strategy, especially in the Government sector, Business Process Management, and Economic Development.

ABN 64 806 162 996
3rd Floor, 45 William St.
Melbourne, 3000
e-mail: admin@whitehorsestrategic.com
Phone: 03 9614 8510
Fax: 03 9614 8201

Executive Summary

Survey and Analysis Process

The data for this report was gathered in October - December 2007, and represents 53% of total current industry employment and 92% of total current industry revenues in the ICT industry in Australia. The bi-annual survey process upon which this report is based commenced in 1998.

From the survey data, a series of industry models are developed in a consistent and statistically verified structure.

In this report, the term “ICT Industry” refers to companies solely concerned with the provision of ICT products and services, and companies with major units supplying ICT good and services.

ICT Employment Model

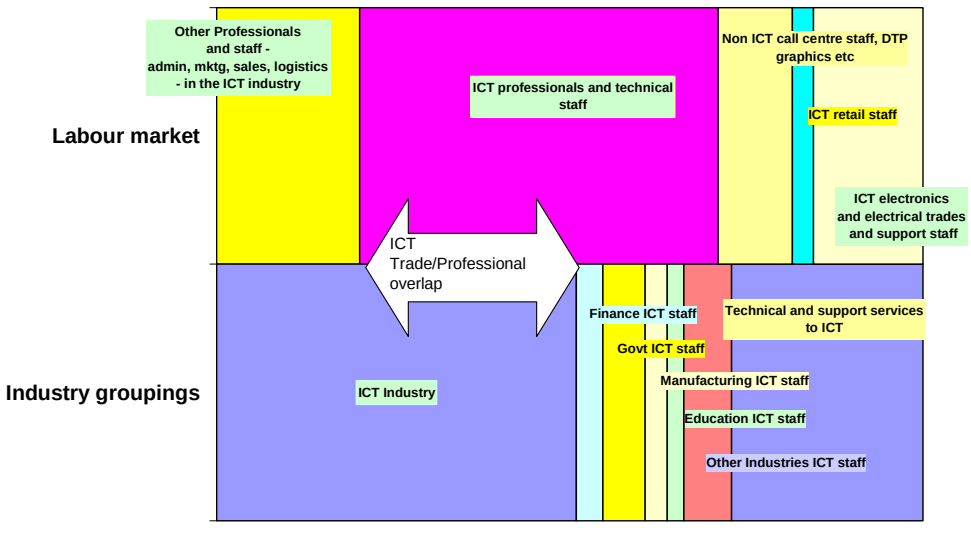
There are around 255,000 ICT professionals employed in Australia, (of the 514,000 people performing ICT technical and professional tasks in the country), with over 60% of the 255,000 directly employed within the ICT industry, and the balance interacting with the ICT industry from their roles in business, government, and academia.

The continued, sustainable growth and prosperity of the ICT industry is therefore vital to the continuance of the ICT profession.

The diagram below shows a Model of the relative proportion of ICT employment that makes up the Australian ICT employment structure, by both Labour market and industry sector measures.

514,000 ICT Workers in Australia,- by Industry and by Labour market ,

Source ABS Labour force Feb 2006, ABS ICT Satellite account, Mar 2006, CIIER/Whitehorse T250 Dec 2005, DEWR Employment by State Dec 2005, Some data unpublished. CIIER modelling based on ABS paradigms. Copyright CIIER Inc 2006



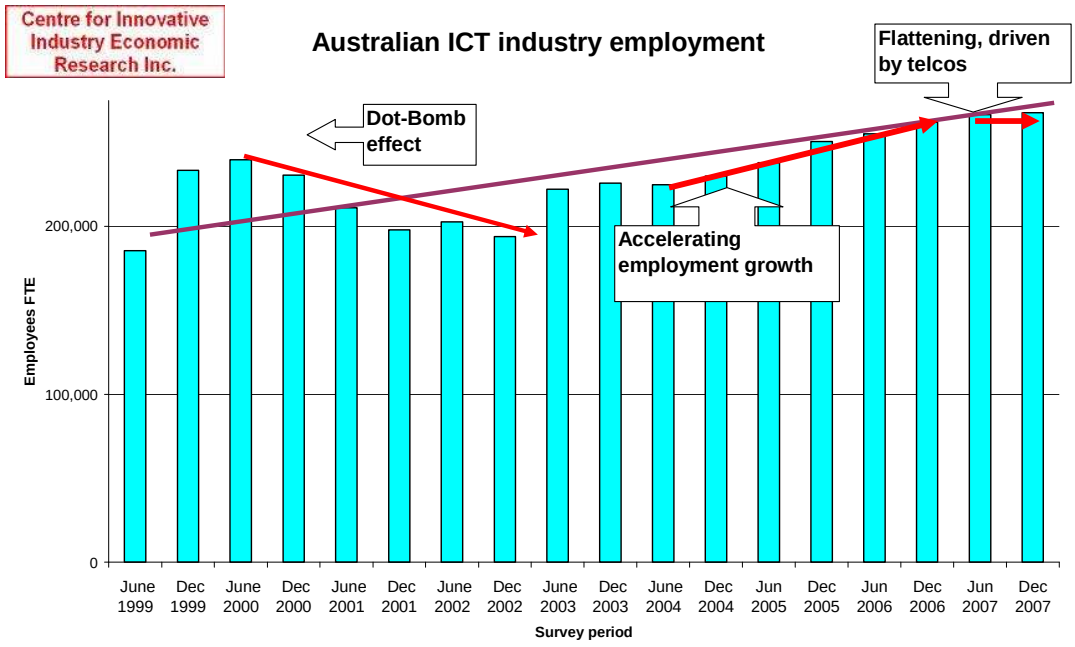
The Model also demonstrates the significant overlap between ICT industry employment, and ICT professionals and technical staff employed across all industries, underscoring the common interests of ICT trade and professional bodies in Australian ICT industry development.

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.

ICT Industry employment



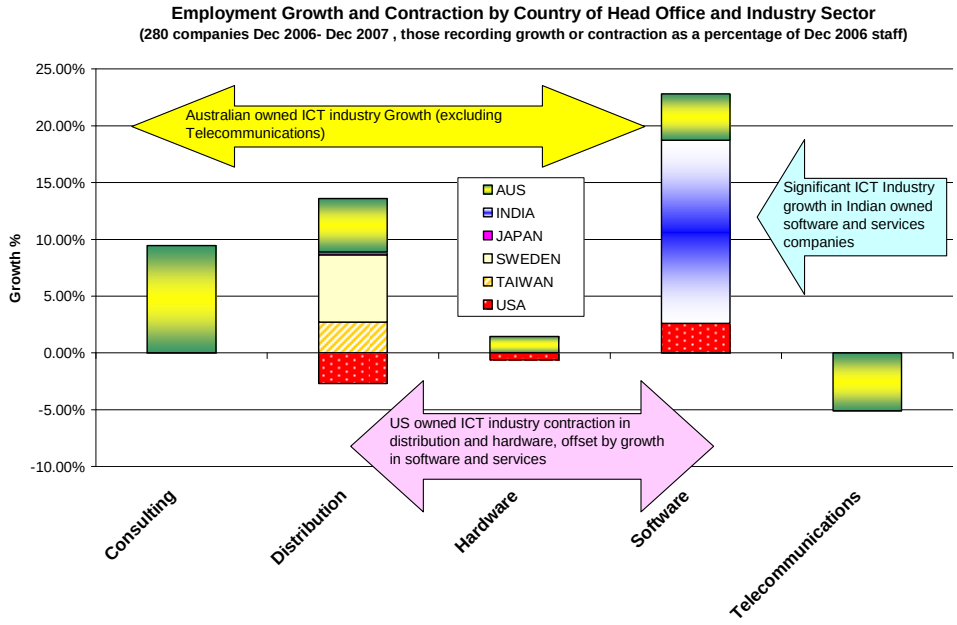
The steady growth in the national ICT industry employment trend, whilst still above the previous high of January 2000 has slowed in the last four Surveys, mainly due to flat telecommunications employment. The latest Olivier and DEWR index movements suggest that we have enter a higher paced employment growth period for non-Telco's, but are now facing growth constraints.

What about the recession?

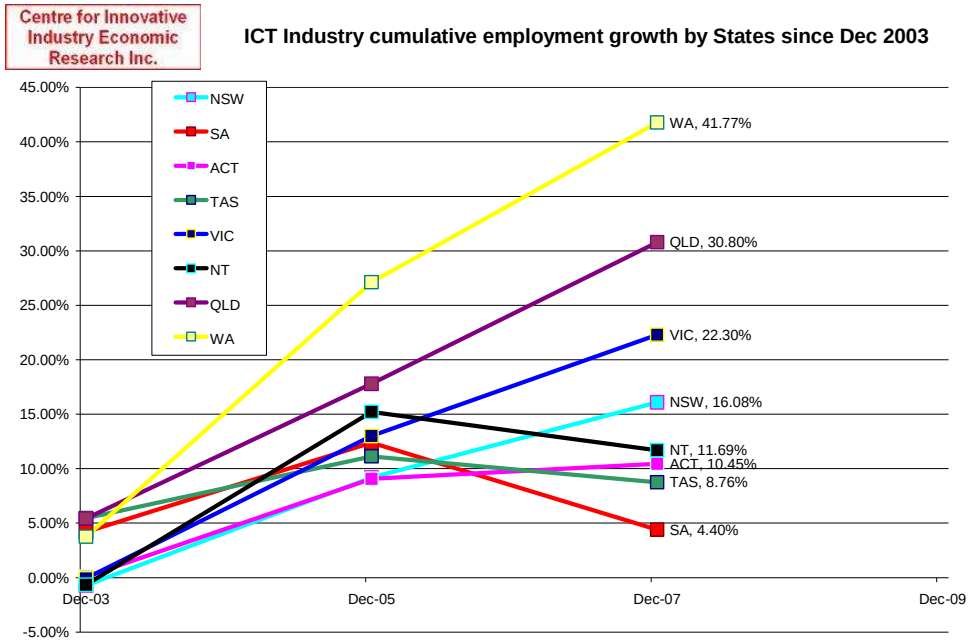
Last time there was a major downturn in the US economy, Australian ICT industry employment also contracted, although no means as severely as did the US ICT industry. When we analyse employment data by country of ownership and by industry sector, it is apparent that Australian owned companies are still growing well, but the growth is offset by contraction in telecommunications.

Indian owned companies in software and services are recording significant growth, as are some other Asian and European distribution companies.

US owned distributors and hardware companies are beginning to contract, but US owned software and services companies are still growing. US owned companies, however, employ a smaller percentage of Australians in the ICT industry than they used to.



State by State employment growth



ICT industry jobs growth often varies significantly between the States. Whilst WA and Qld continue to grow ICT industry employment faster than non-mining States, (WA 42% and Qld 31% since Dec 2003), Victoria at 22% growth and NSW at 16%, are also still growing. The pace of growth has slowed in WA in the last six months to more closely correlate to that of Victoria and Queensland.

Are ICT Skills shortages now constraining ICT industry growth?

Tipping point indicators for growth constraint can include declining employment volatility, increased vacancies, slowing growth, and anecdotal input from companies. Volatility has declined, vacancies are up to record highs, and employment growth is slowing. Even WA, NT and Qld jobs growth has started to slow, suggesting a plateau in mining industry driven ICT jobs growth. This is reasonable early evidence that the ICT skills shortage is starting to really bite, against Australia's economic interests.

Changes in ICT employment structure

Whilst there have been significant changes in ICT industry employment by location, there have been significant changes in the composition of the structure of the ICT industry as well.

Of most import is the downward trend in telecommunications employment, which includes specific skill-sets that are not shared with other sectors. The 2005-6 rises in the distribution sector have flattened and declined, whilst consulting, software and services employment continues to grow, and there is a slight lift in manufacturing employment.

These changes not only impact upon gross employment and sectoral significance, but also on demand for particular skills, and have differing national economic impacts from growth or contraction in particular ICT industry sectors.

According to ABS, Computer and software services, for example, employs around 46% of all ICT industry staff, pays 49% of all ICT industry wages, contributes 31% of all ICT industry "gross value add" (GDP less allowances for taxes and charges) but only receives 14% of all ICT industry profits.

ICT Industry Employment Skills demand

ACS have supported the establishment of the ICT Skills Demand Quantification Project, in order to build an ICT Skills demand model, drawing on the best available public and private data, and on developed expertise in industry and demographic modelling.

Current estimates are based upon the ICT industry data from the December 2007 to January 2008 T250 Surveys, representing input from over 100 companies employing over 13% of the total Australian ICT work-force in all States and Territories. The data has been converted into the new ANZSCO 4 digit structure, based upon the conversion models developed in the ICT Skills Forecasting project.

Net ICT industry job growth over the year concerned is around 12,000, with gross demand around 23,000. On the basis of this analysis, the model projects the gross demand for particular ICT skill-sets. ICT Project Manager is the largest category, with an estimated gross skills demand of over 4,000 jobs.

ICT Industry revenue

Australian ICT industry revenue has grown in the last period to nearly $85 Billion and the slow growth of the previous year has resumed its upward climb.

The biggest growth has been in reported telecoms revenues. Software and services revenue has held steady, despite some quite significant variations by individual company, and there has been a rise in distributor revenue.

ICT Industry research and development

Just under $600 million annual R&D expenditure was reported by over 140 companies from all ICT industry sectors, with R&D operations in every State. Total ICT Industry R&D is, of course, higher than this.

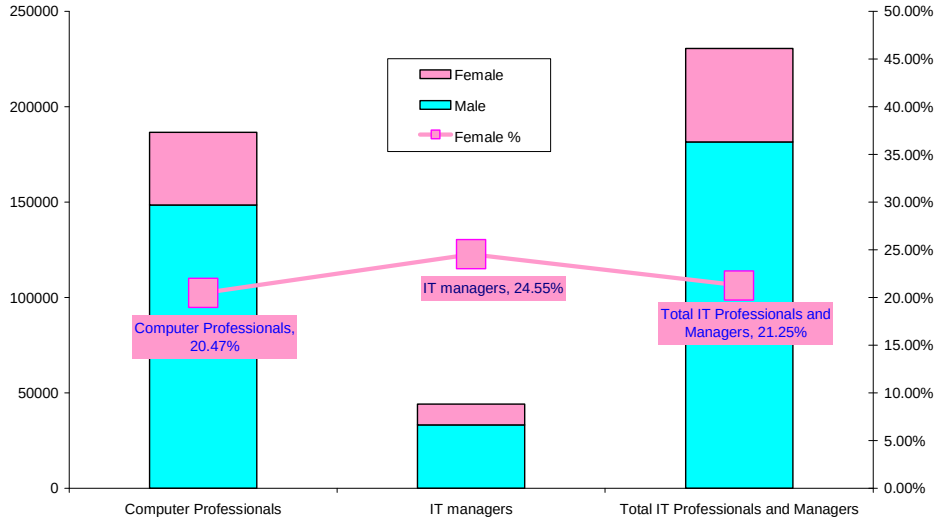
Among the companies responding, this continues the long-term R&D Index decline, from 1.3 % of total industry revenues of responding companies to a current low of 0.77%., and average annual research expenditure of $4,300 per ICT industry employee.

ICT Industry Female Employment

Of the 348,200 ICT workers in 2005-06, 85% (295,000) were men. The number of male ICT workers increased by 6% between 2004-05 and 2005-06." The conclusions have

frequently been mis-quoted, without understanding their origin, as evidence of low female participation, both in ICT professional occupations and in the ICT industry.

Female participation in ABS categorised ICT Professional occupations November quarter 2007.
Source ABS unpublished data Occupation classes 2231 (Computer Professionals) and 1224 (IT managers)



The ICT industry, however, has a higher level of female participation than this. The ICT industry, has a better track record on female employment than many other industries, with around 30% overall female staff.

24% are female technical and professional staff, with higher percentages in software and consulting sectors. Other ICT technical and professional employers employ around 100,000 ICT technical and professional staff between them. 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).

This suggests 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 significant variation in female participation in the ICT Industry, or at professional levels, over the last six years.

ICT Industry Demography

There are 25,500 companies in the Australian ICT industry. 78% of ICT companies with 4 or less staff employ less than 15% of the ICT industry work-force and less than 1% of all companies with over 100 staff employing nearly 55% of the total ICT work-force.

The ICT industry is, truly, a small business industry in Australia, with a limited number of companies having the critical mass for international growth.

Introduction

This Summary has been prepared on behalf of ACS to give an overview of the Australian ICT industry as of December 2007, based upon the regular CIIER/Whitehorse Top 250 survey and methodology (T250), and other statistical sources.

The key question that is beginning to arise is: **Are ICT Skills shortages now constraining ICT industry growth?**

In situations of this nature, there is normally a "Tipping Point" from which the pool of available talent becomes simply too small to provide the depth of ICT skills required. At this point, companies are placed in the position where they may be unable to deliver services to clients, or to continue research and development, because they simply cannot find the people they require, with the skills that are needed.

It is also important to note that State and/or regional tipping points can be different, there may be a supply of talent in Australia, but will those people all want to move to WA – for example, and, of course, so can industry sector tipping points be different as well, there is not much point in having an oversupply of e.g. telecoms engineers, if what you need are .net programmers!

Tipping point indicators can include declining employment volatility, increased vacancies, slowing growth, and anecdotal input from companies. We look for early evidence of these.

The Survey analysis shows that volatility has certainly declined, vacancies are up to record highs, and employment growth is slowing. WA, NT and Qld jobs growth has slowed, suggesting a plateau in mining industry driven ICT jobs growth – or they simply can't find any more people to hire! We believe this is reasonable early evidence that the ICT skills shortage is starting to really bite, and this is against Australia's economic interests.

A counter argument, however, is that the possible US recession could ameliorate this problem, and, in some ways, be a friend for ICT, rather than a foe. There is significant divergence in rates of growth by firms grouped by their head office country. Analysing this data by industry sector as well shows that most Australian owned non-Telco's are growing well, Indian owned companies in software and services are recording significant growth, as are some other Asian and European distribution companies.

US owned distributors and hardware companies, however, are beginning to contract, but US owned software and services companies, in total, are still growing a little.

A mixed bag of answers, with a few indications that US owned companies are already showing some recessionary symptoms, but nobody else is – so far. Also, it is worth remembering that US owned companies employ a much smaller percentage of Australians in the ICT industry than they used to, last time round.

The report contains some significant update on ICT skills demand quantification, for the first time correlating different data-sets into the new standard ANZSCO nomenclature, and quantifying both the current employment break-up and estimated demand.

And after analysis of the ever increasing ICT industry revenue and ever decreasing ICT industry research expenditure, we present an evaluation of ICT female employment and present some facts on percentage and quantified ICT female employment, both in the ICT industry and the ICT profession.

Statistical Panel

Australian ICT	**January 2008**	**Trend**
Total ICT workers in Australia	**514,000**	Slowing but steady growth, shortages apparent
Employees in ICT Industry	**268,000**	Slowing but continued growth, major State and sectoral variations
Revenue of ICT Industry	**$84.3Billion**	Significant growth, sectoral variations
R&D of ICT Industry (T250 only)	**$600 Million**	Long term sustained decline

Background

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.

Research Support

The conduct of a research task such as this cannot take place effectively without the support and freely given time of many people. ACS and the consultants wish to thank all of the individuals and companies who assisted us by providing the data upon which the analysis is primarily based.

This research has also been greatly assisted by the helpful cooperation of industry bodies, especially the Australian Information Industry Association (AIIA), and Software Queensland, both of which bodies have circulated the Survey questions to their members and encouraged participation, and by Whitehorse Strategic Group Ltd, who have generously provided access to the valuable intellectual property that has formed the basis of the CIIER models.

Survey and Analysis Process

The primary mechanism that is used to provide the data for this Report is a regular detailed survey of ICT companies in Australia. The methodology employed includes a questionnaire both mailed and emailed out to respondents and direct verification telephone contact with a significant proportion of the survey base. The survey is supplemented by web-searches, press reports, Annual Reports, and other public sources of data.

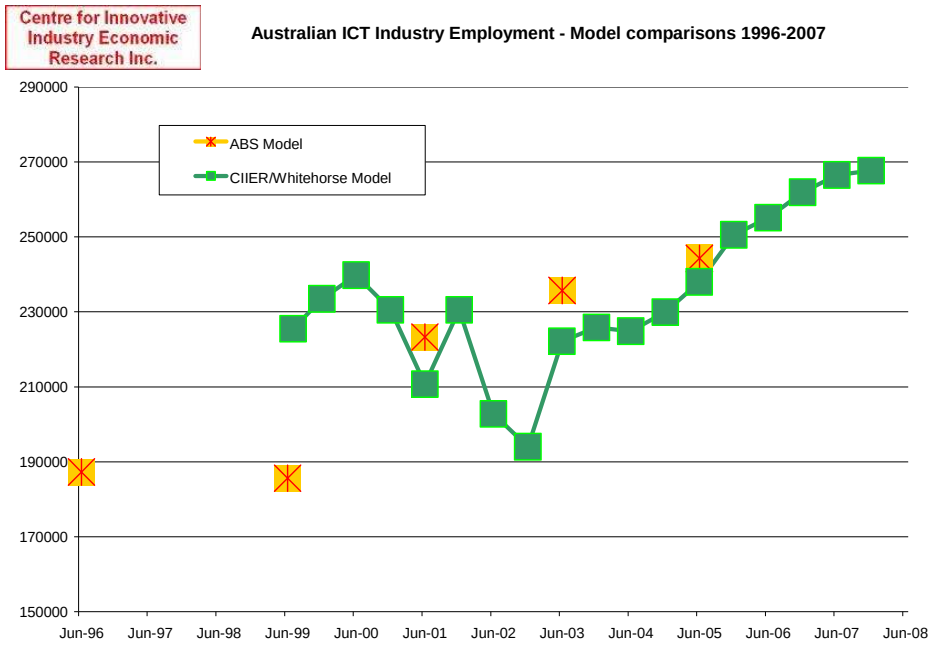
The database contains detailed data for the last six years on now *over* 790 operating companies with 137,000 staff, $79 billion in revenue and over $600 million in R&D expenditure. Historical data is also kept on companies which have been acquired, merged, or closed during this period, leading to a database with over 1000 company entries.

The current data, gathered in October - December 2007, represents 53% of total current industry employment and 92% of total current industry revenues in the ICT industry in Australia.

From this data, a series of industry models are developed in a consistent and statistically verified structure. These models allow for the estimation of National and State industry sectoral totals for a number of measures, and for comparison and trend analysis to be performed.

Frequency of survey and analysis

The chart below shows ABS and CIIER/Whitehorse estimates of ICT industry employment. (In a number of cases ABS original estimates were later amended, the later data has been used in all cases).



The ABS data, based upon an average three year gap between models, indicates steady ICT industry employment growth from 1999 through to 2005, however the CIIER/Whitehorse six-monthly data shows a far more volatile picture, charting outsourcing driven industry growth in 2000-2001, and both the “dot-bomb” employment reductions in 2001-2, the very swift recovery back to the old employment base in 2003-4, and the continued, but now slowing, growth since then.

What is the "ICT Industry"?

The term "ICT Industry" is also often used in the press, or by other commentators, for a confusing range of different things, ranging from the "tight" definition of companies solely concerned with the provision of ICT products and services, but that includes companies with major units supplying ICT good and services, through a "looser" definition that may include retail ICT, that may include call centres that are mainly parts of other industries (e.g. banking), that may include significant sections of the electronics industries, and of other professional services (e.g. management consultants and, historically, accountants), to a "broad" definition that can include anyone working on ICT related matters in any industry. State and Federal governments may also have varying interpretations of what is or is not within the “ICT Industry”, making regional comparisons more difficult.

It is considered that the "broad" definition is best described by the term "ICT Worker", whereas the term "ICT Industry" is better reserved for the "tight" definition above, as defined by the Australian Bureau of Statistics [1], but perhaps "loosened" to embrace the other ICT goods and services covered by the more globally accepted OECD (2003 and 2004) definition, in order that international comparisons be made more meaningfully.[2]

It should be noted that these internationally agreed definitions are not followed by the Australian Bureau of Statistics, which recently stated that:

*"**The OECD definition included a broader range of goods than the Australian definition**. The Australian definition only includes ICT goods if they are able to be networked or are components of goods that can be networked. It also excludes a range of medical, scientific and audio visual equipment".[3] (emphasis added).*

Obviously, where "goods" are excluded, so are the workers who produce, market, and distribute them, consequently **a more narrow definition of the goods and services involved in ICT necessarily also understates the commensurate employment and revenues involved, and thus the relative "size" and significance of the industry concerned**.

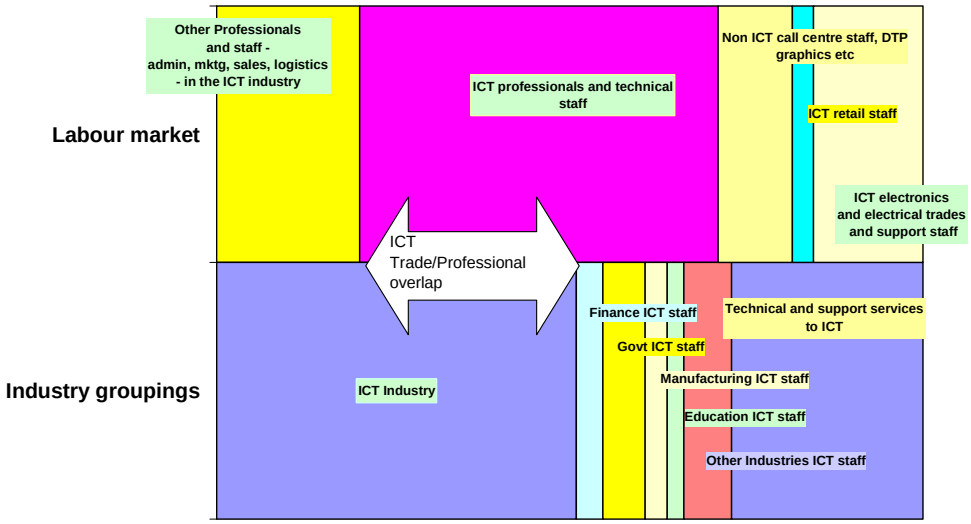
Whilst these overlaps and distinctions have been known for some time, to date there has not been an attempt to reconcile, and, more importantly, to quantify, the various components within a single employment model.

The diagram below illustrates a Model which allows for reconciliation of these differences, regardless of the employment and classification paradigm selected, and calculates the relative proportion of ICT employment that makes up the Australian ICT employment structure, by both Labour market and industry sector measures.

[1] ABS 8126-0
[2] A Proposed Classification of ICT goods, OECD, Paris, 2003; Classifying Information and Communication Technology services, OECD, Paris, 2004
[3] ABS (2006) *ICT Satellite Account: Australia*, Cat No 5259.0, Canberra, p33.

514,000 ICT Workers in Australia,- by Industry and by Labour market ,

Source ABS Labour force Feb 2006, ABS ICT Satellite account, Mar 2006, CIIER/Whitehorse T250 Dec 2005, DEWR Employment by State Dec 2005, Some data unpublished. CIIER modelling based on ABS paradigms. Copyright CIIER Inc 2006

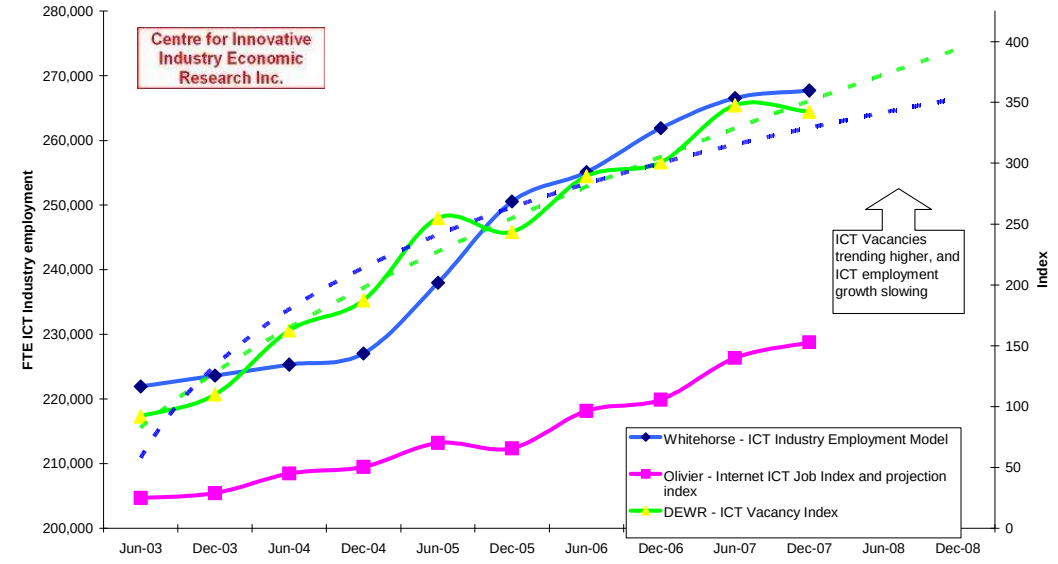


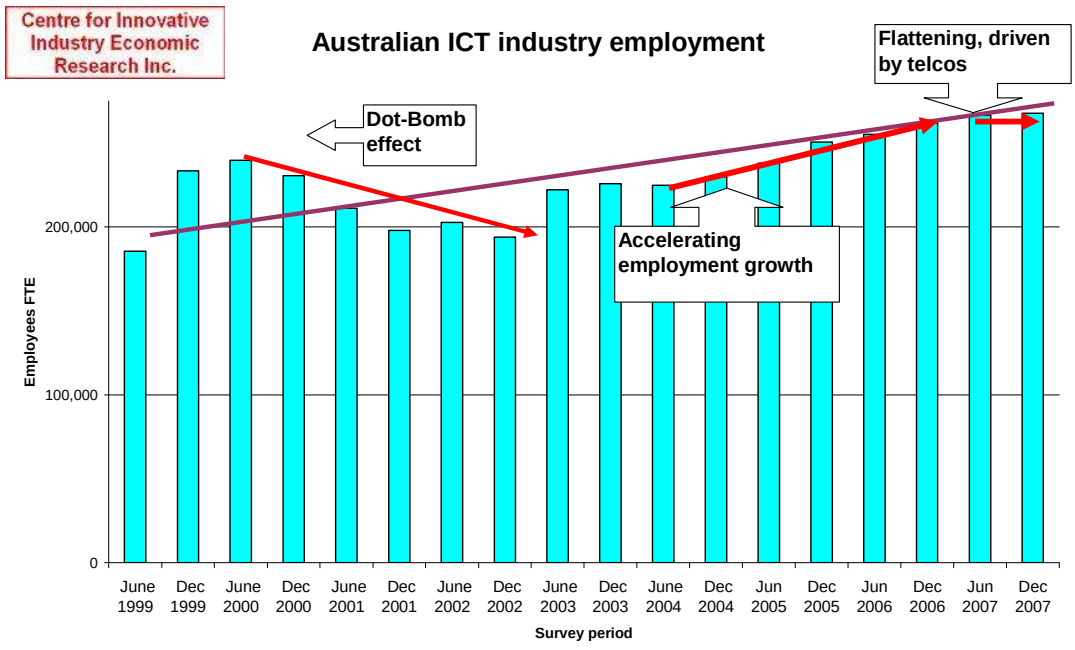
Perhaps as significantly, the Model also demonstrates the significant overlap between ICT industry employment (using the "tight" ABS definition), and ICT professionals and technical staff employed across all industries, thus underscoring the common interests of ICT trade and professional bodies in Australian ICT industry development.

In the balance of this report, the term “ICT Industry” refers to the “narrow definition” of companies solely concerned with the provision of ICT products and services, and companies with major units supplying ICT good and services.

ICT Industry Employment

Employment Model





The steady growth in the national ICT industry employment trend, whilst still above the previous high of January 2000 has slowed in the last four Surveys, mainly due to flat telecommunications employment, the latest Olivier and DEWR index movements suggest that we have enter a higher paced employment growth period for non-Telco's, but are now facing growth constraints.

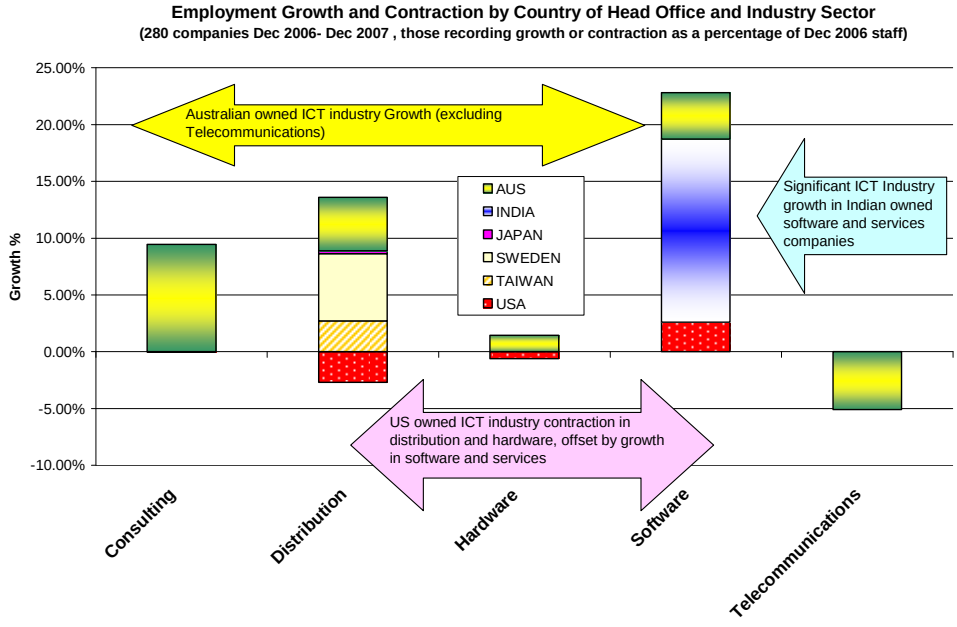
What about the Recession?

Last time there was a major downturn in the US economy, Australian ICT industry employment also contracted, although no means as severely as the US ICT industry did. The question must therefore arise as to whether there are any early signs of this happening again.

Whilst there is significant divergence in rates of growth and contraction by firms when grouped by their head office country, the answer is yes, but not to any great significance yet. Indian owned companies in the main, have been growing rapidly over the last year, US and Japanese companies, overall, have been marking time, and Australian owned companies have been declining in total numbers.

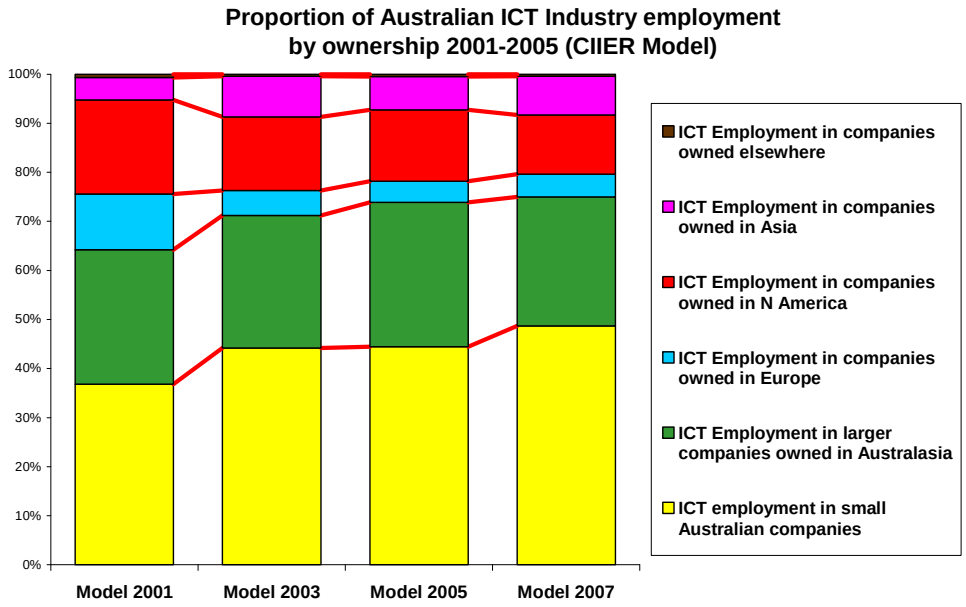
Gross employment movement in Companies owned in these countries					
INDIA	SWEDEN	TAIWAN	USA	JAPAN	AUS
16.12%	5.92%	2.72%	1.25%	0.26%	-0.79%

When we analyse this data by industry sector as well, however, it is apparent that:



- Australian owned companies are still growing well, but the growth is offset by contraction in telecommunications;
- Indian owned companies in software and services are recording significant growth, as are some other Asian and European distribution companies;
- US owned distributors and hardware companies look like they are beginning to contract, but US owned software and services companies, in total, are still growing - (but not by as much as their Indian and Australian owned counterparts).

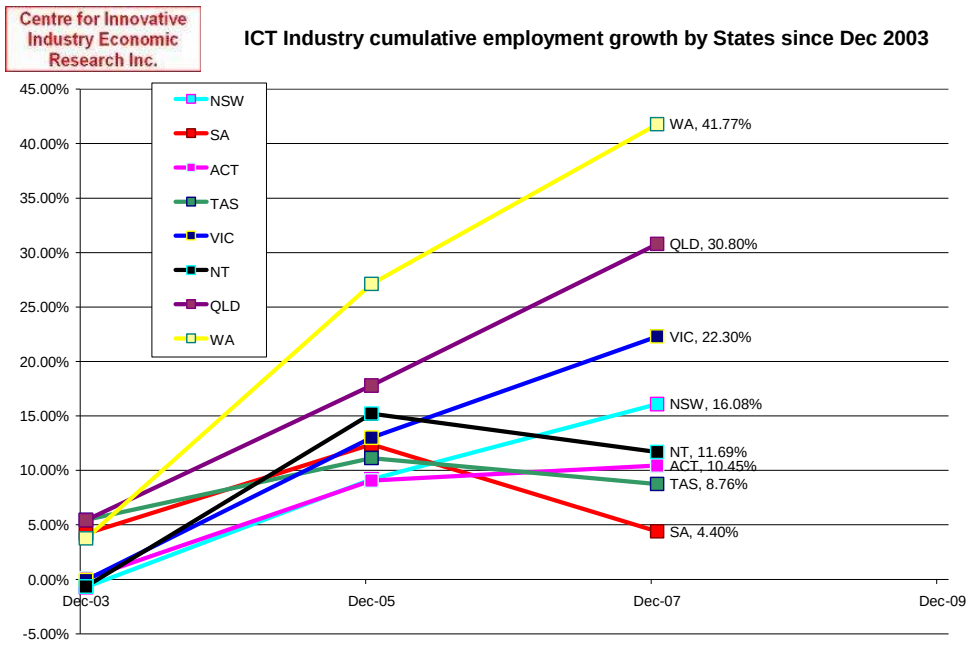
And it is worth remembering that US owned companies employ a much smaller percentage of Australians in the ICT industry than they used to, last time round.



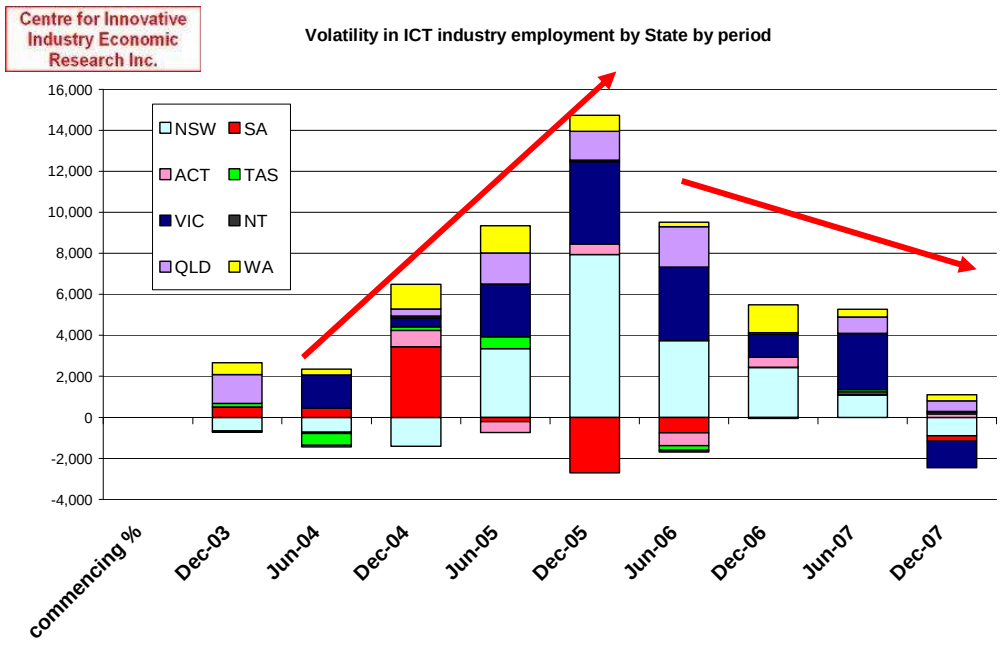
None of this analysis, however, takes into account the potential longer term impact on Australian owned companies that operate extensively in the US market, or the potential impact of a US based recession infecting Europe and Asia, and thus impacting upon their companies in Australia. As a general rule, when companies contract, they start pruning with the “outer branches”, and this, almost invariably, includes Australia.

On the evidence to date, for non US owned companies; this has not started to happen.

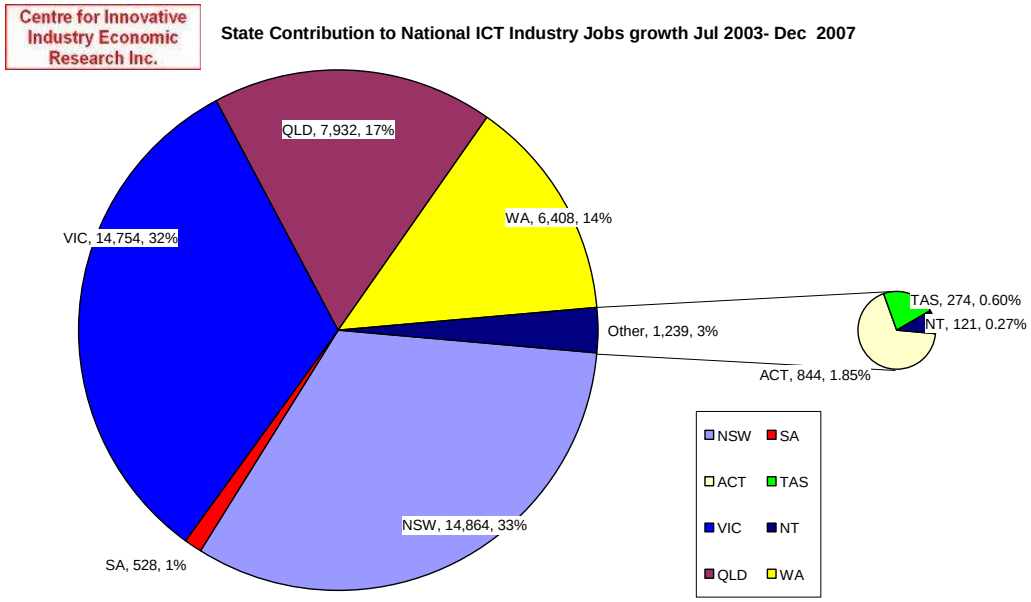
State by State



ICT industry jobs growth often varies significantly between the States. Percentile ICT industry employment growth since December 2003 has been highest in WA, Qld, and Victoria, flat since December 2005 in ACT, whilst SA has the slowest ICT industry employment growth over this period. Actual jobs, however, have risen most in Victoria and NSW, outstripping even the "mining" States.



Employment volatility in the last six months has continued in Victoria and NSW, with net job reductions in both major States. WA, NT and Qld jobs growth has slowed, suggesting a plateau has finally been reached in mining industry driven ICT jobs growth – or they simply can't find any more people to hire! The reduction of national volatility since June 2006 has been continued, indicating a more stable, but slowly growing, environment.



The % shown is that States contribution to national ICT industry employment growth, e.g. Queensland has contributed 17% of all national ICT industry jobs growth over the last 4.5 years. Such contribution needs to take into account the percentage of national jobs that the State concerned provides, e.g. as the chart below shows 40.3% of all ICT industry employees are located in NSW, so a contribution to employment growth in that State that is only 33% means that the NSW has lost some "market share" since July 2003.

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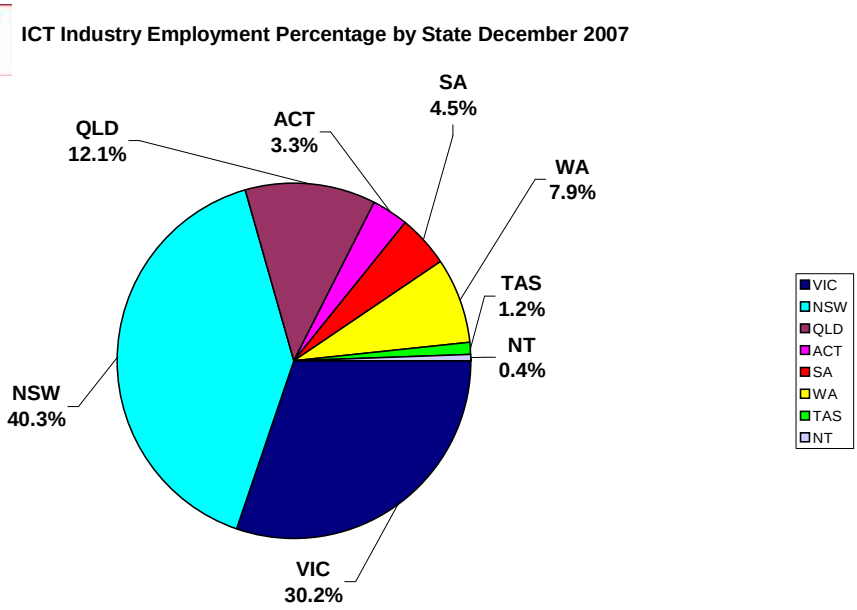
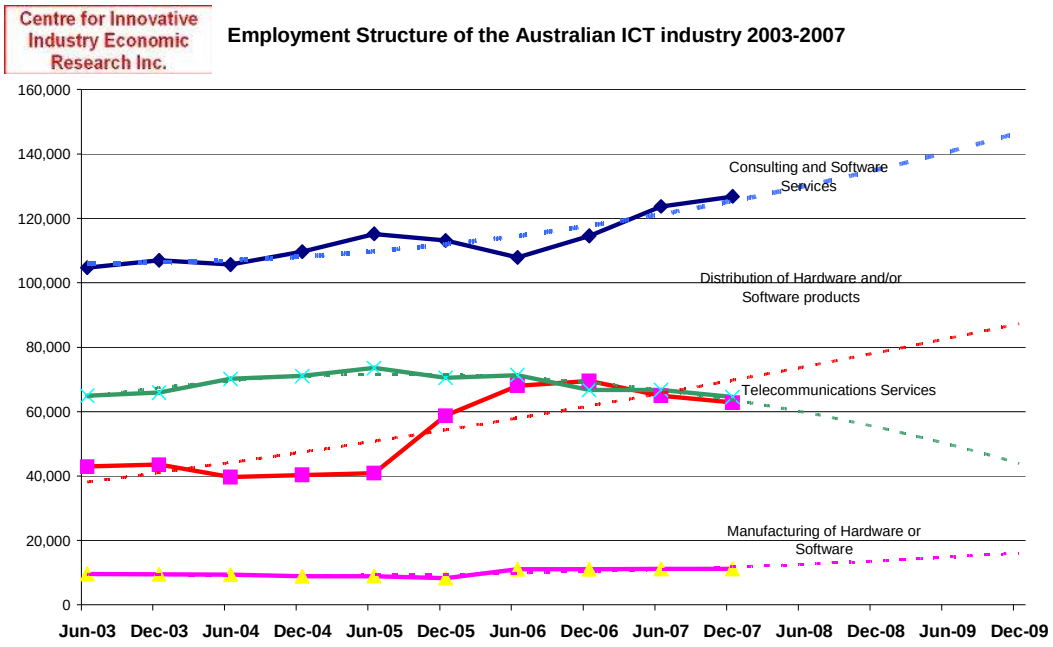


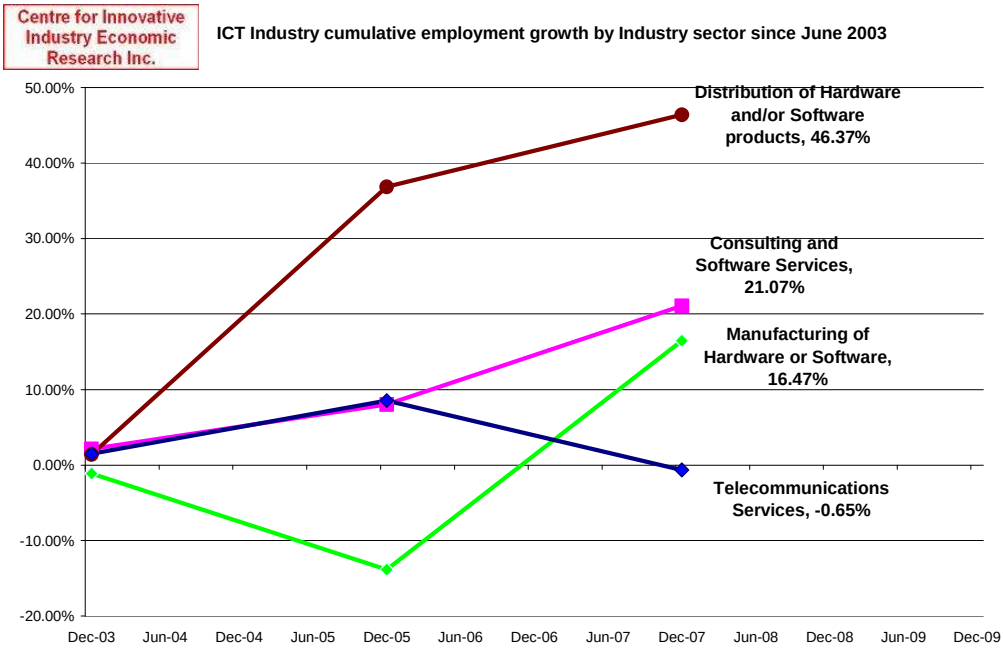
Changes in ICT employment structure

Whilst there have been significant changes in ICT industry employment by location, there have been significant changes in the composition of the structure of the ICT industry as well.

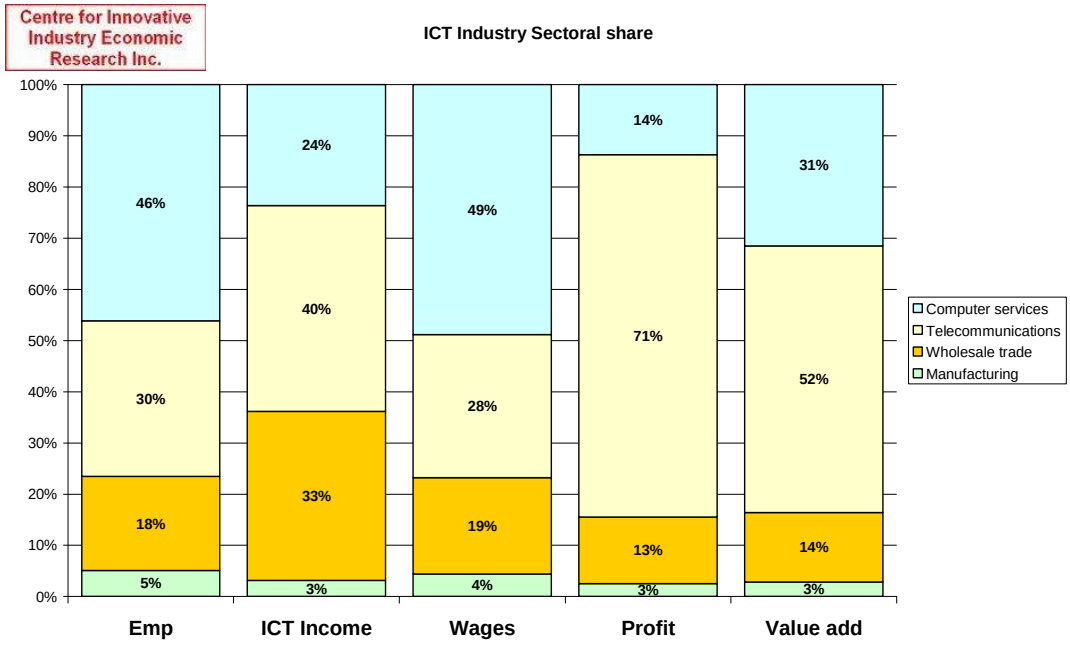
This graph shows both the impact of those changes by industry sector, and the effect if the current trend continues. Of most import is the now well-established downward trend in telecommunications employment, which, whilst it is offset to some degree by growth in other industry sectors, tends to include quite specific skill-sets that are not shared with other sectors. The 2005-6 rises in the distribution sector have flattened and declined in the last three surveys, whilst consulting, software and services employment continues to grow even more strongly than we predicted, and there is a slight up tick in manufacturing employment starting to appear.



These changes not only impact upon gross employment and sectoral significance, but also on demand for particular skills in the future.



If we look at this same data in cumulative percentage variation terms, we can see, in even starker contrast, the significant changes that have taken place in the ICT industry employment landscape in the relatively short economic period of a mere 4 years, and the way that, even in shorter, two year spans, positions can change, and previously expanding ICT work-forces can constrain or contract.



In this context, it is again useful to consider the difference in economic impacts of growth or contraction in particular ICT industry sectors. The graph above shows the significant economic disparity in economic “plusses and minuses” for the individual sectors. (For consistency, the calculations are based upon the latest ABS originated data from 2005-6, and thus vary in some percentages from more current data).

According to ABS, Computer and software services, for example, employs around 46% of all ICT industry staff, pays 49% of all ICT industry wages, contributes 31% of all ICT industry “gross value add” (GDP less allowances for taxes and charges) but only receives 14% of all ICT industry profits.

Distributors, with much the same profit share, contribute less than half of the GVA, employment and wages of the software and services sector, and the telecommunications sector is by far the most profitable, whilst also contributing strongly to GVA.

To maximise economic benefit to Australia, those industry sectors which provide the highest levels of employment, exports, and GVA, are obviously those to which the majority of industry development support should be provided.

ICT Industry Employment Skills demand

The issue: How many people do we need?

Most ICT Skills-related reports produced so far by government and industry stakeholders have addressed qualitative issues or focussed on one-off, snap-shots of employment and skills. They do not answer the key question:

"**How many ICT people will we need in 5-10-15 years time, what skills will they require, and what are our projections of the employment shortfall or over supply, based on current settings, that we will need to deal with?**"

Modeling ICT skills demand

ACS have supported the establishment of the ICT Skills Demand Quantification Project, in order to build an ICT Skills demand model, drawing on the best available public and private data, and on developed expertise in industry and demographic modelling. The central aim of this project is to develop and refine a model that can be used over time to produce rolling forecasts.

Such a model could evolve over time as it is developed and refined. The model will be developed as a national model, structured so that state and/or industry sector versions could also be derived. Phase I of the project focuses on the development of a basic national (or single state) model, and Phase II on its development and refinement.

Elements of the model

The principal elements of such a model include:

- The collection and analysis of a wide range of data on historical and forecast trends;
- The development and formalization of a model capable of embracing and reflecting the many trends in the above data, reconciling the numerous unconnected nomenclatures and data structures, converting both current and historical data into comparable formats ; and
- The building, formalization, testing, validation and further development and refinement of the model.

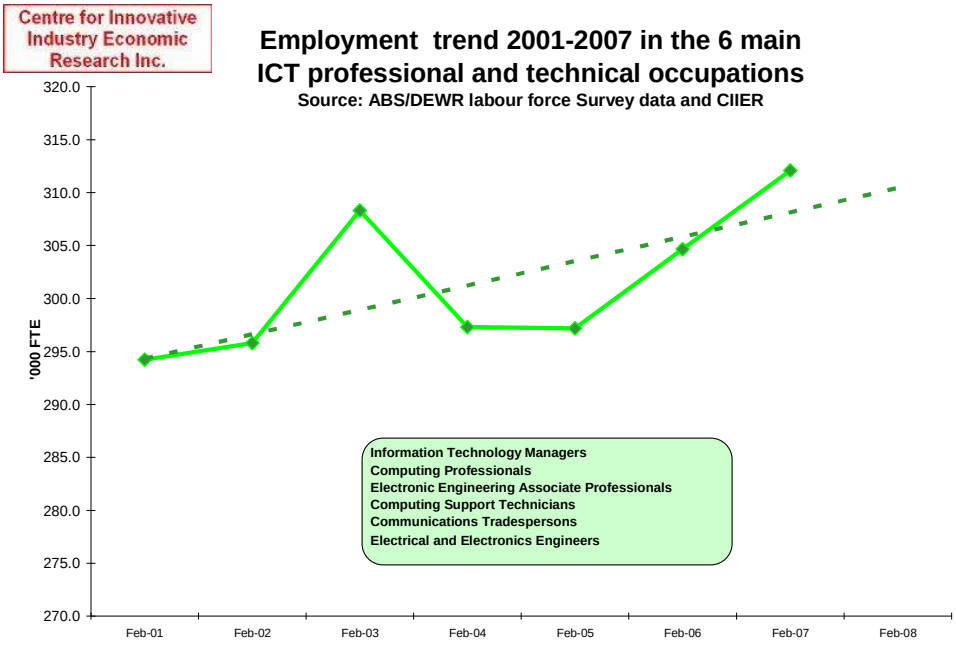
Progress to date

Initial partial funding for the project has been provided by the Australian Computer Society. Data collection is well under way and the first "one-way:" conversion models between a series of nomenclatures (ITCRA, CIIER etc to ANZSCO) have already been developed and tested in prototype.

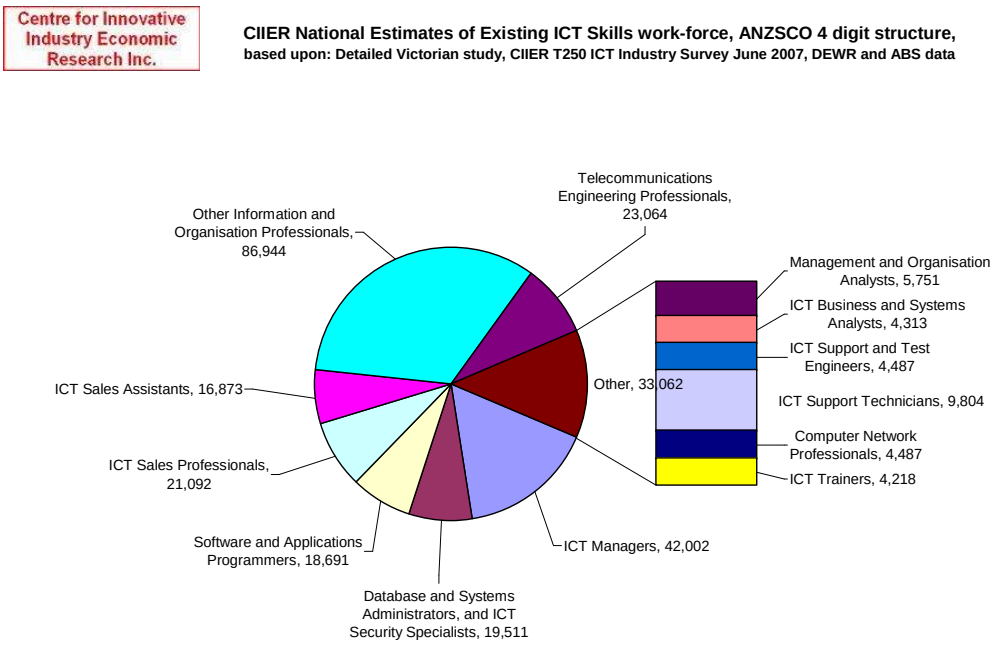
ANZCO compatibility

The project team is in the process of converting all the current and historical data and structures to the new ANZSCO format. This will enable historical and trend analysis to continue under the new structure.

ICT Skills demand quantification



As can be seen from the chart above, Australian ICT employment in the key ICT professional and technical occupations across all industries is very similar to that within the ICT industries, - in a period of continued growth.



The chart above shows our estimates of the current work-force allocated to the new ANZSCO 4 digit structure. It should be noted that, whilst the new structure has been

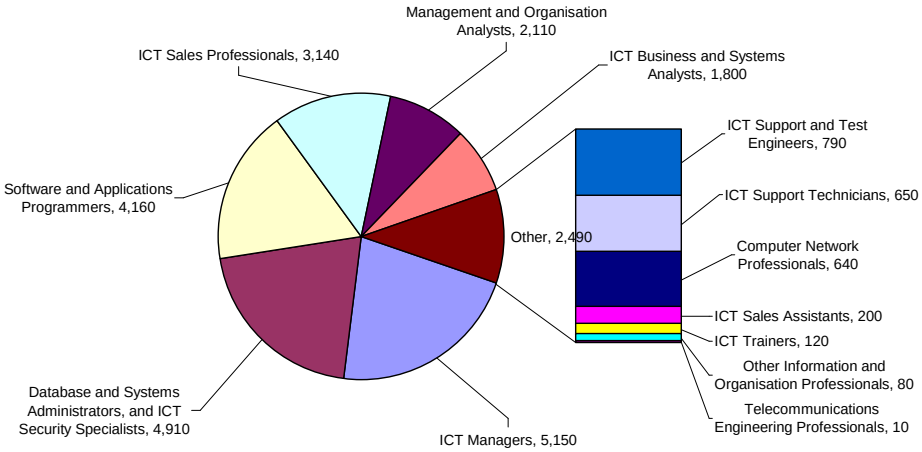
adopted, historical data is only available in the *old* ANZSCO structure, which is far less detailed.

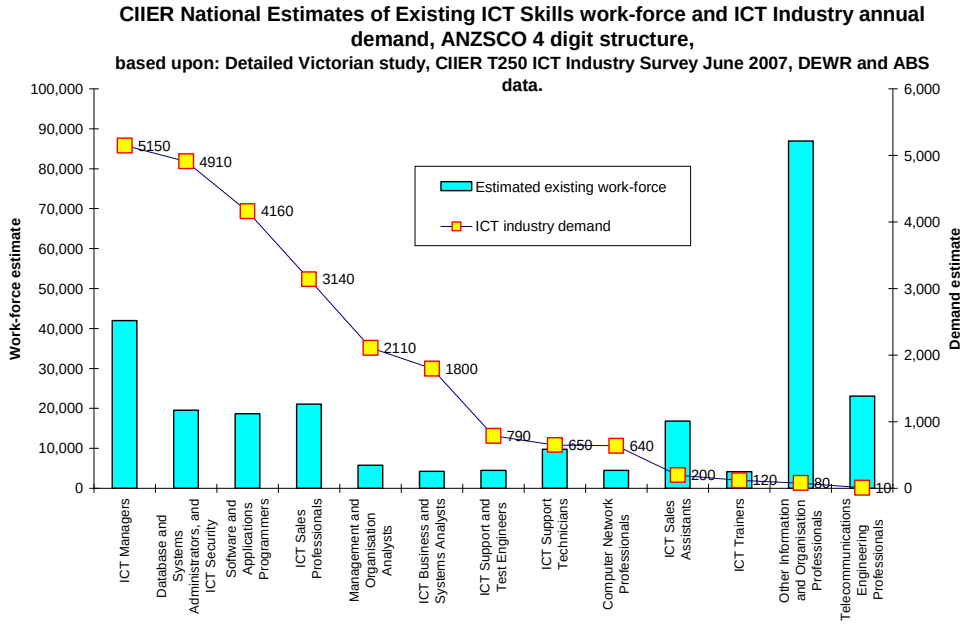
The data below represents the second outcome of the new experimental model of skills forecast projections. It is based, at this point, upon the ICT industry data taken from the December 2007 to January 2008 T250 Surveys, but still represents up-to-date input from over 100 companies employing over 13% of the total Australian ICT work-force in all States and Territories. There are, based upon standard turnover ratios, approximately *4,000* sample jobs, extrapolating to approximately *23,000* jobs across the industry, represented in this analysis. The data has been converted into the new ANZSCO 4 digit structure, based upon the conversion models developed in the ICT Skills Forecasting project.

We note a significant caveat in relation to the quantification of telecommunications jobs. Whilst Telco employment is not expanding, it is also unfortunate that a number of the major Telco's did not provide information on their skills demand, which, accordingly, in the data below, may therefore be under-stated.

Centre for Innovative Industry Economic Research Inc.

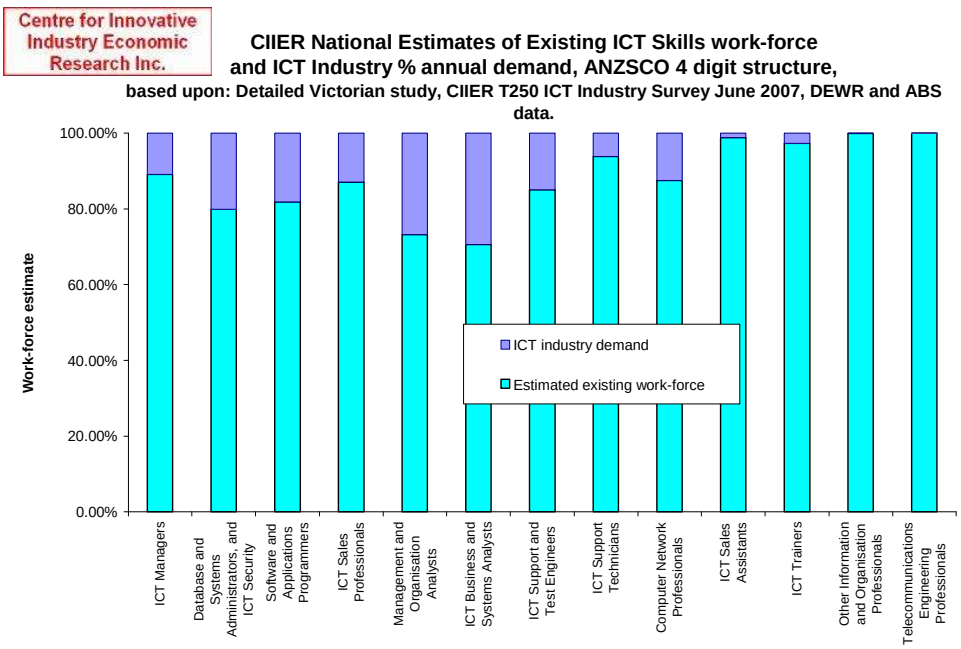
June 2007 Estimates of National ICT Industry Skills demand
by Job-Skill taken from ICT Industry Survey data
(CIIER experimental model of 23,000 jobs - converted to Anzco 6 digit structure)





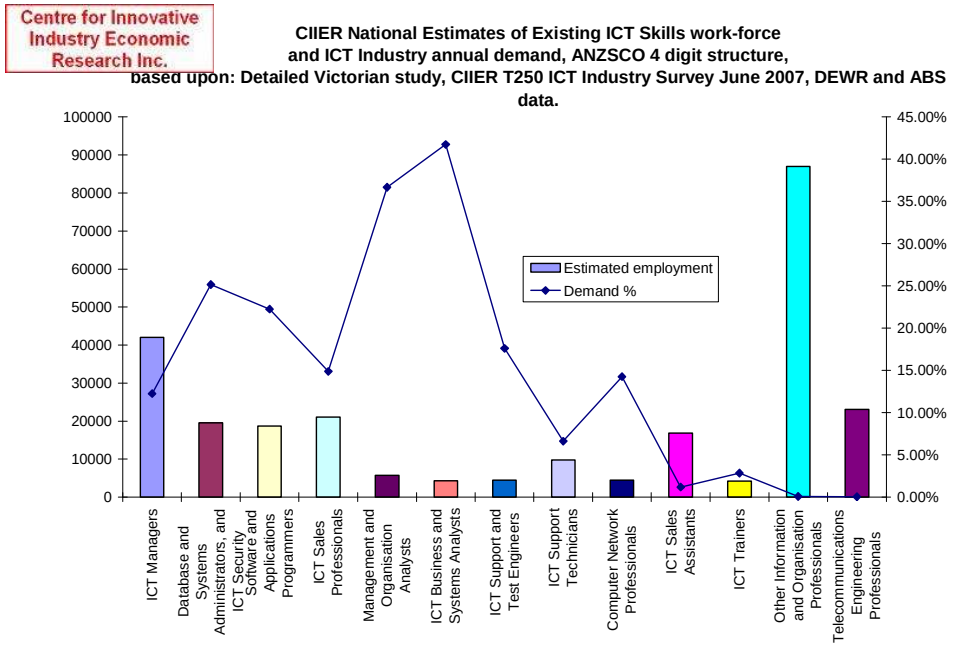
When compared to the estimated work-force structure above we see, for the fist time in this format the contrast between the current work-force and current demand. The category "other information and organisation professionals" is, however, very large, and, obviously includes a large number of uncategorised ICT personnel.

The chart below shows the extent of unmet demand as a percentage of total employment, at the 4 digit level; the percentage demand is a useful measure of skill scarcity, when coupled with the analysis of gross demand.

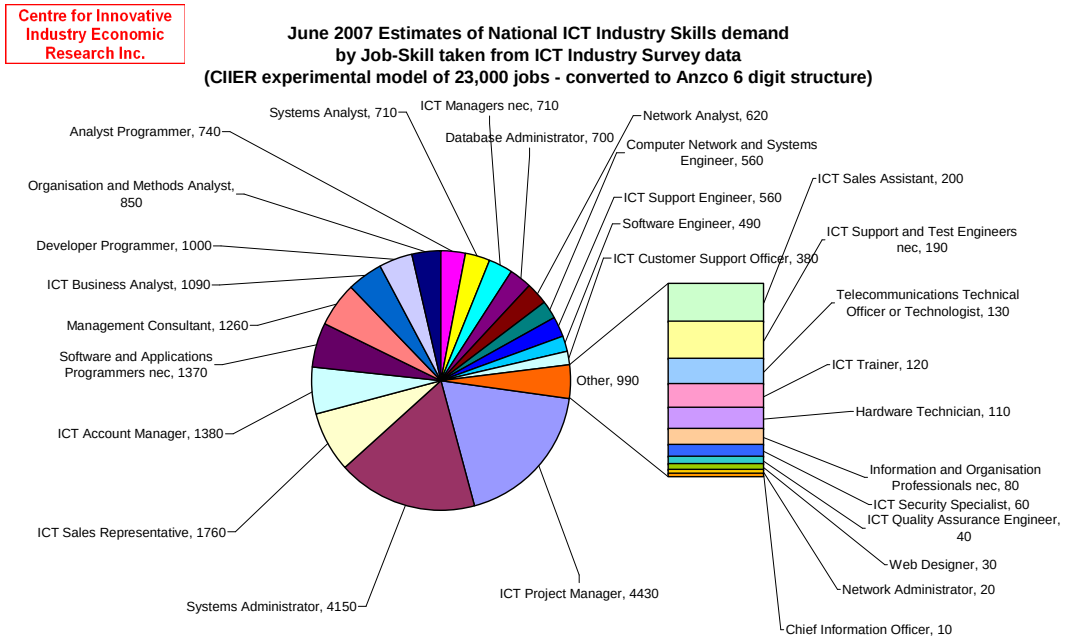


When we compare the percentage and the estimated work-force, we see a strong picture emerging, that seems to suggest that the majority of those ANZSCO classified “other information and organisation professionals” should, in fact, be listed under the “ICT business and systems analyst” skill group, as, even in the tightest of job markets, it is highly unlikely that 42% of this job-skill is “in demand”!

After allowing for this classification anomaly, we believe the rest of the data is highly indicative.



The same data is presented here in the more complex ANZSCO 6 digit structure. This analysis should be treated with even more caution, since the “deeper” the level of conversion, the more prone to categorisation error it becomes. The ANZSCO structure, like all nomenclatures, is more detailed in categorisation in some areas than in others, and this can lead to accumulations during data conversions of only slightly related occupation skills being forced to be treated as synonymous, or, conversely, one of the more detailed ANZSCO classifications being selected to cover a “group” of related skills sourced in a single category in another nomenclature.



Net ICT industry job growth over the year concerned is, of course around 12,000. This is less than the total demand identified of 26,000, but it must be remembered that skills demand is a “gross” requirement, i.e. it must also supply replacement staff for those leaving, and cover for jobs movement between companies. We are advised that the gross/net ratio in the ICT industry is about 2.3 to 1 at the moment, so the size of the sample can be considered statistically indicative.

On the basis of this analysis, the model projects the gross demand for particular ICT skill-sets. It’s most useful application is in placing some indicative upper limits on the quantification of some of the more significant job-skills, and thus helping to identify those that might be over-supplied, or under-supplied, by either ICT courses at Universities and TAFES, or from other sources, e.g. migration or private sector training.

Naturally not all of the projected 4000 project management jobs, for example, will be filled by new graduates, but a percentage of such jobs could be, and we need to now evaluate, for each job-skill, what those relative percentages might be.

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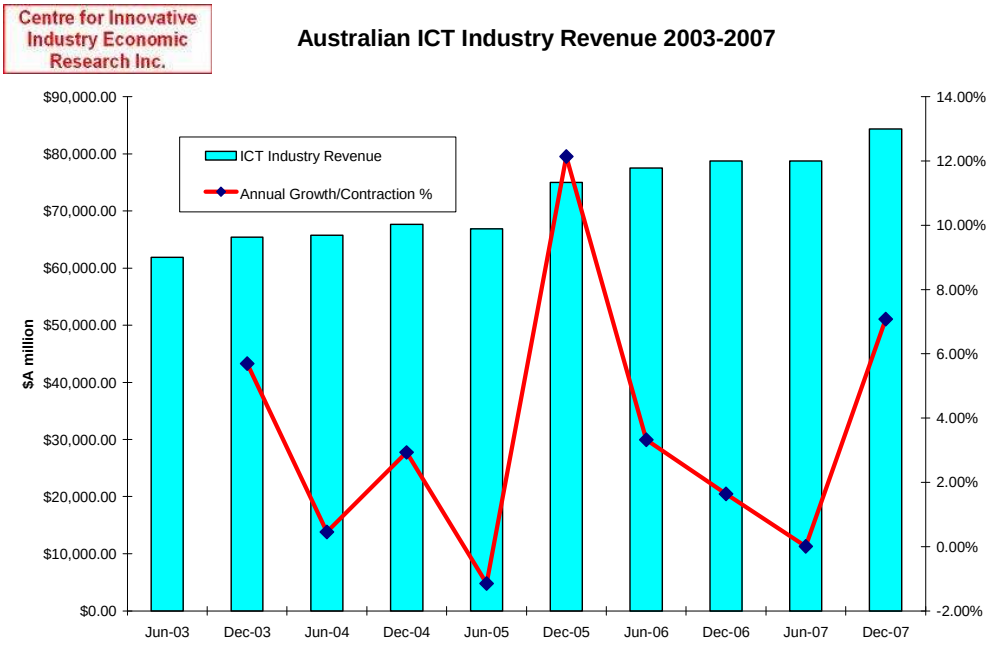
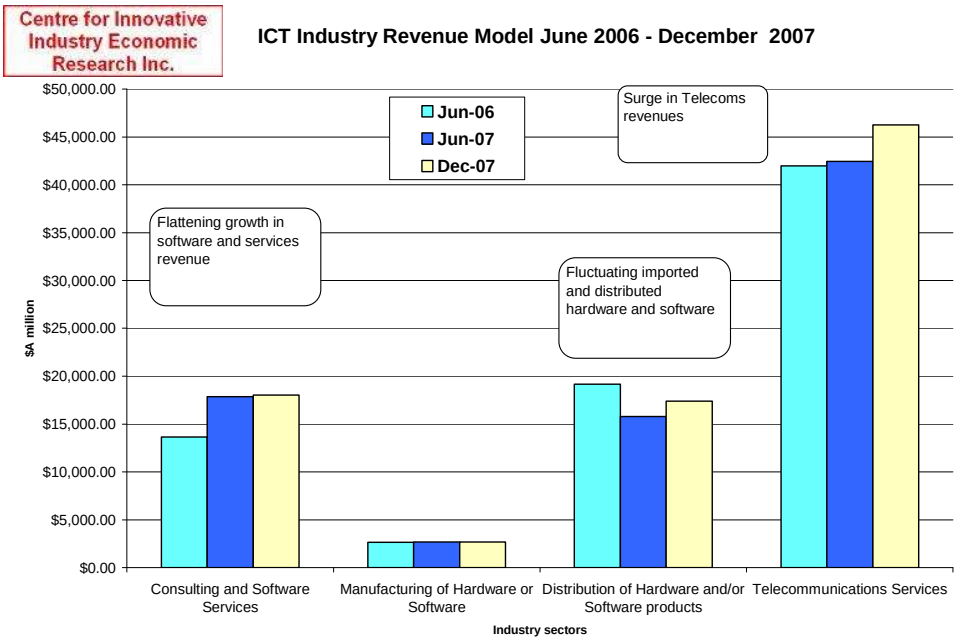
ICT Industry revenue

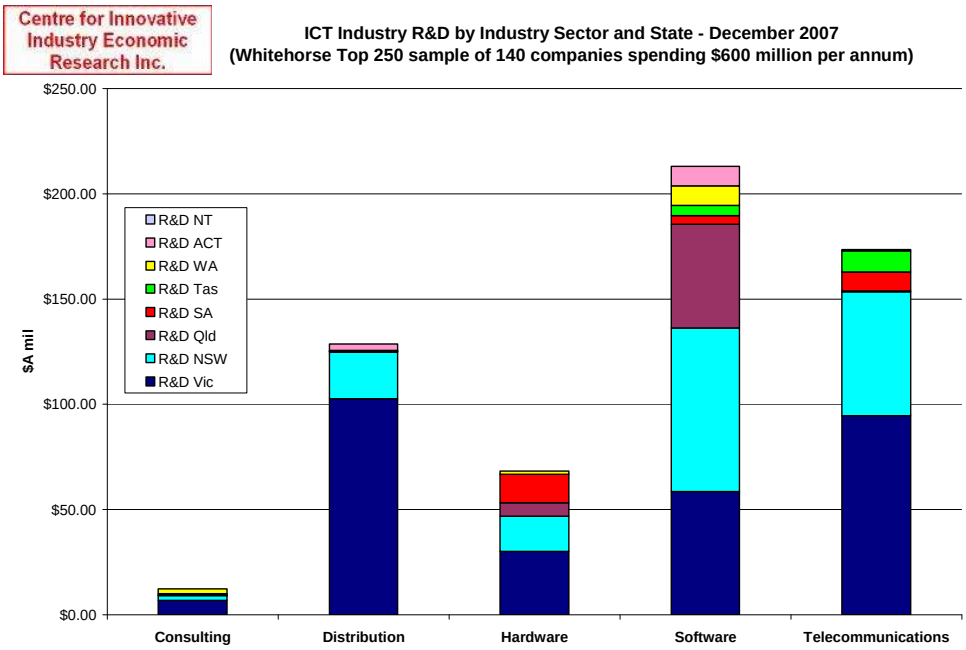


Australian ICT industry revenue has grown in the last period to nearly $85 Billion, and the slow growth of the previous year has resumed its upward climb.

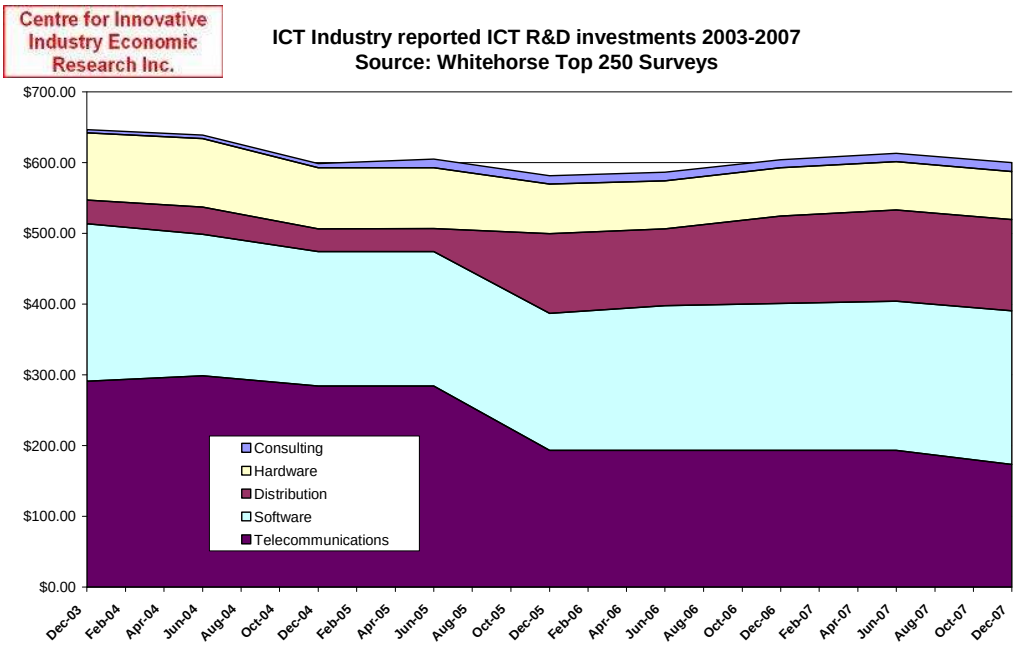


The biggest growth has been in reported telecoms revenues. Software and services revenue has held steady, despite some quite significant variations by individual company, and there has been a rise in distributor revenue.

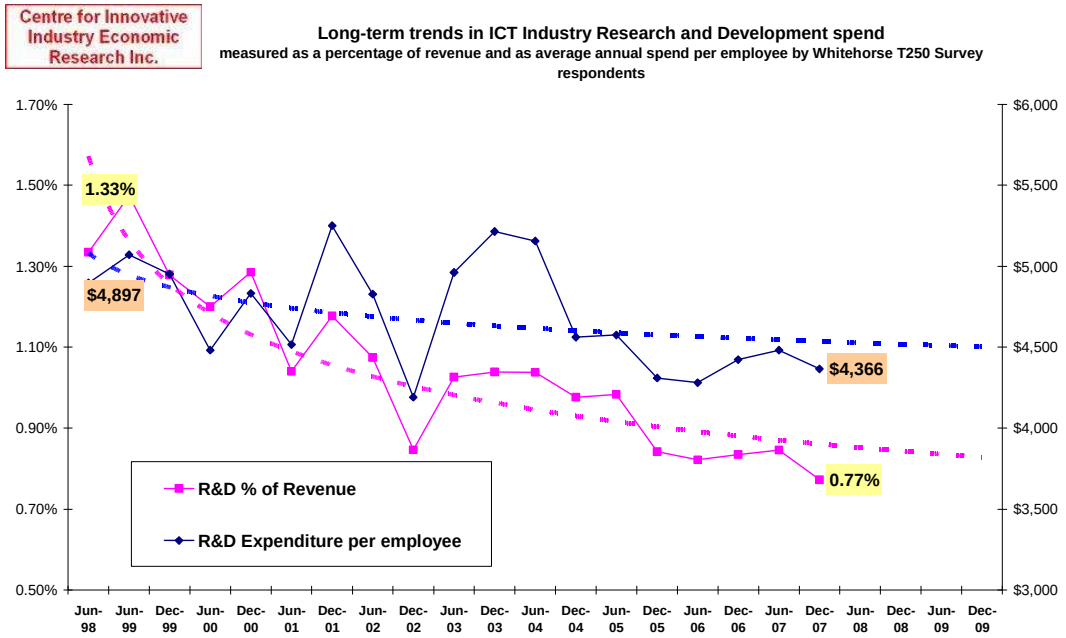
ICT Industry research and development



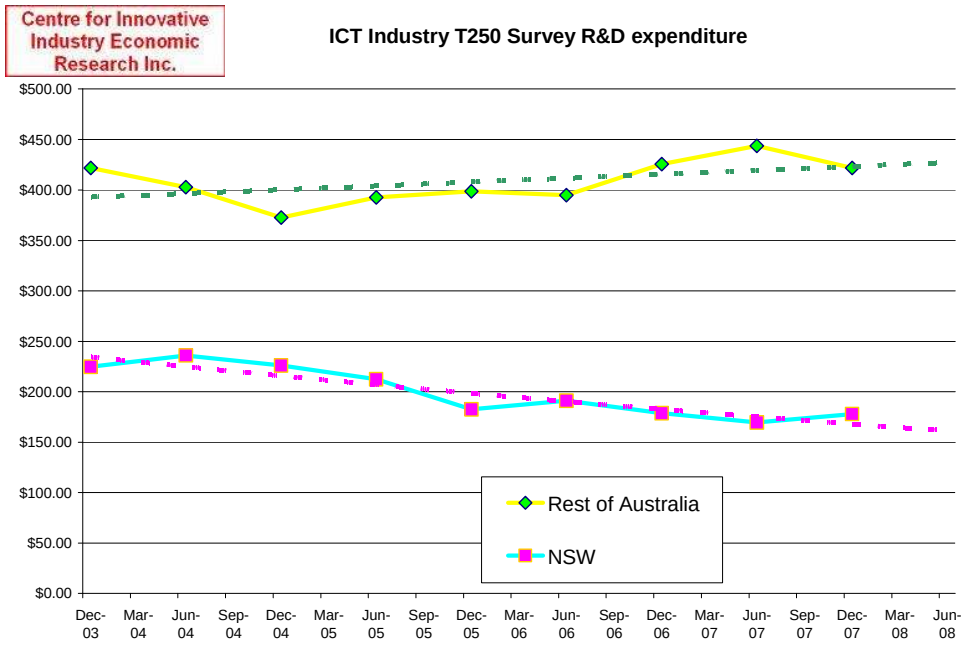
Just under $600 million annual R&D expenditure was reported by over 140 companies from all ICT industry sectors, with R&D operations in every State.



The R&D expenditure trend, however, continues the long term decline, despite increasing corporate revenues.



This continues the long-term R&D Index decline, from 1.3 % of total industry revenues of responding companies to a current low of 0.77%., and average annual research expenditure of $4,300 per ICT industry employee.



The strong presence of NICTA in NSW may now have started to translate into a small counter-trend lift in ICT Industry R&D spend in that State, which shows a small rise in the current survey, but has declined significantly in ICT industry R&D spend since 2003, especially compared to the rest of Australia.

ICT Industry Female Employment

The Australian Bureau of Statistics, in a publication last year titled “EMPLOYMENT IN ICT OCCUPATIONS” had this to say about female participation.

”Most of the people working in ICT are men. Of the 348,200 ICT workers in 2005-06, 85% (295,000) were men. The number of male ICT workers increased by 6% between 2004-05 and 2005-06. In contrast, the number of female ICT workers fell by 8% between 2004-05 and 2005-06 to 53,300. “

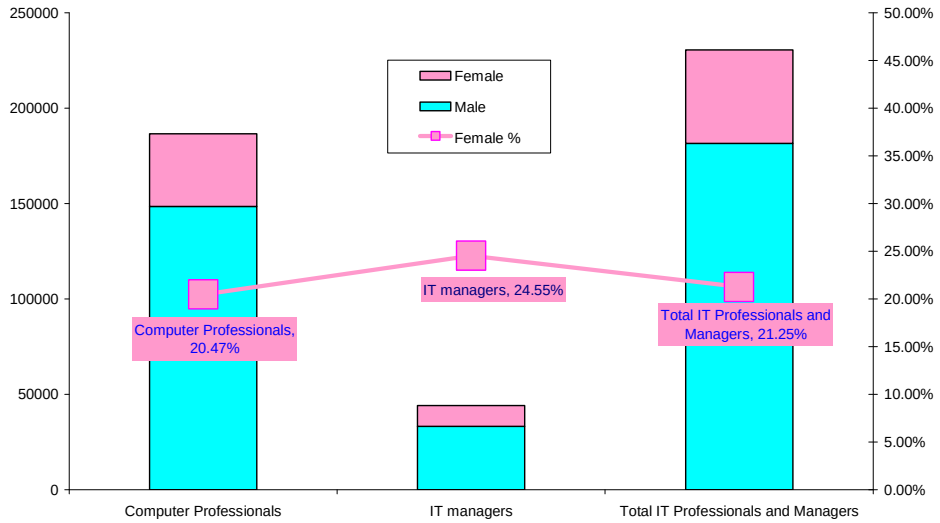
To draw these conclusions, they included the groups below, (reproduced from their report) which include a significant number of electronics trades people and technicians, and suggested a female participation rate of 15% within this group, and the number of females within the group in decline.

1. Employed persons, ICT occupation groups - 2000-01 to 2005-06(a)(b)

	2001-02	2002-03	2003-04	2004-05	2005-06
	'000	'000	'000	'000	'000
Computing professionals and technicians					
Information technology managers	29.5	30.2	29.7	38.5	43.4
Computing professionals	163.2	174.8	174.6	153.0	162.0
Computing support technicians	29.4	29.7	30.7	42.0	41.3
Total	222.1	234.7	235.0	233.5	246.7
Electronic engineers/technicians and communication technicians					
Electrical and electronics engineers	23.7	26.4	23.7	25.9	29.4
Electronic engineering associate professionals	15.5	14.5	15.1	18.9	11.5
Electronic and office equipment tradespersons	32.6	36.7	33.9	34.9	33.5
Communications tradespersons	20.7	24.5	24.7	21.0	23.9
Electrical and telecommunications trades assistants	*2.8	*2.9	*2.8	*2.2	*3.3
Total	95.3	105.0	100.2	102.9	101.6
Total ICT workers	317.4	339.7	335.2	336.3	348.2

The ABS conclusions have frequently been miss-quoted, without understanding their origin, as evidence of low female participation, both in ICT professional occupations and in the ICT industry.

Female participation in ABS categorised ICT Professional occupations November quarter 2007.
Source ABS unpublished data Occupation classes 2231 (Computer Professionals) and 1224 (IT managers)



ABS, however, have provided the data shown above, specifically in relation to the 231,000 people categorised in the key "old" ANZSCO definition ICT professional occupations, "Computer professionals" and "IT managers". It can easily be seen that the female participation rate in ICT professional groupings, on the latest information available, are a little over 21% of the total, at over 49,000 in these groups alone.

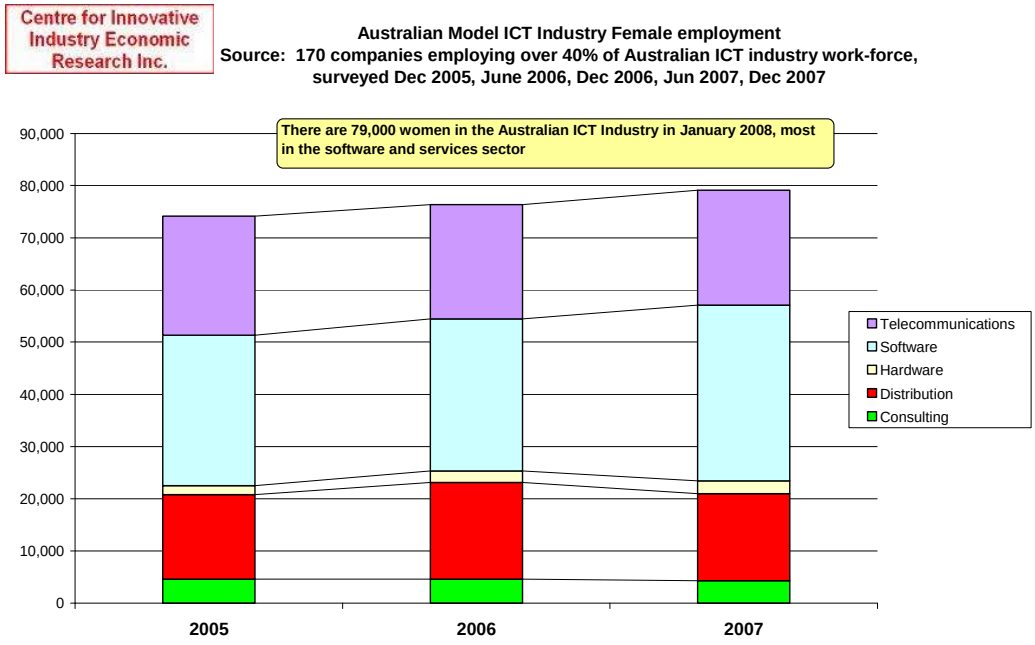
Another, earlier restricted data set from ABS, covering specific ICT technical and professional employment and including:

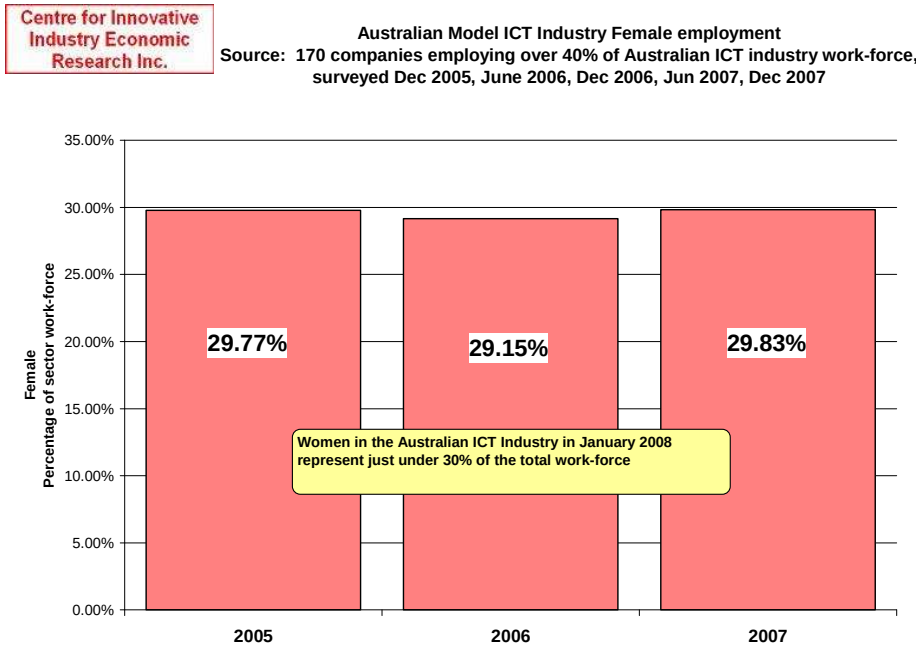
Information Technology Managers	Computing Professionals
Electronic Engineering Associate Professionals	Computing Support Technicians
Communications Tradespersons	Electronics Engineers

(E.g. the same group as in 2006 excluding electrical and telecommunications trades assistants), had May 2005 data of 232,600 males, 51,700 females, adding to 284,300 FTE. This represented 18.2% female participation, and, according to ABS, there had been no significant variations in this percentage since August 02.

Accordingly, it can reasonably be concluded that ICT female participation is at around 21% at the IT professional level, lowers to 18% when Electronic and Communications people are included, dropping further to around 15% when all of the relevant trades assistants are included.

The ICT industry, however, has a higher level of female participation than this. The modelling below indicates an overall level of 79,000 women in the Australian ICT industry, regardless of role, at just under 30% of the total work-force.

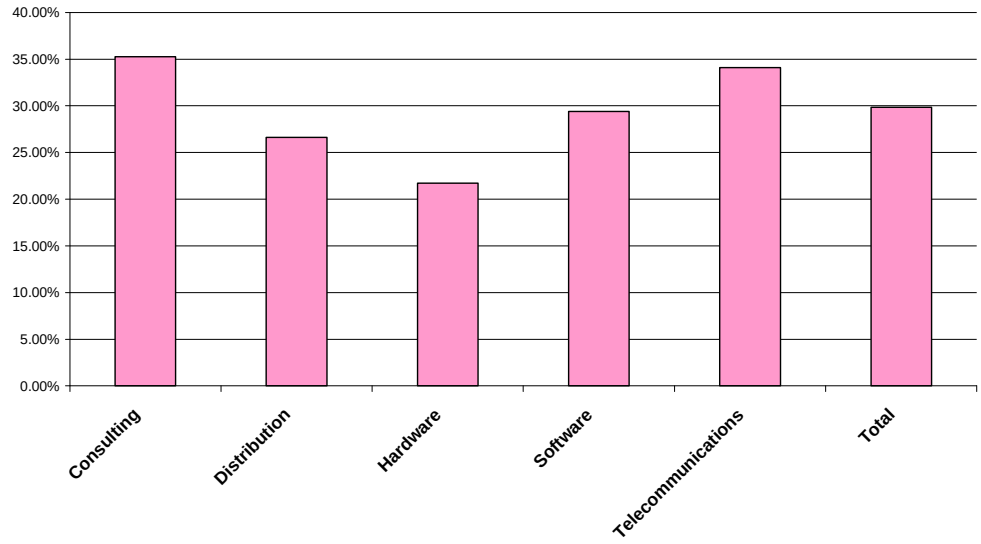




Relative proportions by industry sector are, somewhat surprisingly, not significantly dissimilar to the total work-force, however it is likely that a higher proportion of females employed in the telecommunications and hardware sectors are in non-professional employment, such as call-centres or assembly lines, whereas females in the consulting and software sectors, other than those employed in administrative tasks, are more likely to be professional or technical staff.

Centre for Innovative Industry Economic Research Inc.

Australian Model ICT Industry Female employment
Source: 170 companies employing over 40% of Australian ICT industry work-force, surveyed Dec 2007



The conclusion therefore is that the ICT industry, even in the more male dominated sectors, 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, according to ABS data, of this 30% complement the ICT industry employs around 24% female technical and professional staff, with higher percentages in software and consulting sectors. (This analysis, however, does not seem to include Communications technical staff as an ICT technical and professional skill).

Other ICT technical and professional employers, in Finance, Government, Manufacture and other industries, employ around 100,000 ICT technical and professional staff between them. By a process of reduction it can therefore be calculated that around 15% of these employees are female.

Based upon the evidence above:

- 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);
- This suggests 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 significant variation in female participation in the ICT Industry, or at professional levels, over the last six years.

ICT Industry Demography

Company Numbers and Sizing

There are always some reservations about the relevance of this measure, as overall employment is, in many cases, a far more effective measure of economic growth that the number of companies amongst which that employment is distributed.

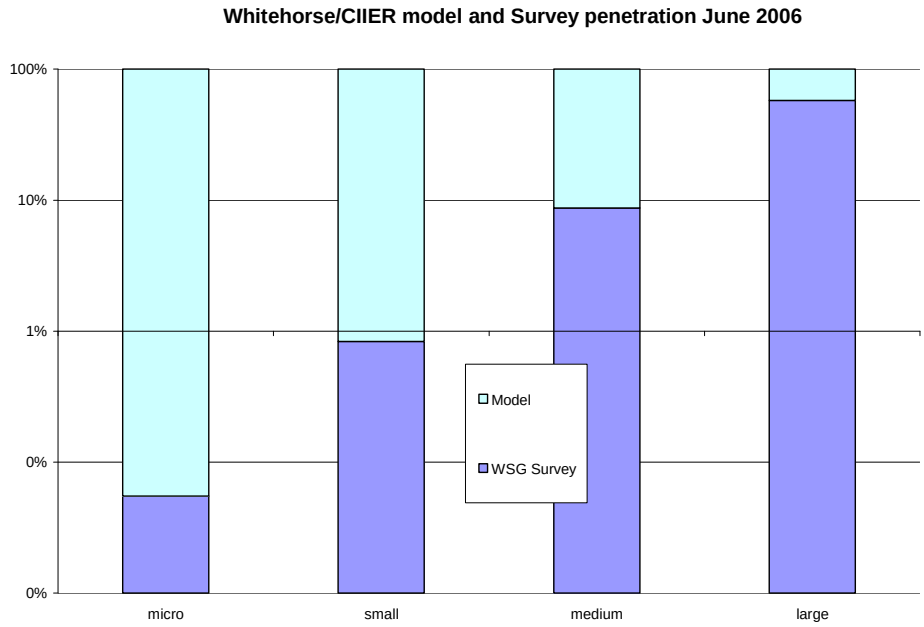
It should also be noted that arbitrary allocation of companies to sizing criteria based purely upon staff numbers can be misleading in terms of economic significance, as different industry sectors have differing paradigms, e.g. distribution companies may, with relatively few staff, command significant revenues, whereas software and services companies have a much larger staff load to an equivalent revenue.

The ratio between staff and revenue can also indicate changes in the operations of sectors, e.g. telecommunications has gradually changed over the last ten years from a relatively high employment to revenue position, to a more "commoditised" ratio, similar to that for wholesale distribution companies.

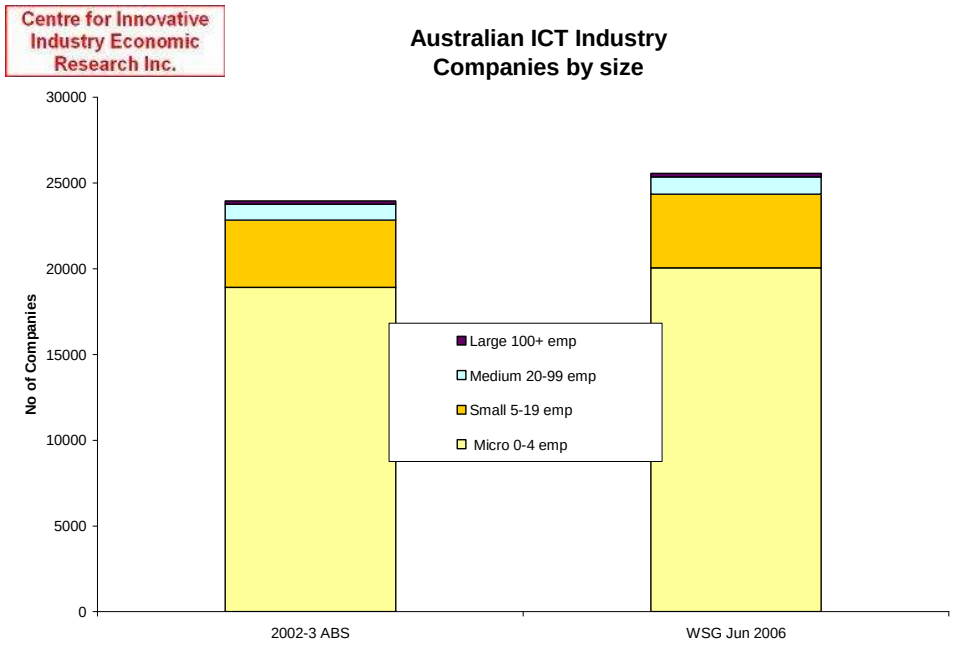
Nevertheless, the information is still frequently requested, so, after discussion with ABS, and with the following caveats, the "company numbers" model has been prepared. Data from June 2006 has been used, as the ABS paradigms relate to the 2002-3 period and become increasingly less accurate for later data.

Caveats

1. Models presume that the ABS 8126-0 2002-3 Sizing model is sufficiently accurate to use as a paradigm
2. These are modelled statistical calculations, based upon ABS paradigms and changes in employment by sector, not specifically identified companies; however the "large" data modelling has been tested against actual company data in the WSG database for verification purposes.



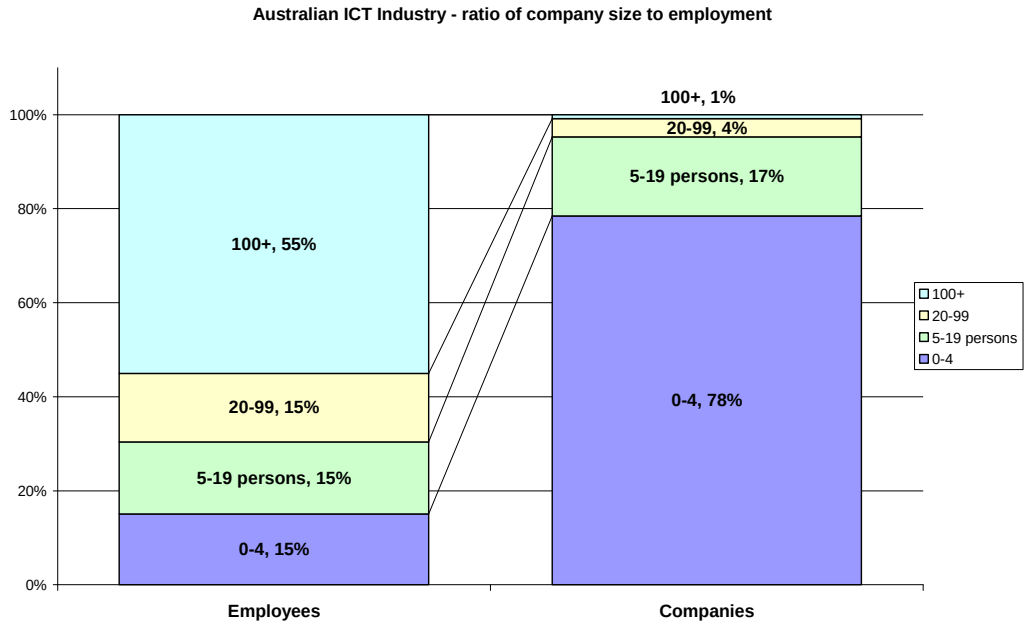
The chart above indicates the ratio of "survey" to "model" data. The survey is always higher rated for larger companies, but this is factored out in the Model.



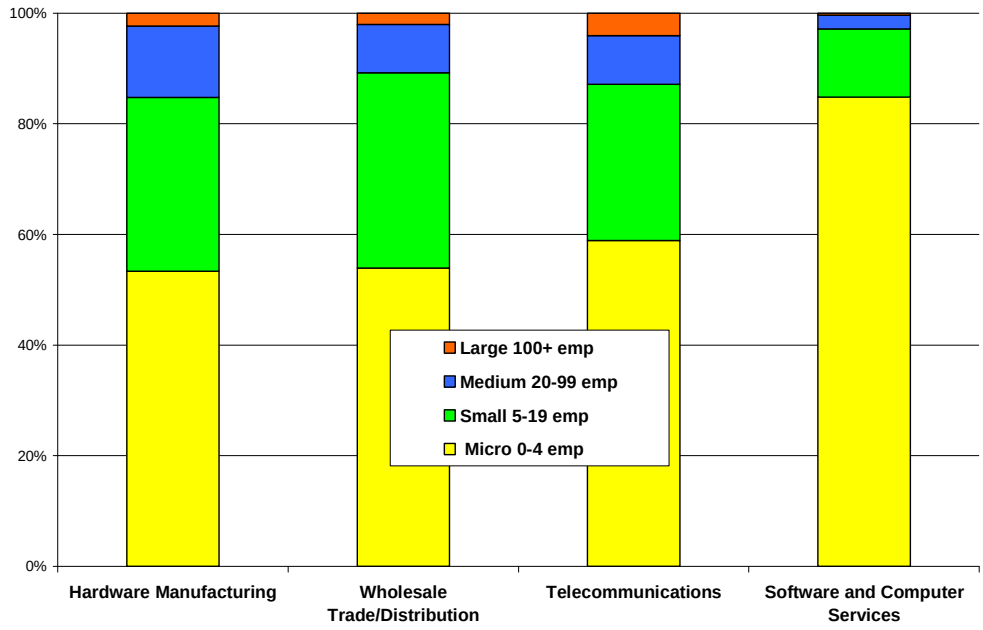
This chart shows the data for the whole of Australia, distributing over 25,000 companies. Only 200 companies, only 0.8%, can be classified as "large" in this measure i.e. over 100 employees.

It is noteworthy that in other sizing measures, often used by Governments, companies with less than 200 staff are still considered to be SME's.

Companies Australia Model	Total	Micro 0-4 emp	Small 5-19 emp	Medium 20-99 emp	Large 100+ emp
2002-3 ABS	23951	18924	3928	911	188
Jun 2006	25562	20052	4303	998	208



The impact of this sizing is shown here, with 78% of ICT companies with 4 or less staff employing less than 15% of the ICT industry work-force, and less than 1% of all companies with over 100 staff employing nearly 55% of the total ICT work-force.



But the sizing criteria vary considerably, depending on which industry sector is being analysed.

Over 96% of software and computer services firms are small to micro sized.

Distribution companies, on the other hand, only have just over around 50% "micro" sized.

Telecommunications companies also include a large number of small players, illustrating the more fragmented nature of this industry sector compared to earlier years.

The ICT industry is, truly, a small business industry in Australia, with a very limited number of companies having the critical mass for international growth. Policies and programmes for ICT industry development need to recognise this reality, and be focused to an industry paradigm that is capable of response.