

# **Centre for Innovative Industry Economic Research Inc.**

## **Tasmanian ICT Industry Sector Assessment Report 2010**

Section 1 ICT Industry Survey and  
Statistics

Section 2 ICT Innovation Case Studies

Section 3 ICT Economic Impact and  
Skills

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### **About the Centre for Innovative Industry Economic Research:**

**Centre for Innovative  
Industry Economic  
Research Inc.**

CIER 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. CIER 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 provides the analysis for this project.



Whitehorse is an Australian owned management consulting practice specialising in ICT Market Research and analysis, ICT policy and strategy, especially in the Government sector, Information Management, and Economic Development.

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## Section 1 ICT Industry Survey and Statistics

## Statistical Panel

Centre for Innovative Industry Economic Research Inc.	July 2003	July 2008	July 2009	July 2010	Trend
<b>Tasmanian ICT Industry</b>					
<b>Employees in Tasmanian ICT Industry</b>	2,820 (1.33% of Aust ICT)	3,572 (1.33% of Aust ICT)	3,647 (1.29% of Aust ICT)	3,693 (1.30% of Aust ICT)	Up marginally in number and in percentage
<b>Overall revenue of Tasmanian ICT Industry</b>	\$1.1b (1.8% of Aust ICT)	\$1.4 b (1.6% of Aust ICT)	\$1.1b (1.4% of Aust ICT)	\$1.13b (1.4% of Aust ICT)	Software and services recovery, but telco slide
<b>Revenue of Tasmanian ICT Industry software and services sector</b>	\$98.4 million (0.8% of Aust ICT)	\$252.9 million (1.44 % of Aust ICT)	\$287 million (1.55% of Aust ICT)	\$313 million (1.6 % of Aust ICT)	Continued increase in \$ value and percentage of Australian market
<b>R&amp;D of ICT Industry (Survey companies only)</b>	\$11.3m	\$29 million	\$32 million	\$31 million	Slight decrease

## Introduction

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. TASICT received funding approval from the Intelligent Island MAPP program to perform a Tasmanian ICT Industry Capability Assessment to be conducted annually over a period of three years. CIIER was engaged by TasICT on an annually renewable three year contract to provide the analysis and report.

Separate reports were provided by to TasICT by CIIER each year as part of this engagement, a number may be downloaded from either the TASICT or Whitehorse Strategic Group websites<sup>1</sup>, the final report in 2008-9 was a proposed ICT industry strategic framework, prepared for the TasICT Board.

Each years report has had a different focus, requested by TasICT.

The 2008-9 report looked at research synergy and infrastructure, strategy, and changes since 2003. Last years report dealt extensively with exports and with research expenditure, and then focused on ICT industry experience and perceptions. We encourage readers to look at these earlier reports for more detail on these matters.

TASICT have requested that the focus of the 2010 report be ICT skills. Accordingly, the report will concentrate on aspects of skills demand, variation, shortage etc, and extra attention will be paid to employment demography and trends. It is not intended that the 2010 report repeat material covered extensively in 2008 and 2009, but that, instead, it will analyse changes and progressions, and focus on economic impacts.

The Report is in three Sections.

Section 1 provides an overview of the current state of the Tasmanian ICT Industry sector, as of July –Dec 2010, based upon a CIIER statistical Survey of the Industry, and on other reputable statistical sources.

Section 2 is a SWOT review of the ICT sector, supported by interviews and case studies.

Section 3 will address overall ICT skills issues and will include the final evaluation assessment and economic impact review.

No further annual ICT Sector annual assessment report is scheduled.

## 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. 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 the Premier, the Tasmanian Government, and the TasICT board and its Project manager.

The work is also supported by the partners, staff, and research associates of CIIER and Whitehorse Strategic Group Ltd. Current and former Whitehorse and CIIER Partners, Senior Consultants and Research Associates include:

Ana Govan	David Dennis
David Goble	Reg Coutts
Ian Wells	Phil Kowalski
Richard Hogg	Ian Dennis
Liz Dennis	Roy Pallett

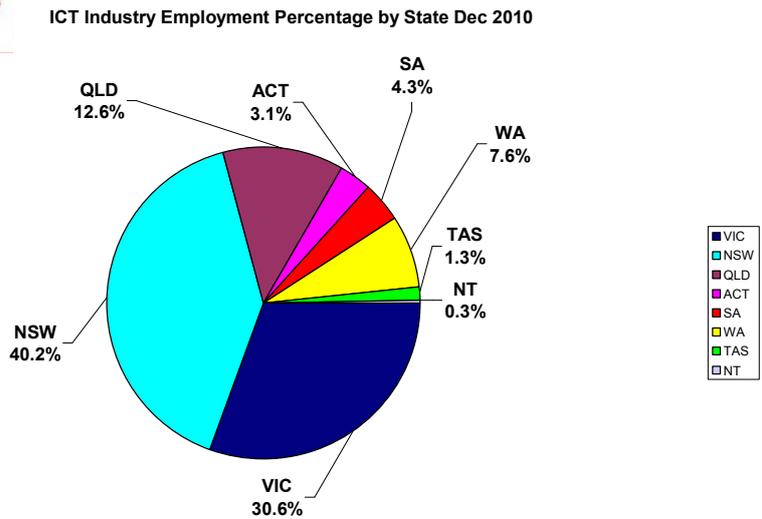
<sup>1</sup> [www.whitehorsestrategic.com](http://www.whitehorsestrategic.com) publications tab.

## Tasmanian ICT Industry Employment

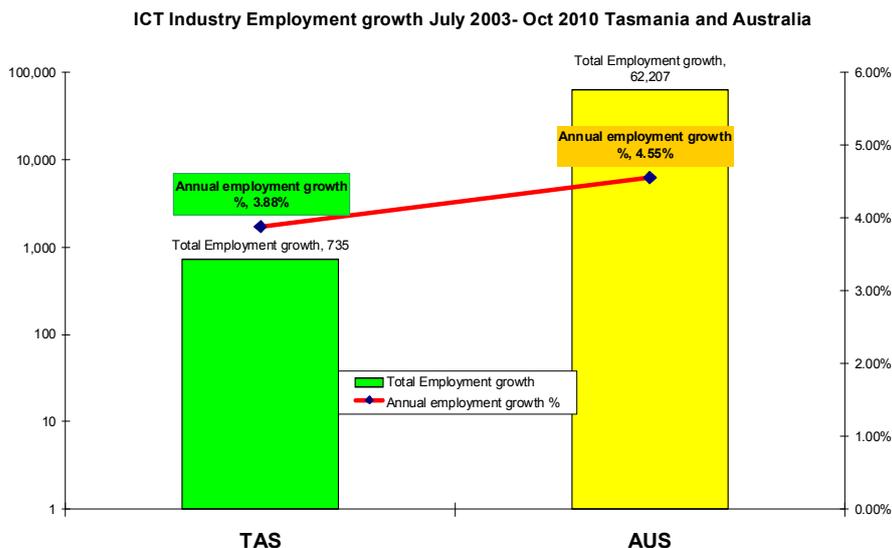
The Tasmanian ICT industry employs just over 3,600 FTE. This equates to 1.3 % of Australia's ICT industry employment, similar to the first analysis in July 2003 (1.33%).

Nationally, the demographic profile of the Australian ICT industry has continued to change. As the main smaller states have increased their relative percentages, and larger states (Victoria and New South Wales), having less dominance. As most of this percentile growth, took place in the mining states of Western Australia, and Queensland driven by increasing demand for ICT services in the construction and mining industries, there has also been some flattening in these States over the last year due to the economic downturn, and Victoria has continued to grow proportionally, whilst the NSW percentage of the ICT Industry has continued to decline.

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Since July 2003, Tasmania's annualised employment growth of ICT industry employment has dropped slightly, from just over 4% to 3.88%, but remains only marginally below the total Australian percentile growth of 4.55 % over this period.

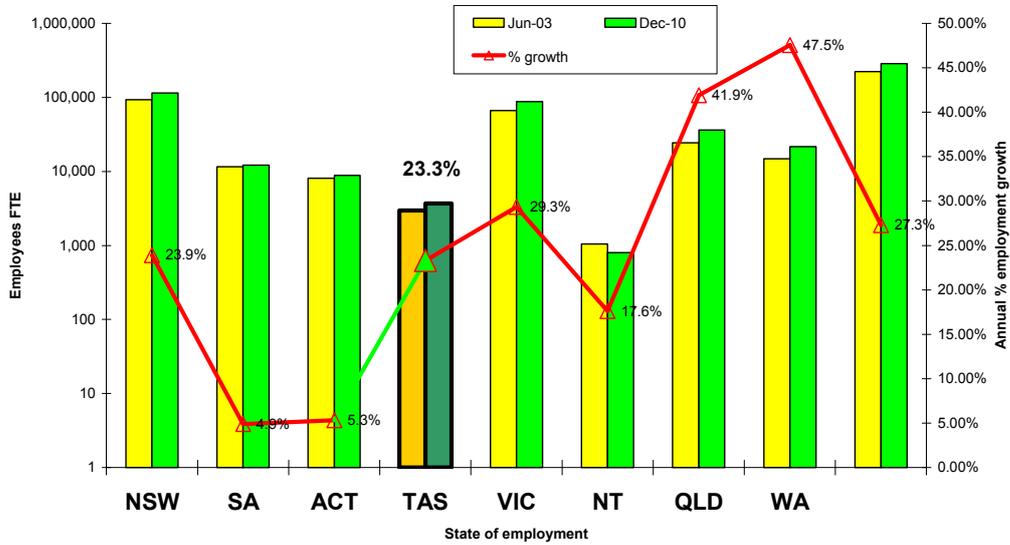


ICT industry employment in Tasmania has continued to grow, but proportionally less than in some other States and Territories. Tasmania ICT industry employment growth is almost all in software and services. Because Tasmania has a more significant employment exposure proportionally to the telecommunications sector, the State has suffered more from the

extended employment contraction over the last few years in that sector, both in Tasmania and nationally.

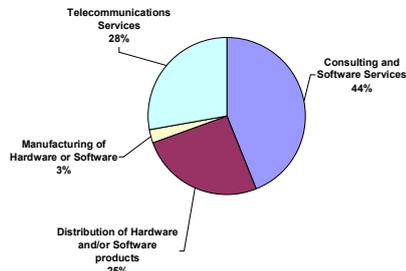
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**ICT Industry Employment variation by State, and total AUS.**  
 Modelled by CIIER from ABS and Whitehorse data based upon ABS paradigms and definitions



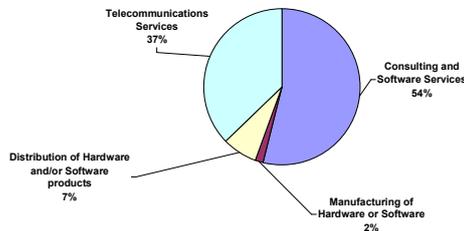
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**ICT Industry Employment by Industry sub-sector Dec-10**  
 Source CIIER-Whitehorse Top250 Survey and Industry Model



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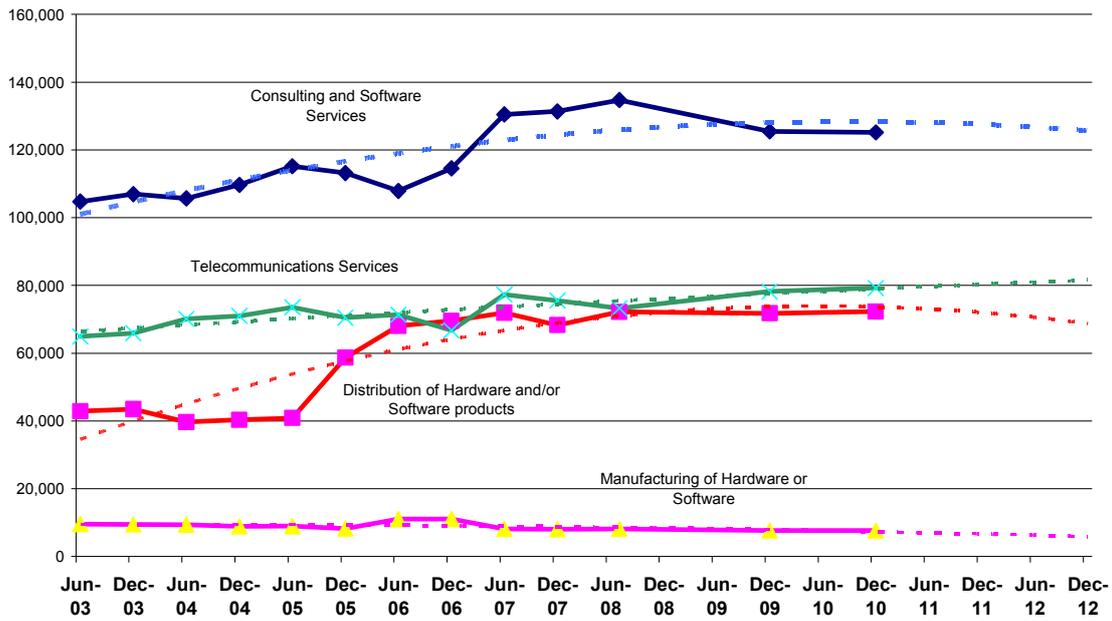
**Tasmanian ICT Industry Employment by Industry sub-sector Dec-10**  
 Source CIIER-Whitehorse Top250 Survey and Industry Model



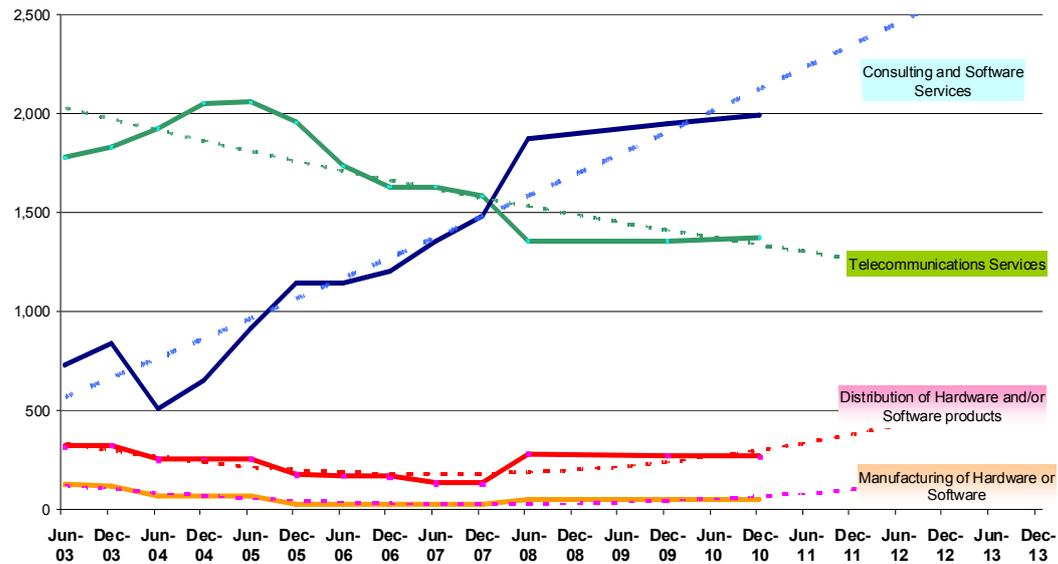
This is illustrated in the charts below, showing variation since 2003, nationally and in Tasmania. Since 2006, national employment in distribution of hardware and software products runs alongside national employment in telecommunications services, In Tasmania, consulting and software services ICT industry employment remains more significant than telecommunications services employment, but distribution is relatively small.



Employment Structure of the Australian ICT industry 2003-2010

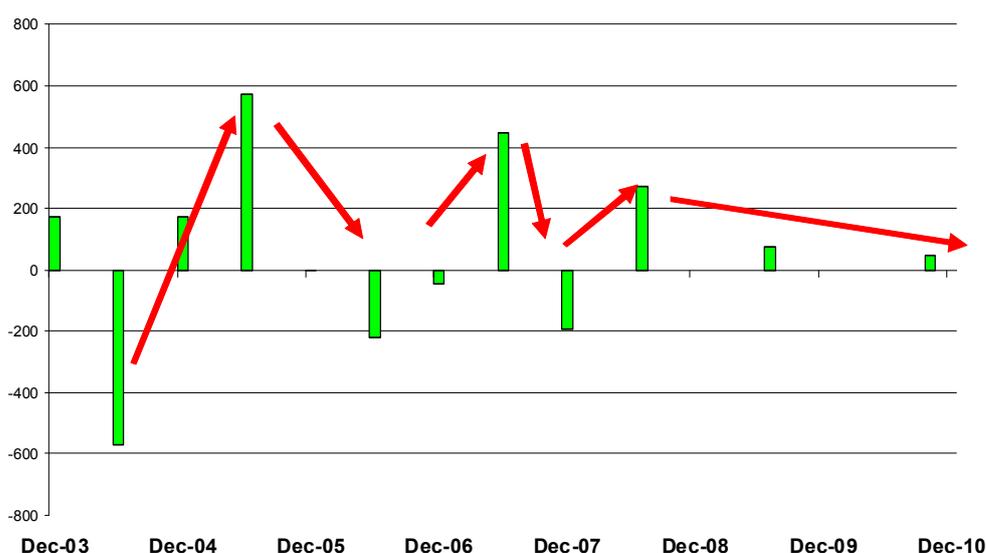


Employment Structure of the Tasmanian ICT industry 2003-2010



In 2008, we projected that “Whilst domestic software and services demand growth may slow as a result of economic turn down, it is considered unlikely that any structural, rather than economic, contraction will take place in this sector”. The latest data continues to confirm this view.

## Volatility in Tasmanian ICT industry employment by period



The impact of the economic downturn can, however be seen in the continuation this survey of decreased employment volatility, with the pace of employment turnover diminishing, as staff stay in jobs and employers retain good staff, waiting for the economic upturn.

The structure of Tasmanian ICT industry employment is unique to Tasmania, as we have indicated each year, It is therefore necessary to ensure that programmes for ICT industry support recognise that the engines for growth are to be found mainly in companies providing consulting and software services and in the future to those supporting high speed broadband, rather than distribution of hardware and software products sourced elsewhere

### Tasmanian ICT Industry employment trend

Tasmania Sector	Source	Consulting and Software Services	Manufacturing of Hardware or Software	Distribution of Hardware and/or Software products	Telecommunications Services	Total
Dec-03	Whitehorse T250	844	123	326	1,835	3,128
Dec-04	ABS (published Oct 2008), <i>sub-sectors do not correlate exactly</i> )	654	73	253	2,056	2,735
Dec-05	CIIER-Whitehorse T250	1,143	28	178	1,956	3,306
Dec-06	CIIER-Whitehorse T250	1,207	29	173	1,633	3,043
Dec-07	CIIER-Whitehorse T250	1,485	29	134	1,583	3,231
Dec-09	CIIER-Whitehorse T250	1,954	56	276	1,360	3,647
Dec-10	CIIER-Whitehorse T250	1,992	56	270	1,376	3,693

The Tasmanian ICT Industry employment trend is shown in the table above, with consistent, but now slowing, growth in consulting software and services, offset by declines in telecommunications employment from 2003, until the slight growth indicated in this year's survey.

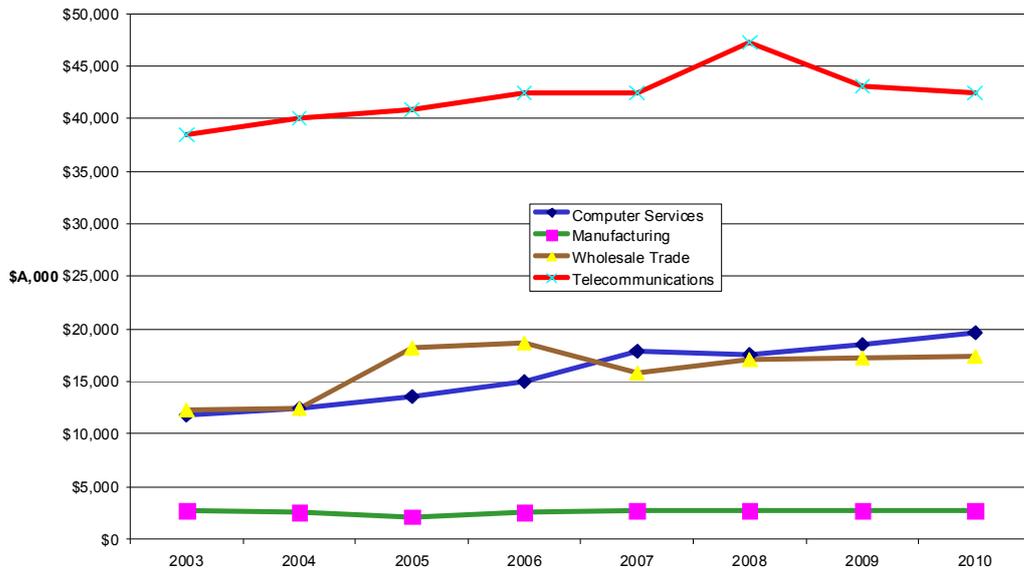
## Tasmanian ICT Industry revenue

### Revenue estimates Tasmanian ICT Industry 2010 \$Amillion

Computer Services	\$313
Manufacturing	\$20
Wholesale Trade	\$65
Telecommunications	\$738
	\$1,137

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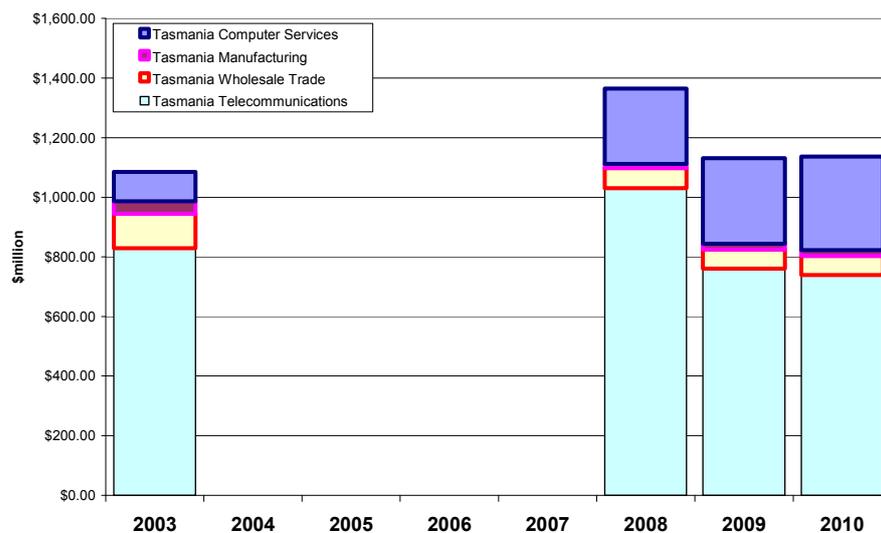
ICT Industry revenue trends 2003-2010



Telecommunications revenues have continued to diminish nationally, and this is also reflected in Tasmania. Other industry sectors continue to increase or remain flat on last year in slow recovery from the economic downturn.

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Revenue of Tasmanian ICT industry

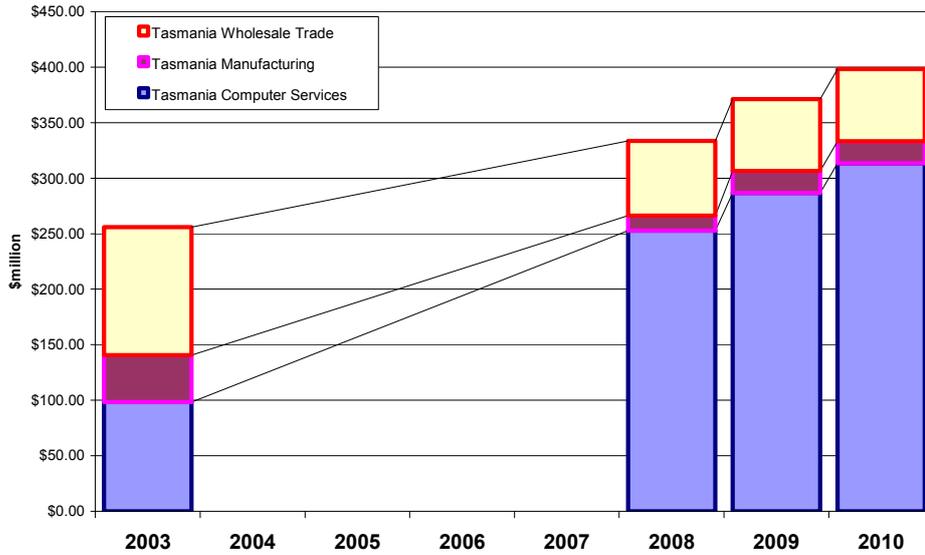


The 2009 total Tasmanian result of \$1.13 billion, is an increase in actual dollars on previous years, and represents a very similar percentage of total Australian ICT industry revenue to the 2008 and 2009 Surveys.

Whilst the overall increase is worthwhile, the performance of the software and services sector continues to improve.

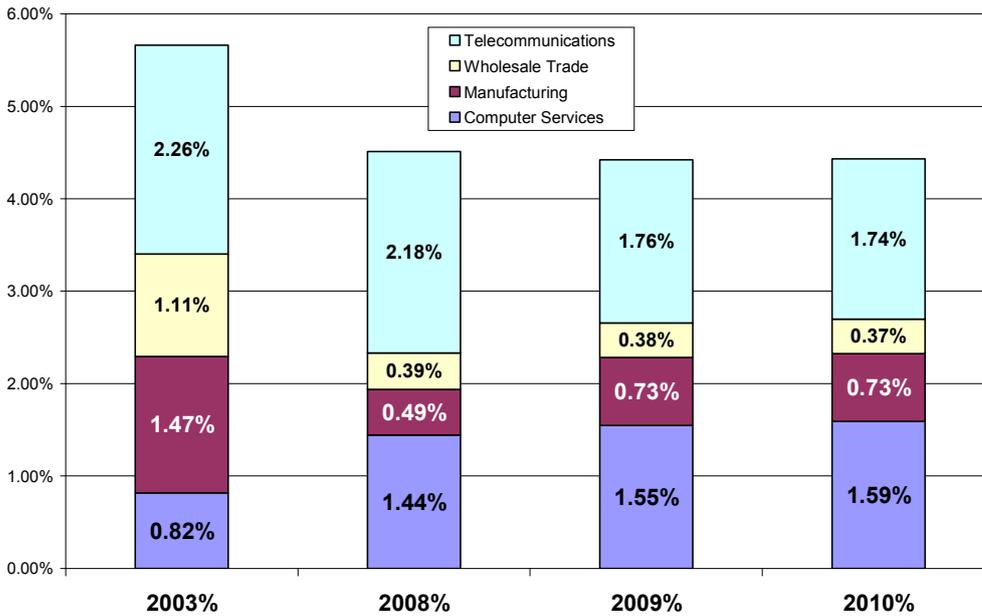
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Revenue of Tasmanian ICT industry - excluding telecommunications



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Tasmanian ICT Industry revenue trends, as a percentage of total Australian ICT industry revenue

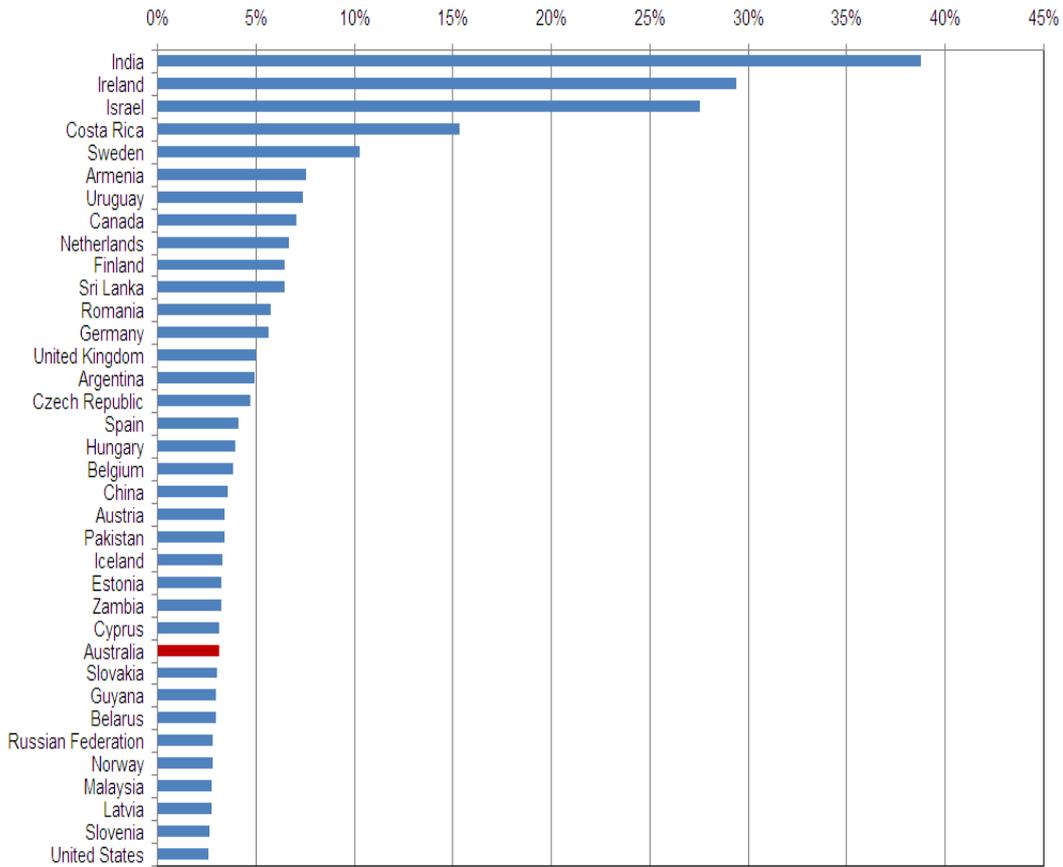


As a percentage of total Australian ICT industry revenues, Tasmanian software and computer services revenue has grown from under 1% of the Australian total to now nearly 1.6%. The growth in revenue for software and computer services, both in percentage and actual terms, matches that seen in employment demographics and reinforces the perception that the major shift in the structure of the Tasmanian ICT industry noted in previous reports is continuing.

## Tasmanian ICT Exports

According to recently published data from TradeData ([www.tradedata.net](http://www.tradedata.net)), and the CSES<sup>2</sup>, in 2009, the *Global Financial Crisis* and higher Australian dollar have brought a marked slowing in Australia's ICT exports, although imports continue to grow. During 2009, Australia's ICT exports fell by 11%, with ICT services exports falling by almost 7% and ICT equipment exports falling by 15% (in current prices). Preliminary analysis of ICT trade data for the first half of 2010 reveals evidence of further slowing – with equipment exports during the first four months down by the annual equivalent of 9%, and computer and information services exports in the first quarter of 2010 some 27% lower than first quarter 2009 (in current prices). Both first half year 2010 and Financial Year 2009-10 computer and information services exports are also down by around 15% to 20% on the previous periods.

Share of IT services in total services exports, 2007 (per cent)<sup>3</sup>



It is probably worthwhile noting that Australia's ICT services exports do not rank that highly internationally as a percentage of total services exports, with Cyprus, Iceland, Belgium and Romania among the countries outperforming us.

<sup>2</sup> ABS and TradeData ([www.tradedata.net](http://www.tradedata.net)), Centre for Strategic and Economic Studies (Victoria University) Analysis

<sup>3</sup> Source: UNCTAD, CSES analysis

## Tasmanian ICT exports

The figures produced this year by CSES indicate that, on current prices, Tasmania's exports of locally produced ICT equipment were worth a little more than \$447,000 in 2000, and they exceeded \$1 million in 2009. Services trade data are very limited with \$6 million of telecommunications services exports and \$5 million of computer and information services exports being reported in 2009.

### Tasmania's ICT exports, 2000 to 2009 (\$ '000)<sup>4</sup>

	2000	2002	2004	2006	2008	2009
<b>ICT Equipment Exports</b>						
Communications	16	6	62	11	356	255
Computer	175	137	341	182	95	171
Audiovisual	12	841	86	646	239	299
Components	50	35	27	54	6	17
Other ICT-related	193	466	300	1,431	322	273
<i>Total</i>	<i>447</i>	<i>1,484</i>	<i>815</i>	<i>2,324</i>	<i>1,017</i>	<i>1,015</i>
<b>ICT Services Exports</b>						
Telecommunications services	28	16	12	9	6	6
Computer & information services	..	..	..	..	..	..
Audiovisual & related	..	..	..	..	..	..
Royalties & fees	..	..	..	..	..	..

It should be noted that, according to CSES, software goods (i.e. recorded and unrecorded software-related media), which were estimated at \$257,000 in exports for Tasmania in 2006, can no longer be tracked in official export data. There are also cases in which either the State of origination of goods and services is not known, or a head office address is given as origin instead of the address of the branch or office that is the ultimate origin. Electronic sales not subject to customs operations are also not recorded in official data. Services data by State are limited, and are derived from ABS estimates.

Both National and State ICT export data, especially for ICT services, are therefore assumed to be significantly understated.

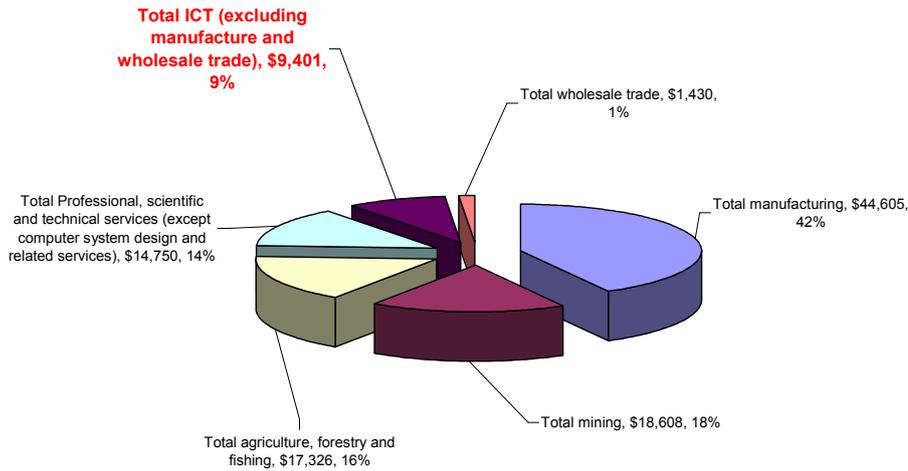
<sup>4</sup> All data are current prices. Exports fob. Exports exclude re-exports Source: TradeData ([www.tradedata.net](http://www.tradedata.net)), CSES Analysis.

## ICT Industry R&D in Tasmania

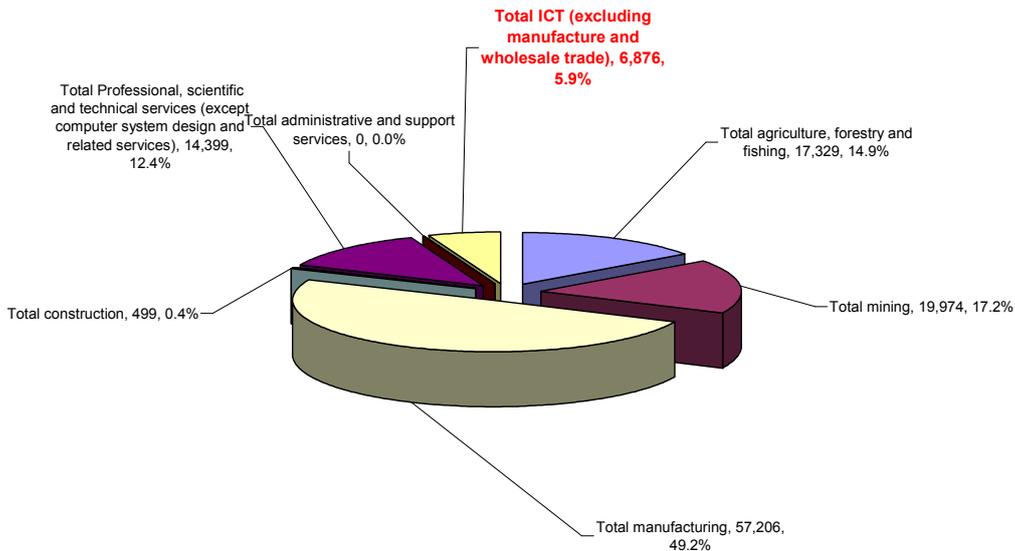
### Official data

Lat report, we noted that, comparing ICT to other industry sectors statistically is made complicated by the segmentation of ICT data, in Australian Government sources, across a number of different industry sectors and sub-sectors. For the charts below, only data relevant to companies categorised as computer systems design, telecommunications, or internet service providers has been able to be extracted and aggregated to the “Total ICT (excluding manufacture and wholesale trade)” heading we have used.

**Tasmanian Research and development expenditure by Business 2008**  
 Source: ABS 81040 2007-8 published Sep 2009 (analysed by CIIER)



**Tasmanian Research and Expenditure by Business 2008-9**  
 Source ABS 8104.0 published Sept 2010



On the basis of ABS data, ICT Business R&D has reduced from over 9% of all business R&D in Tasmania allocated by industry sector in 2007-8, to less than 6% in the 2008-9 year. However there continue to be variances between the total for Tasmania allocated to the industry sectors shown, and the overall total recorded by ABS for Tasmanian ICT business R&D.

The ABS Tasmanian total also only includes computer systems R&D. This is because the ABS data continues to show no telecoms R&D outside NSW. As this is demonstrably incorrect, with significant telecommunications research activity taking place in a number of other States, it is likely that data for one or more large telecommunications businesses have simply been aggregated to a particular head-office location rather than recorded where the research actually took place.

### ***Survey data***

There was only a small change reported in total R&D expenditure by survey respondents, to a slightly lower total of \$31.09 million.

## Section 2 ICT Innovation Case Studies

## INTRODUCTION

### ***Background***

Much of the research into the Tasmanian ICT Industry in the past three years has been quantitative. To broaden the scope of the research, in 2008 CIIER prepared a strategy paper for the TasICT Committee, and in 2009 a qualitative survey into ICT Innovation was completed. For 2010 a compilation of case study responses from a selection of companies in Launceston and Hobart engaged in a wide range of activities contributed information to this survey. As requested by TasICT, the study has a significant emphasis on staffing issues, and, in particular, skills needs.

This report is a compilation of business responses and every attempt has been made to remove those that could directly be linked to a company or person.

### ***Purpose***

Case studies allow greater in-depth coverage of pertinent issues. A number of issues identified by TasICT has been included to supplement the quantitative survey and to complement what has already been established.

Case study research is a long established way of gaining a better understanding of issues and extending or adding strength via a limited number of topics to the findings in previous quantitative research reports. The limited questioning and discussion methods used in this series of company profiles will not produce statistically valid conclusions, but will bring the opinions and experiences of many into a single integrated report from multiple sources of evidence.

Consistent views across a number of businesses can be considered a very robust finding.

### ***Scope***

The study's questions were generally framed as "how" and "why" questions, framed to meet the study's main goals:

***Activities*** - of the company past and present

***Issues*** - affecting the growth and development of the company

***Needs*** - of the business, especially staffing and finances

***Intentions*** - including employment and planning

***Attitudes*** - that are needed for the business to thrive

This is more of an exploratory study, gathering rather short, sharp reactions to a proposition or criterion. No attempt has been made to link these responses to the quantitative studies of the Tasmanian ICT Industry.

### ***Method***

There is a wealth of material for study in a diverse, developing and ever changing field such as the Tasmanian ICT industry. The grouping of topics (above) is a convenient way of approaching issues, but this grouping may have discouraged some responses to other issues. The categories and the fact that the selection of interviewees has been restricted to one or two companies within a sector of the industry means that this survey is not comprehensive. The aim has been to gain insights into issues and detect trends and, within the limitations of the survey method, meet the three tenets of the qualitative method: describing, understanding, and explaining.

## **Limitations**

A characteristic of restricted case studies such as this one is that while they strive to deliver an all-inclusive understanding of the culture and effectiveness of an industry group, they must always have boundaries. A case study approach such as this is not sampling research, meaning that selecting businesses must be done to maximize what can be learned, in the period of time available for the study. The selection process must be broad and the writing of the report must be relatively free of bias. This is the intention of the researchers, while recognizing that the study is based on perceptions and not hard data.

## **Assumptions**

By interviewing a company from each of the listed sectors of the Tasmanian ICT an adequate sample group has been selected to represent the diversity of activity, size and longevity of businesses based in Tasmania.

## **Findings**

### **Activities** - of the company past and present

Using a case study approach and a qualitative research methodology, this report documents the key experiences of selected businesses in the following ICT business fields:

- Software development: the design, development and testing of software packages for industry and general purpose.
- Outsourcing services: data entry, software coding, code testing, and many types of online jobs
- R & D in ICT: research and development of new applications, systems and software.
- Content creation and development: the development of local websites, databases, archival services, translation services, etc.
- Website design and hosting services, including co-location services.
- Personnel training and development: the production of various categories of ICT professionals -
- ICT system assembly: the manufacture and assembly of computers and other related equipment.
- Development and distribution of specialized software
- Telecommunications solutions: network design, routing solutions, etc.
- Computer hardware and software retail and wholesale businesses.

### **The number of years in business.**

The companies taking part in this study ranged in years of operation from 1 to over 30.

### **The main clients -**

The range of clients for the companies reflected the diversity of activities of the companies and ranged from 95% provision of services to government to 100% provision to the private sector. Overall it appears that there is a high dependence on government for many businesses.

## **Government and Private Sector Engagements**

### **What have been the key factors in your most successful government engagements?**

Being close to the client and maintaining a professional ethos, as well as longevity of association and good back up are important. Often pricing and expertise are the first steps to gaining an association with an instrumentality. The initially low price can then often be increased as a long term relationship is built. Having a good working rapport with key people in a department is a distinct advantage. Giving the client no reason to go elsewhere is an important factor in a successful arrangement with government.

The aim of companies to build longer term relationships with government clients is a common thread as is patience with the decision making process. Ownership of a project from design, through implementation and support after completion leads to control that can eradicate potential problems.

### **What have been the key factors in your most successful private sector engagements?**

While a strong service record is expected in dealings with the private sector, the approach is often quite different from that required by government agencies. As with government agencies, trust, a depth of experience and a long term commitment to the client are valued. The main differences appear to be in the greater flexibility required and the ability to meet evolving business and technical needs. This will more likely result in the necessity to undertake 'quick, smart' developments and an overall higher expectation for innovation. For software projects, getting involved with the client early in the process to make sure all understand the project is important.

For those dealing internationally, payment details and money transfer problems can be a problem.

### **What have been the key factors in your least successful government engagements?**

Positive experiences with some sections of government do not automatically translate to successful relationships with others. The changing of a government or changes in key staff in an agency often mean unwelcome adjustments to relationships with an instrumentality. It is not uncommon for a company early in a year to be praised for the service it offers and then later in the year, following personnel changes to be dropped or to be 'screwed' for price reductions making what was regarded as a stable relationship uneconomic for the company. This lack of loyalty to the private company can extend to giving confidential EOI responses to other competing firms.

However, not all of the fault lies with government. Smaller businesses often do not have internal management processes nor the resources to meet the challenges of a large government project. A lack of clarity of who is doing what from the point of view of both the provider and the client leads to poor communications and consequent problems.

Over the years, at least since the introduction of Community Access Centres, there has been disquiet on the part of some businesses about the unfair competition posed taxpayer funded government or semi-government agencies. While some of that disquiet exists with other agencies, the latest concern has been expressed about unfair competing services offered by water authorities using public funds.

The changing of roles within departments or the loss of staff compounds the communication problems, especially if the perceptions of a project have not been adequately conveyed to the new person in charge of working with the private company. Finding exactly who to work with and who is the ultimate decision maker is often difficult in a large organization.

### **What have been the key factors in your least successful private sector engagements?**

For many Tasmanian ICT companies, especially when seeking to tender work with larger businesses the perception of size matters, despite the fact that smaller Tasmanian firms have solved problems that have eluded mainland and overseas companies. An apparently common problem, with some of the larger firms in particular, is that they have inflated, often

unreal expectations of what can be achieved and often do not proffer the required management for the project. Similarly it is conceded that the ICT firm could often do more to take the initiative when unforeseen problems occur. Many of these problems could be avoided by earlier involvement of both the developer and software tester to give greater direction to a project. Ineffective client relationships blight many projects.

### **What criteria do you use to show that a project has been executed successfully?**

Customer satisfaction is the one common thread for all ICT businesses describing the successful completion of a project. Success can be based on meeting the client's criteria, on their terms, for investing in a project. Provider and client sign-off procedures for each major step helps to ensure quality control. The next most common criterion is completing the project "on-time and within the budget". For a small business commercial success is paramount and this also means payment on time; a factor that is less of a problem with private companies than it is with some government departments.

However, given (above) that the scope of a development project may change during its execution, good communication and regular progress reviews generally lead to a good outcome for all. The next most important aspect is a post (or project) implementation review (PIR) to check whether benefits to the client and to the ICT company have been achieved and to identify opportunities for further improvement or for new business opportunities.

Feedback from the client is important to avoid problems and so that support can be given when first indications of a problem occur rather than waiting for a complete disaster to occur. For some projects the time to get a product to the market is the key criterion.

### **How do you accurately determine the price for a project?**

For training and product sellers the price list is generally fixed, but for service providers the challenge is much more complex and the approaches differ from the systematic approach to using experience to make a reasonable estimate. The most systematic approaches involve a full project management system, which without listing all of the well-known formal steps, means at first looking at the design of the project, determining its likely architecture and establishing what needs to be done. The cost for each of the tasks is then estimated, possible things that could go wrong are identified and a risk estimate made. Often, a business case generator with a built in cost analysis tool can be used. Technical estimates are often then passed to sales or management for the final figure.

Smaller businesses frequently do not use formal project management approaches and rely on less formal means of determining prices, such as looking at the specifications and making price estimates based on the experience from similar projects. The

In general, companies warn against quoting for a job on an hourly rate – a sure means of losing money on a job. However, this does not apply to extended service agreements for which a fixed or hourly rate is negotiated and they may even take a lower rate for an extended contract.

A job costing mix based on the ability of a client to pay and general market prices unrelated to the actual cost of producing the service or goods also may be used. When the ability of the client to pay is the preferred mode, the price starts out high and negotiations continue until a satisfactory position is reached. Negotiations may result in some customizing of a project to get a desirable outcome for a project.

The broad mix of costing methods reflects the diversity of the industry and the niches in which companies operate.

## ***Business Set-up and Location***

### **Stimulus to Enter Field of Operation**

**How did the founders come to select this business niche? e.g. database development, GIS, accounting software?**

Qualifications of the owner, the opportunity to enter an emerging market or a belief that a mark can be made in an established market, interest and encouragement from others all feature as reasons why people went into business.

Altruism may not have been in their minds, but unlike many industries, several people in the Tasmanian ICT industry did not start out in business with the sole ambition or purpose to make huge amounts of money. Many could see an opportunity in an appealing, emerging sphere and thought that it could provide them with an intellectual challenge or a channel for their interests and to use their qualifications and experience. Each had a strong belief in their ability to succeed or to do better than others; for some, the financial rewards or the grim financial alternative emerged after the business was up and running. In small business partnerships it is often the belief that they could do better by combining skills and talents. Perhaps surprisingly, few seem to have had a specific target market in mind when they started out in business.

**Has the location of the business had a positive or negative effect on the business**

The most consistent reasons for establishing and remaining in Tasmania are the lifestyle and the fact that the people who started the businesses were living in the state anyway. Life style is important for the 'Sea changers' who have also provided added expertise and experience for some companies. For businesses partially or wholly dependent on the State Government, having premises close to the government offices is a priority. For those less dependent on government the other reasons for establishing in Tasmania are the lower rentals, the lower employee pay rates, lower advertising costs and in some fields little competition. Another advantage is that start-up costs of a new business are lower. For the North American market in particular, Tasmania has a novelty ring about it, which could be a marketing advantage.

For some service companies having to contact mainland or overseas customers by phone, e-mail and video link is a disadvantage when competing companies have the advantage of being closer to these customers, however this disadvantage is being overcome. Other than private reasons, for the sector dealing in hardware, there is no great advantage in being in Tasmania with its higher costs, smaller market, few technicians and the difficulties in finding good, technically savvy sales staff. *[This lack of a pool of technicians seems to contrast with a strong pool of competent software graduates, courtesy of UTAS.]*

## **ISSUES**

### ***External and Internal Analysis***

**Rating the strength of each force on a business**

The companies in the survey were asked to rate the strength of each of the following factors (forces) on their businesses using a numbering system, with 5 a strong influence on the business and 1 weak or very little influence. They listed in order from the most important factor for companies as a whole to the least important.

- Bargaining power of customers
- Competitive rivalry within the industry.
- Threat of substitute products
- Threat of new entrants
- Bargaining power of suppliers.

For some businesses the bargaining power of suppliers and the threat of substitute products was either not applicable or totally absent; for others they were quite real and looming concerns, especially in a very competitive sector. Each niche within the industry has to deal with different forces with the potential to affect their operations and profitability. Whether any conclusions for the industry as a whole can be drawn from this sample is doubtful.

If there is one concern that should be voiced, it is that some established businesses feel that the Government is more likely to support start-up companies and those that move from interstate than Tasmanian businesses that have established a good record over the years.

## **Barriers to Enter the Field of Operation.**

**Have there been any special challenges to the resolve of the company to continue in the field?**

For those companies that have not found an exclusive or unoccupied niche, the size of the Tasmanian market may mean strong competition and increase the challenges to survive and to thrive. Changes in technology without corresponding changes in the way a company operates means that a niche may be marginalized, restricting both the market opportunities and the willingness of customers to pay the true value of the goods or services.

For at least two ICT industry sectors the perceived unfair competition from government subsidized bodies is important. There have also been instances where government instrumentalities have deliberately refused to seek expressions of interest or tender submissions from local companies, even though the expertise is clearly evident in Tasmanian companies and they have the advantage of being able to provide strong after sales support. It is clear that Government policy is to support the ICT industry in the state. It is a pity that all instrumentalities do not fully support the policy and the industry.

For start-up companies with young principals there is the difficulty of youth. Few large companies and government bodies are prepared to entrust 23 year olds with projects worth 10s of thousands of dollars. For some start-up companies, even with good ideas and products, the road in the early years is hard. In addition with so many industries not keeping up with latest ICT trends, part of a company's marketing may be to educate clients about new technology and this can be costly.

## **Business growth, success or failure**

**What has been your company's experience?**

It is not exactly revealing to discover that Tasmanian ICT businesses mostly follow classic growth patterns, with struggles to survive in the first couple of years, followed by an increased growth rate, plateauing after a few years as the company and the sector matures. The only difference from the classic pattern is the fluctuations during the global financial crisis, with some being unaffected and some with declining income, only to recover in the past 12 to 18 months to previously projected levels.

For hardware and communications companies, innovation by suppliers may mean a general increase in revenue over time, but changes in sales as new products hit the market and the popularity of older products fades. This means, if not continuous change, at least periodic changes bringing new challenges and expenses for staff training, but also new income opportunities. For some, market and technology changes have meant a more permanent decline in income, forcing them to adjust their offerings or change their mode of operation.

Another less predictable factor is ownership change or forays by companies into new markets, with mixed results. Some companies seem to be content with income increases just above annual cost of living increases and have no great ambitions to expand.

In businesses closely tied to government, policy changes and occasional episodes of departmental restructuring make a company's income stream vulnerable to fluctuations beyond their control. Having a diverse market enables companies to avoid these problems.

## **Work flow processes**

### **What model has the business adopted for staff and contractors?**

Despite years of predictions about telecommuting and home offices, the majority of Tasmanian businesses prefer the traditional central office/permanent staff model. Consultants may be used for specific projects where their expertise is required, but using semi-permanent consultants is not a feature of the industry.

## **Management Experience and Expertise**

### **Have there been points in the history of the business where adaptive change management techniques have had to be used?**

In a rapidly evolving, technologically shifting industry such as ICT, new projects often provide challenges to the management of a business. To continue to be successful, software development teams in particular, may have to enhance their adaptive capability even if it means changing the roles of staff or engaging new staff. In some instances improvements in technical expertise have been successful, but in others involving management and structural changes the results have not always been encouraging, nor the desired goals attained.

For some, relatively unhurried or evolutionary changes have been successful. Keeping pace with changing customer requirements and a solid check on relating costs to revenue may force some changes, which are hardly perceived as significant at the time, but in retrospect may be viewed as substantial. The reality for some is that project pressure does not always permit a measured or evolutionary approach to organizational changes, but that challenging projects may mean changes to a business without premeditation.

Another tactic has been to avoid necessary internal structural modification by buying in experience or expertise. This may be an expensive option, but it can also be seen as the easy, short term way of avoiding difficult decisions and processes. In other companies, especially smaller businesses, there has no real necessity to employ adaptive change techniques.

It must also be pointed out that adaptive management changes are not always successful and as a result resorting to old practices also occurs.

### **How did your business find the correct balance between improving management for the future and achieving the best short - term outcomes?**

Some made the changes by varying roles within the business causing some pain as they all 'trained-up' and gathered the necessary experience for their new roles. That tactic may result in much greater management strength and a greater appreciation for what was required to make the business succeed. The balance could also be found by not separating the management and operational roles and having 2 or 3 share in and bear responsibility for the company's advancement. Stability, but not stagnation in the management of a company is important. Takeovers and frequent management changes make it difficult for a company to achieve the right balance.

For the more 'hard-headed' businesses, keeping very tight rein on business finances enables the management to find the correct balance without taking risks.

### **What management changes do you envisage for the future of your business?**

Without the threat of takeover, as much as anything envisaged management changes are a function of the age of the company, expansion issues and the ages of the senior managers. Where changes have been contemplated, they range from succession planning through a gradual handover over of responsibilities to a younger person, transferring more of the policy making decisions to make a board of directors more effective, to splitting responsibilities currently held by one person. The opening up of a new branch is a chance (or excuse) to change management roles

At their present phase of operations, the reality is that many small businesses are not contemplating changes to their management structure. Such notions may be 'pie in the sky' until revenue improves or other significant changes occur. As repeatedly stated over the

years, the biggest management problem for small businesses is that owner/managers too often find excuses for working 'in the business' and not working 'on the business' to improve its performance. This reluctance to face up to management improvements undoubtedly affects the ability of many companies to grow and become more profitable.

## **Business planning**

### **In the early days of the business, what sort of business planning did you do?**

If a business is not contemplating bank loans or other start-up capital, the compilation of business plans in the first two years of an ICT company seems to be uncommon. The stage of life when a person enters the ICT business field apparently has a significant influence on whether good plans are drawn up and financial backing sought.

Not surprisingly, for younger industry participants, out of university, without family responsibilities, but with a good idea or technical expertise in a field is more likely to be the stimulus to 'make a go of it' than any business planning. They are prepared to survive with minimal income until cash flow starts to cover their basic business and personal needs. Business plans, competitor analysis, financial and marketing are more likely to come, if at all, after the first two or three years. Some companies that have started in this manner have proved to be very successful. This success may be contrary to the accepted commerce models, but they argue that the use of these models does not guarantee success.

The anti-plan argument may be given strength by those who started out with clear business, marketing and financial plans only to dump them or to totally recast them when the realities of operating in the marketplace hit them, forcing a major rethink. However, some have started out with good plans and have stuck to them over the years, albeit with differing degrees of adherence and with some modifications as the industry changes.

People starting out in the more speculative software development or applications fields are less likely to have followed the formal business planning path than a training, hardware retailer or wholesaler or networking company. The latter group generally need considerable capital to commence trading and have looked more closely at the market; business planning looms as an important ingredient. This group is more prepared to mortgage their houses, to try to find a partner with more financial clout or seek loans from financial institutions.

The roads to success vary in the Tasmanian ICT business community, as do levels of achievement in realizing differing ambitions. For some in the initial stages, formal planning does not come into the equation, but as both businesses and individuals gain more experience and maturity in the market place, formal business planning becomes necessary.

**Identify the company's generic competitive strategy - *differentiation, low cost, or focus* - and its investment strategy, given the company's relative competitive position and the stage of the life cycle.**

In a well-run company, there is no doubt that the experience gained in developing the business over a number of years, a proud record, solid service and sizeable customer base combine to confer a strong strategic and market advantage over younger companies in the niche.

The strategic positioning the company with the customer base, the experience gained in business and mature stage of the life cycle of the company confers some strategic advantages and may enable good differentiation from competitors to occur.

For some the early entry into an emerging field and promoting a wide spectrum of skills and expertise is designed to intimidate other start-up groups. After an initial burst, if a strategy works, it seems that the company settles down into the specialized field for which it has the greatest expertise, at least preserving some of its entry advantages.

For some a very definite business focus on a specialized field provides the advantage. When single-mindedness is combined with a strong marketing program to boost its credentials, the company develops a very strong position in the market. Sometimes the customers are fairly conservative, so building a brand close to their expectations helps in the local market. The same approach does not necessarily apply if the company decides to expand to the mainland.

Competitive cost and quality deliverables enable a company to leverage size and depth, especially if it has sufficient versatility to fix a client's problems outside of its core discipline.

## Marketing

**Understanding and meeting the requirements of customers.**

*The place of market planning and market research, finding details such as the potential size of the market, the extent of competition, as well as consumer preferences and tastes.*

It must be said that despite the K2B project input, if there is a major operational area requiring improvement within the industry, it is marketing which is commonly identified as a major weakness. The needs of companies vary according to the niche and to a company's ambitions. Most would benefit from improved marketing. Some are content to maintain a list of solid clients, picking up a few, losing a few without real marketing efforts and with the hope that word of mouth will suffice.

For some a systematic approach is employed by using such customer relationship management (CRM) software such as SAGE on which to base all of their marketing. Others are aware of the necessity of marketing and developing different approaches using social media. For product retailers, marketing material and market research may come from the supplier.

Networking is seen by all as important for their marketing efforts. While TasICT increasingly provides networking opportunities, the question must be asked, 'why do those in the industry who could benefit from better networking ignore the opportunities?'

## NEEDS

### ***Human resources (staffing)***

**Any special techniques the business has used with staff to ensure that the business succeeds?**

In a small business loyalty by employers to staff is usually reciprocated. Compared with some other industries, staffing in ICT companies tends to be relatively stable. The lesson from small employers is that communication is the key and is relatively easy. The sharing of information on the successes and failures while providing a good working environment, sometimes with flexible working hours, is seen as important. The common thread is valuing the contributions of staff. If they are kept informed and can contribute, they may even forgo salary increases during a down turn if they are kept informed and feel that things will eventually get better for all in the company.

An important factor is choosing the right person for the job and this often does not mean technical excellence. In this aspect, the 'try before you buy' approach (probationary period) seems to work. Most would prefer to hire a person who in an interview comes across as likeable and willing to learn ahead of the 'tech-wiz' who may be lacking in social skills. Building a solid, functional team is considered to be the main long term goal. If technical wizard is needed for a project then contract employment is a desirable option.

Mentoring of new staff is also considered important.

**What is the significance of the following sets of skills to the company and the current staff and their levels of these skills?**

*Essentially all ICT businesses need a good mixture of skills, but the balance seems to be determined by the business niche, the size of the business and to a large extent by the preferred leadership styles and egos of the manager or management team.*

- **Soft skills** including personal skills (organization etc), interpersonal skills, critical thinking skills, creative (innovative) thinking, oral communication,

written communication, presentation skills, transcription/documentation (listening, decoding) skills.

The so-called soft skills are considered vital by all of the surveyed business managers, especially for teamwork and interpersonal relations in a business. In some businesses, creative thinking skills are highly valued. Not all staff members are required to possess all of the listed soft skills and the use of them depends on the role of a person within the company. Some are prepared to hire people deficient in some of the inter-personal skills for strictly back room roles. The one stipulation is that all are expected to make the compromises need for the company team to operate. In small companies the luxury of being able to hide poor interpersonal skills does not exist as almost all are expected at some time to deal with clients.

As was frequently stated, in hiring staff it is frequently the possession of the right 'soft' skills which determines whether a person gets the job. A person with the right social attributes is likely to land the job, provided that he or she has the ability, willingness and intellect to learn on the job.

- **Business skills** including understanding the business goals and objectives of the company, planning skills, customer service skills, project management, understanding business functions (such as finance, HR, marketing, operations) and sales skills.

The need for business skills throughout a company is less important than 'soft skills', especially the larger ones where there is a strong administrative group and a distinct technical group. In smaller business where roles are shared or occasionally swapped, business skills are more important for each person to cover for absences. In a small communications or network company with a wide geographic spread of clients, technical staff may be away from base and have to make decisions with a bearing on both their employer and client company. In this situation business skills and judgement are very useful.

Some admit that business skills are deficient and that attendance at course such as those run by AIDC should be mandatory.

- **Technical skills** including network design and administration, Database design, development and administration, Programmer/software engineer, Technical support (including ICT related CC representatives) System Analysis and Integration ICT sales/marketing Technical writer/trainer Digital media specialist Data encoders and transcribers.

It is interesting that while having technical skills in an ICT business is vital and in demand, employing people who have experience with a desirable set of skills is not always a priority. The use of technical skills in a business may be idiosyncratic. It often appears that having a good theoretical background and a willingness to learn new skills along with a range of the 'soft' skills is most likely to land a job for an applicant.

It is also interesting to note that skilled professionals with university qualifications are in demand for software jobs. The perceived lesser qualifications such as those offered by TAFE are mainly sought by hardware retailers and network companies.

## **Staff Training**

### **What approaches does the business undertake to rectify skills deficiencies?**

Participation in training programs for the above groups of skills varies greatly. As expected, the most common training sought by ICT businesses is technical in content. Extensive training in improving business skills is not common, but when it is undertaken it is comprehensive and undertaken very seriously to bring fundamental changes to a business.

The 'soft' skills training is usually conducted by either bringing in a training consultant or by staff attendance at short courses. The implication is that most will employ people with relatively good 'soft' skills, so the need for these courses is not great, unless a new role requiring improved skills is contemplated for a person already within the business.

With technologies evolving or newly introduced, there is a greater demand for technical skills training. This may also reflect the size and longevity of a company and also the field in which they operate. The larger and more varied the offerings of a company the greater the need for staff training. This training may be a mix of external formal courses, in-house training and online courses, depending on the immediate needs of the company. Mentoring within the company is also common, as is self-training by staff, especially for software developers. 0

### **How valuable are vendor training and certification schemes?**

There is an apparent dichotomy between seeking certification for individuals to improve their CVs for better employment opportunities and companies sending people to vendor courses for certification to improve their business credibility.

A degree is a must for every ICT professional, especially in software development. For some certification such as offered by Microsoft courses works as an icing on the cake. For an employer a degree indicates a core knowledge set, but the additional vendor courses such as Microsoft Certifications may help employment prospects for the individual and add to the marketing armoury of a company. So called Vendor Training is important for retailers and is usually available online, but some face to face courses may be run, unfortunately almost always in Sydney or Melbourne.

There is some disquiet about the delivery of vendor courses such as Microsoft Certification, the rigor of post course examinations and their practical value. Vendor training and certification appears to be more valuable for those offering specific services such as in the financial area than for most other companies. For developers, qualifications and/or expertise in .NET and JAVA seem to be most important, but for companies needing .NET skills, the refusal of the University to provide anything more than JAVA rankles.

Even though vendor training might not be essential for the actual operations of a company, it is seen as offering a degree of credibility to other companies.

### **What other training would be desirable for your staff?**

Other than three indicating that training for sales and general business was desirable, for the remainder there were no indications that extra training was needed by any of the surveyed companies.

## ***Internship***

The subject of internship brought mixed and varied responses. On the technical side, some ICT business will employ interns for technical purposes, but apparently not for other roles. Businesses with 7 or fewer staff are seemingly not eager to engage interns as they don't have the resources to divert staff away from their regular revenue generating activities. If there is an exception it is likely to be through the UTAS northern campus scheme in which students may have a few hours a week for two semesters with a business. The advantage is that students do not require salaries; the company may be paid a small stipend, and being part-time, do not take up too many hours of a professional officer's time.

For companies that are prepared to take on interns, they will do them mainly for university vacations or they may take recent graduates at other times during the year. In both cases the maximum period of full time internship is likely to be 3 months. An exception is a company will to engage an intern for 2 or 3 days per week for a much longer period with a salary based on the lower level of the State Award rates.

Depending on the level of expertise of a student, a software development company may take on an intern, but the general rule seems to be that before graduation a young person does not have the programming skills to be useful. Without adequate skills an intern needs a lot of time consuming, onerous supervision.

When interns are engaged they are paid competitive salaries, generally above 75% of the official full-time starting salary for full time work. The intention of a company may be to employ the person at the end of a specified period, especially if the intern shows real talent and commitment to the employer. For some a bond system may apply, meaning that if the intern leaves the company early, they may have to pay back any training expenses, but not salary or

other money. If an intern proves to be very successful during the internship period, a company may engage him or her on a casual basis until qualifications are completed when full time, permanent employment may be offered.

Some managers seem more kindly disposed to internships than others, but the concept of internship seems to be accepted in principle. The actual engaging of interns is related to company size, the industry niche in which the company operates and the likely need for future staff. Some who are reluctant or unable take on an intern may take work experience students. The principle of building for the future with qualified and experienced personnel is well established in the ICT industry.

A more widespread and effective internship scheme could be developed, but a subsidy of some nature would make it more desirable throughout the ICT industry. The concern is the loss of productivity when a professional officer is diverted from the main tasks for supervision purposes. This needs to be compensated for in some manner.

## ***Objectives***

**Do all staff have a clear recognition of the business objectives and work towards achieving them?**

It is likely that the smaller the size of a business the greater the appreciation all staff have about the business objectives, values and beliefs. In a smaller business communications are informal, socially a group tends to be more cohesive and they all share in the pain of a loss or triumph in a successful outcome. Every member in a small business is likely to be involved in some way in customer service and get the feedback that helps the business lift service and quality horizons. Regular staff meetings may be used to reinforce the understanding of a company's objectives and current performance.

## ***Financial Support***

**How did the business find sufficient initial capital to sustain it in the early years?**

Survival in the early years of operation has been a financial struggle for most new ICT businesses. As mentioned earlier, for some businesses not only was formal planning absent, but the lack of capital meant hardship. Often a lack of capital went hand-in-hand with a lack of formal planning. Some people were content to live on 'skerricks' until they gained enough income to eventually take home a salary and think of putting the business on to a firm foundation for expansion without the need of external finance. This was more the case for the case for the younger people in start-up businesses, but this was not the experience of all.

In-tellinc provided both financial backing and business mentoring for a fortunate few. The advantage of In-tellinc was that it was part of the industry and could make assessments of the potential of an idea without some of the unreal demands of non-ICT venture capitalists who expected 'an arm and a leg' for anything that was not bricks and mortar.

Rare government grants for special projects could provide some early funding for a start-up company, though they were not directly part of the business set-up plans, rather they were the 'icing on the cake'. Intelligent Island including MAPP funds may have helped place a new company on a stable footing, but they were not awarded to those who had not prepared a sound business plan and case.

Raising capital from a bank was undertaken by some, even though this usually meant a mortgage on the family house or at least a water tight guarantee. This form of capital-raising has been mainly confined to the more mature, financially established people seeking to found a business. In many cases even this has not been adequate and in the past few years many ICT businesses have been forced to close.

**Has there been sufficient finance to take advantage all of opportunities that became available or has the business had to compromise?**

The level of finance for small businesses and the difficulties involved in actually having it available for business development is one of the biggest impairments to growth. It was

suggested that small business finance should be an essential part of bank guarantee system by the Federal Government. When the level of small business debt is high, the first response appears to be to increase the interest rate making it more difficult for businesses. All a rate increase does is increase debt levels and the burden on small businesses. The current government could do more to encourage small businesses with some reasonably small financial measures.

For those who started out with no great ambitions to expand beyond a sustainable level of probably less than 10 staff, the need for extra finance has been small and if needed has come from accumulated reserves. Accumulated reserves have also enabled some businesses to grow substantially without an addition injection of capital.

Not everyone has been able to achieve their ambitions by obtaining enough capital for expansion. The ideas might have been sound and the timing right, but the frustrating lack of capital meant that for some these ambitions were unfulfilled. The frustrations even increased when government funding schemes such as MAPP seemed to be too specific, badly timed for a business and provided too many hurdles. A complaint about MAPP was that too many resources had to be diverted from the mainstream of a business to meet reporting requirements and this could not be justified if it appeared that there was only a chance that the application might have succeeded.

## INTENTIONS

Every business must ask 5 basic questions?

- What are you building? – Vision
- Why are you building it? – Mission
- What do you measure? - Objectives
- How will you build it? – Strategies
- What work needs to be done? Action Plan

As with other sections relating to the running of a company, a discussion must cover the full range from those with no formal plans, but a good idea of where they are going, to those who take business management theory seriously and attempt to apply the theories to their own businesses. Rightly or wrongly, some of the younger companies give the impression that for the present at least, that they are “holding the tiger by the tail” and hoping that sooner or later they will develop better business plans and administrative structures. These companies are confident of where they going, but need time for formal documentation to be completed.

Some more established companies have solid vision and mission statements. Some these statements are be clear and unequivocal such as:

- Developing the best professional services company in Tasmania.
- Developing a strong, repeatable business model based on a certain targeted service.
- Making each customer project profitable.
- Maintaining a good client list by ensuring customer satisfaction and building long term relationships.
- Providing employment opportunities for young Tasmania graduates.

All of the responses from those with strong business plans had realistic, achievable and even altruistic aspirations. Fortunately there were no grandiose and nebulous statements like “we want to be the best in the world” or “we will apply world’s best practice to all of our clients’ projects”. Pragmatism abounds and that is a good sign for businesses in the ICT industry in Tasmania.

Most of the more mature companies seem to be guided, consciously or unconsciously, by the tenets of Jim Collins ‘Hedgehog Concept’ of improving business in a measured and deliberate

way. It appears that decisions are the result of careful consideration about what is best for the company. Some appear more ready to take calculated risks to reap greater rewards. Flexibility in the approach to a product or idea is common and what is not working within the company's plans is discarded. Although open to new ideas, companies are most likely to take one step at a time and concentrate on what it does best. They set goals and plans for how to accomplish these goals.

## ***Employment***

The employment situation varies greatly according to the size of the company, its maturity the market niche and the ambitions of the owners. Maturity is not necessarily a fool-proof indicator of staff stability. For the larger companies, takeovers, mergers and policy directions from parent companies can have profound effects on staffing levels and staff satisfaction. Most companies expect little turnover in existing staff outside of the usual changes in personal circumstances of staff. Taken together, albeit with no real statistically valid evidence, it appears that on average each of the companies contacted could employ 4 people next year. When spread across the industry this means that substantial employment opportunities still exist in the Tasmanian ICT industry.

The expectation is that for every sales and administrative person required there will be vacancies for 5 technical staff, mainly in software development or testing. While the demand for networking and hardware technicians is relatively low, the availability of suitably qualified and experienced people is also low.

Not all employers expect that it will be easy to have to fill the vacancies, especially those in highly specialized niches. The expectations of employers are that the following perceived problems with applicants will be encountered. (Ranked in order from most common to least likely):

- Inadequate specialised skills
- Applicants lack skills/experience
- Poor attitude/presentation of applicants
- Lack of applicants
- Wages/conditions not seen as competitive

*Comment:* The lack of specialized skills and experience was expected. While employers would like to have people requiring little training for a job, they are prepared to employ those with a range of skills and the right personal attributes and then put them through training courses or mentoring programs. However they will only do this if they can see that the applicant is likely to be good for the long term future of the business. Concern was expressed that in university courses they teach programming as a philosophy and methodology without applicability to industry. Debate on this has been with us for years and is yet unresolved.

Some applicants seem to come across as 'professional malcontents' moving from job to job and are not regarded highly. Poor communication skills are a problem for many seeking employment and this is not only confined to overseas applicants. Regardless of their ethnic or cultural background, every applicant needs to meet functional or higher English language requirements.

## ***Embracing new technologies and developments***

**In a fast changing field how can your business make best use of advanced technologies such as NBN fibre optics in an appropriate way?**

Reaction to the NBN and its likely effect on the ICT industry is mixed and this is largely a reflection of a company's business activities and aspirations. The overall reaction is positive and the belief is that fibre optics technology will be of benefit to most businesses.

For some it will mean increased opportunities for overseas sales and much better communication with clients anywhere in the world. The need travel will be reduced; a significant cost saver.

Others are adopting a wait and see attitude, with the expectation that it will provide opportunities. While staying alert for opportunities they are not quite sure from where they will come. A few companies see the new broadband as a great opportunity not to be missed. They have started to invest in R&D and to gain skills to keep them ahead of the pack for when the fibre optics technology becomes universal.

However, there is some disquiet about the real effect of the NBN. Recent press statements have not been reassuring, especially with apparently quicker and more effective rollouts in some mainland areas. The main worry is that it is increasingly appearing to be an opportunity that will be lost unless there is better management than Aurora is currently displaying with the project. It will be unfortunate if the opportunity that NBN offers is wasted.

## **Standardisation-Related Issues**

**Are there any Internet access, security issues, interoperability problems, standardization issues and implementation costs causing major barriers for the company's business initiatives?**

Interoperability and standardization issues have been common since the beginning of the ICT industry. With new developments, especially in communications, these issues will remain and as a consequence some innovations will not reach their full potential. In the Tasmanian ICT industry there are varying reactions to the issues of interoperability and standardization. Most businesses are unaffected, for some there are platform issues to be resolved such as .NET vs. Java and for a few there is a great opportunity to profitably resolve these issues.

The previously distinct telecommunications, mass media/entertainment and computer industries are converging, giving consumers and service providers more options. The result is a highly complex and organically changing environment, which makes standardization even more important. The very real opening up of possibilities and opportunities for business offered by these new networking technologies is recognized and being pursued by a few Tasmanian businesses.

## **ATTITUDES**

### ***Key issues***

The attitudes section provided some interesting but not unexpected results. Bernard L. Erven of Ohio State University states that "top managers set the tone for all the other managers and employees in a business. A winning business attitude comes from the top. People lower in a business cannot overcome pessimism, incompetence, negativism and lack of leadership from the top. Seven key characteristics describe which top managers are most likely to build winning business attitudes. Managers with the following characteristics build winning attitudes:

1. Plan makers
2. Information users
3. Opportunity seekers
4. Risk takers
5. People helpers
6. Organization builders
7. Enthusiastic learners"

It is implied from the earlier sections in this report that all of the participating managers embraced Ervan's attitudes with the exception of risk taking. This is reflected in the ranked responses to the following question. "Based on your business experience, which from the following list will be most important for your business to thrive in the next two years?" (*Ranking from most common to least common response.*)

1. Honest business approach;
2. Positive attitude and strong business perception;
3. Flexible solution - ability to develop new features upon request;
4. Quick responses to emerging needs;
5. Communication channels between management and staff
6. The encouragement of creative problem solving within the business
7. Dedicated contact: sales and technical support
8. Dissemination of innovative techniques to staff
9. Using the ICT resources available to communicate ideas, coordinate tasks check reports and conduct appraisals?
10. The willingness to take financial and intellectual risks on a project.

## Lessons Learned

**Indicate new insights gained or reasons why you would follow the same path or do things differently if the opportunity arose again.**

1. We should have formalized the business structure faster than we did. (*The most common comment.*)
2. Avoid diversifying too soon.
3. Be less conservative in aspirations as there were opportunities to establish branches on the mainland – and we didn't take them.
4. Initially we could have been a little better at everything. Doing things on the cheap and meant that our main rivals were able to give the impression of being a higher quality company, even if we could match them or do better work.
5. When expanding a business don't do everything yourself.
6. When delegating, things are not always done to the letter as you expect them to be. Accept that you need to train others to do things your way. Alternatively you have to be very careful when vetting people for senior or otherwise very responsible jobs.
7. Do not seek a capital injection too early. Wait until you are sure of the market and of your technical capacity to service it.
8. Obtain higher level management skills earlier in the life of the company through courses such as the **Australian** Institute of Company Directors (AICD) courses.
9. The perception of experience and age when you start a business is sometimes difficult to overcome.
10. We probably needed earlier mentoring in the early days of the business. Fortunately this came in 2007.
11. We would have been better off if we had looked for others, especially mentors to help us develop the business quicker than we have.
12. The initial idea of a profit-centred, diversified portfolio of services and products is as valid as when we started the business.
13. We have not made enough contacts with other members of the industry such as joining TasICT and going to functions, meaning that we have probably missed out on collaboration with other companies.
14. More IT specialists need to get better management skills. IT people don't rate management enough, often because sales specialists and generalist managers don't

know enough about IT. A skill level appreciation would make it easier for the managers to be better rated.

15. Generalist managers from other fields often don't succeed as IT company managers. This means that more IT specialists need to do management courses and administrators need to better keep up with IT developments.

## CONCLUSIONS

The open manner in which business managers were prepared to give up their time and freely discuss issues relating to their businesses was more than just reassuring; it reflected a maturity and confidence both in their own operations, but also in the future of the Tasmanian ICT industry. Not all is glowing and there have been glitches and past problems, but the managers are realistic about what can be achieved and about likely problems ahead. One could assume that their perspectives on the future of the ICT industry are highly dependent on an economic view of their future operations in Tasmania. The most visible advantages of operating a business are having easy access to government and private clients, a stable local market, and in general, an adequately trained and skilled workforce.

Managers are convinced that in the near future, the use of ICT in the wider business and domestic market will increase and improve. This coupled with the hopefully successful NBN implementation will in all likelihood provide them with a growing customer base with rising sophistication and hence more opportunities. However, this optimism varies according to industry sector, with some sectors such as mobile communications set for huge expansion. For other sectors the growth is likely to be steady and in a few cases, changes may have to be made to offerings to keep companies profitable.

In terms of information and communications technology in Tasmania, if you disregard Telstra for the purposes of this report, businesses have been operating in the ICT field for at least 35 years. Even though the ICT industry is small and there are many relatively new businesses, Tasmania cannot be considered a late developer. Some companies are mature, stable businesses experiencing comparatively little growth, while others are making huge advances.

As has been identified in earlier CIIER reports the stages of development of ICT companies in Tasmania follow the classic business growth path of the establishment phase, followed by steady or in some cases, spectacular growth, a plateauing of growth and entry into the mature business. Unfortunately the management stability of some of the more mature companies is not as stable as some of the smaller developing companies. Takeovers, retirements, resignations and retrenchments have affected management and this tends to filter down to affecting a company's performance in the local market.

The perception that "more IT specialists need to do management courses and administrators need to better keep up with IT developments" is relevant in a discussion about business skills needs in the industry. For the majority in the ICT industry, overwhelmingly the so-called soft (personal) skills and the technical skills are required by employers. Within the limits of the survey there is apparently little support for calls for university computing graduates to have more in the way of business skills. The suggestion by some in the industry of the need for an inclusion of business skills within computer science courses needs to be balanced against other conflicting technical skill requirements within such courses.

For most businesses only a few staff members appear to need these skills and there are businesses mentors, private courses and those offered by the AICD (The Australian Institute of Company Directors) that can fill the business management skills gaps when needed. For people with no experience in business, university business courses in a computing degree are probably a waste of time.

The fairly widespread acceptance of the need for an internship system is noteworthy and needs further development work. The mention of subsidies for an internship scheme to work fits with other references to fairly modest financial measures for the industry, including government guarantees for eligible small businesses in times of substantial interest rate increases. There is no suggestion that Tasmanian ICT should be a mendicant industry propped up by governments.

Most importantly, the participating companies anticipate the need for more employees in the next year, signifying a healthy state of the industry. There is optimism about the future of the ICT industry in Tasmania and the managers involved in the survey are well equipped to meet likely challenges.

## Section 3 ICT Economic Impact and Skills

## **Tasmanian ICT Economic Impact**

Whilst the primary focus of these reports has been the Tasmanian ICT Industry, i.e. those companies` which supply ICT good and services, it is common for the term “ICT industry” to also be interpreted as including both those companies, and also the many individuals who provide ICT good and services to their employers, i.e. ICT technical and professional staff. Naturally, a large number of such staff work in the ICT industry, but the ICT industry also employs logistical, ancillary and administrative staff. The economic impact of ICT is a composite of both the direct contribution of the ICT Industry, and the indirect contribution of ICT professional and technical skills to all industries, and, in particular, to Government.

For this years report, we have been asked to focus on ICT skills. The skill base of all ICT workers therefore becomes a significant part of our analysis.

### **Skills v Jobs v Occupations**

The term Skills is, however, often used interchangeably with the term Jobs, and also the term Occupations. This can lead to significant confusion, as nomenclature that properly relates to skills is contrasted with that properly relating to occupations. This confusion has arisen, to some degree, through some members of the HR industry and the bureaucracy allowing self-definitional keywords to influence the development of nomenclature and analytical groups, without applying a “sifting” process to exclude those keywords which are designators other than skills, or through supporting the development of a standard lexicon to ensure statistically valid allocation.

Whilst hierarchical and technical environment indicators are both useful analysis groups, they are not necessarily Skills, and their combined usage has tended to disguise and complicate real Skills supply and demand, and make it difficult to measure any correlation between this and what could, more properly, be deemed Occupational analysis. Most of the employment data available is structured into occupational groupings such as ANZSCO<sup>5</sup>, the terminology of which may either disguise or incorrectly amplify perceptions of skills supply and/or shortage.

As an example, the ANZSCO classification of “Computer Programmer” may include lots of “ICT professionals” (another completely separate ANZCO classification, that tells us nothing about their skills, just their qualifications), but who do not, actually, write computer programmes for a living, but can’t find anywhere else to fit !  
Interpreting a shortage of the Computer Programmer occupation as equivalent to a shortage of the skill of computer programming would be fallacious

The term “Job” applies to a specific employer/employee or contractor relationship.

The term “Occupation” groups together similar “jobs”, for aggregation and classification purposes.

The term “Skill”, by contrast, relates to one or more attributes, both technical and personal, that are a requirement or preference for an individual to have, in order to pursue an occupation, or to competently perform a particular job.

A job will require a number of different “skills”, although in some cases one major skill, especially if it requires certification, will predominate.

For example, an ICT project manager requires, as a major skill, project management. An ICT project manager, however, also requires skills specifically related to ICT, e.g. systems analysis and design, and/or programming, in order to understand the “domain” in which to apply his/her project management skills.

In the experience of the authors, one of the reasons for less than optimum outcomes in a number of Government ICT projects around Australia, has been when a more generalist project manager has been appointed to manage an ICT project, without the individual concerned possessing the other skills in ICT that are actually required.

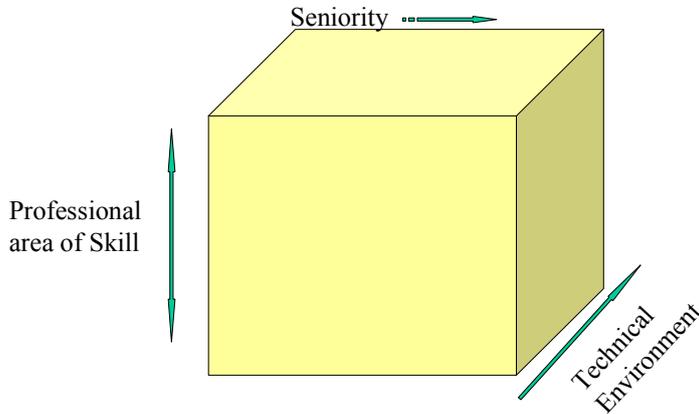
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<sup>5</sup> Australian New Zealand Standard Classification of Occupations

Jobs have three dimensions – seniority, skill, and technical or operational environment. Viz: Senior Programmer in SAP, Technical Network Planner for Mainframe. The “three dimensions” Job model is illustrated below.

**Three Dimension Model**

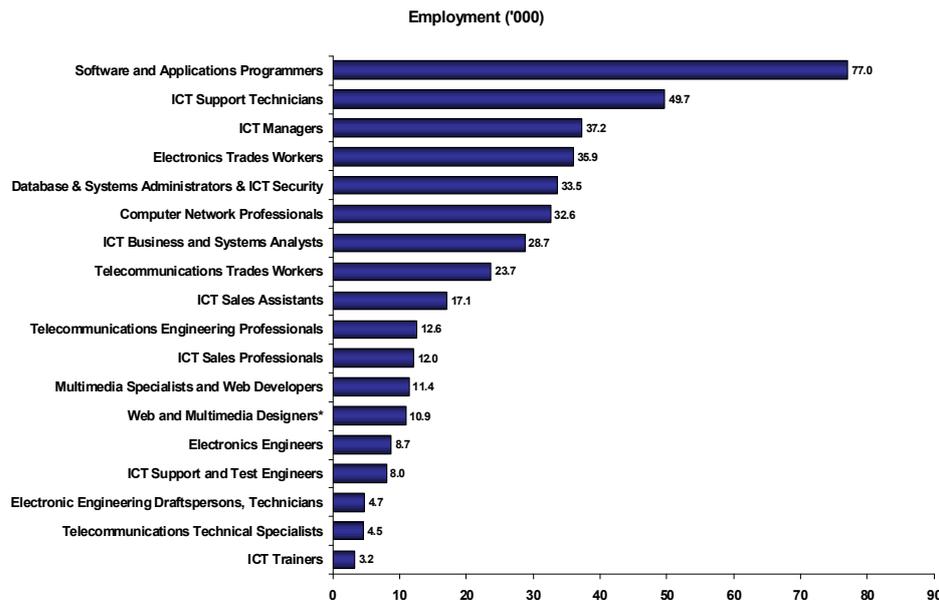
The three dimensions of ICT Employment



**Occupations in ICT**

The table below of Australian and New Zealand Standard Classification of Occupations (ANZSCO) brings together the national employment in core ICT&T occupations together with trades workers and technicians, trainers, sales people and designers working in telecommunications and other ICT&T related occupations, that have been identified by DEEWR<sup>6</sup>. While ICT&T user skills are commonplace in most occupations, employment in these roles is not included in the table.

ICT&T occupations, May 2010<sup>7</sup>



<sup>6</sup> Department of Education, Employment, and Workplace Relations

<sup>7</sup> Source: DEEWR, ICT&T Labour Market Indicators, presentation July 2010.

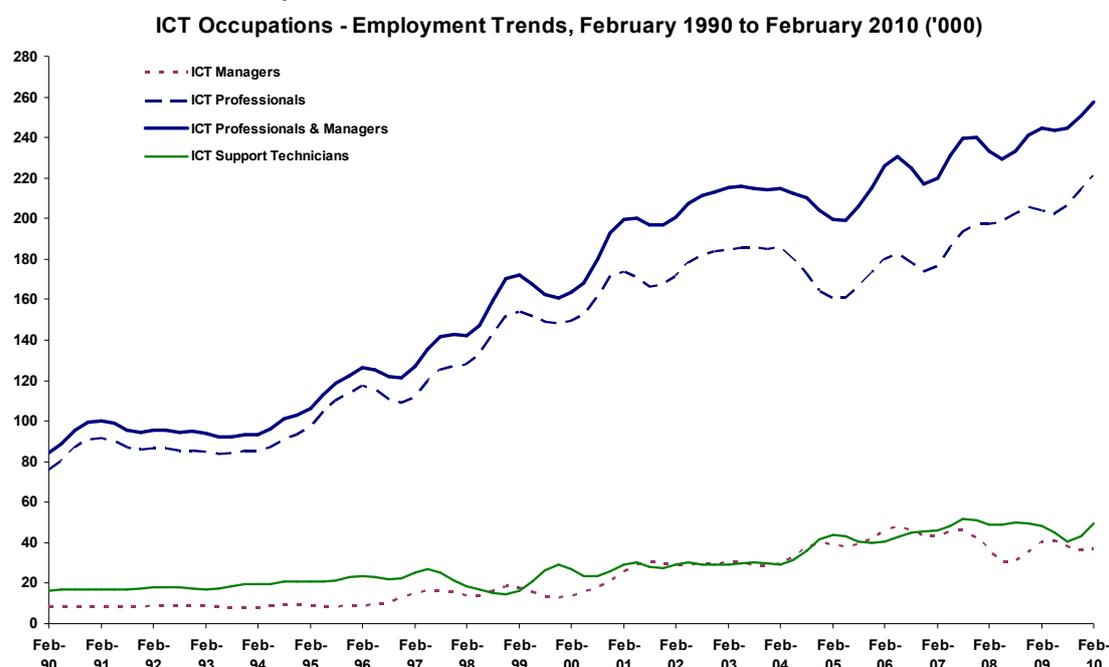
These are then grouped by DEEWR into three core ICT&T occupational groups comprising:

- ICT&T managers
- ICT&T professionals, and
- ICT&T support technicians.

ICT&T managers and professionals include core ICT&T occupations that require Bachelor degrees or higher.

The following graph indicates long term national employment trends for the three core ICT&T occupational groups. ICT&T Professionals have steadily increased three fold over the last 20 years with some minor fluctuations even through the economic downturn in 2008 and 2009. ICT&T Support Technicians, though doubling their numbers over the same period, started on a lower base and represent a more gentle increase. Just over two-thirds of ICT&T Professionals have a Bachelor Degree or higher level qualification. Some industry sources suggest that employers tend to expect candidates to hold qualifications in ICT&T but do not always include a requirement for qualifications as part of the recruitment process. This may be a reflection of supply and demand of skilled labour. It may also be because the qualifications held, including many ICT degrees, are less relevant to the skills required than are specific “trade” capabilities (eg competence in specific languages or operating systems).

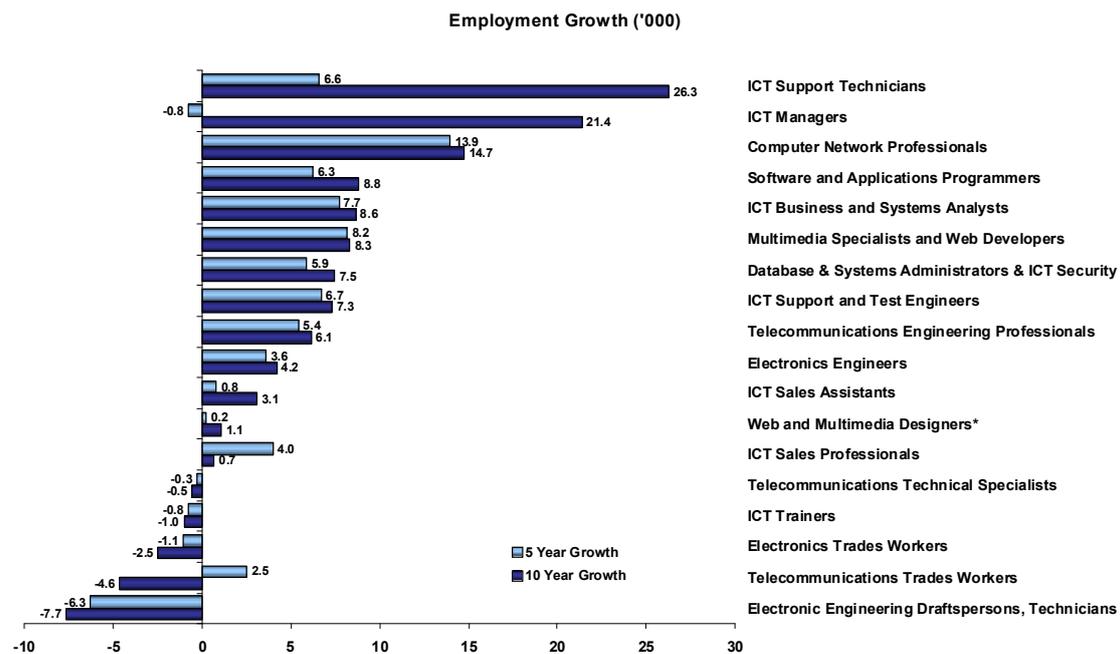
ABS labour force survey – DEEWR trend data<sup>8</sup>



Much of the employment growth tracked by DEEWR over the last 10 years has occurred in the ICT&T occupations with the largest employment numbers namely, ICT&T Support Technicians, ICT&T Managers, Computer Network Professionals and Software and Applications Programmers. Negative growth has occurred in Electronics and Telecommunications Trade Workers and Electronic Engineering Draft persons and Technicians.

<sup>8</sup> Source: DEEWR, ICT&T Labour Market Indicators, presentation July 2010.

National Employment growth in the (DEEWR) ICT&T workforce<sup>9</sup>



<sup>9</sup> Source:DEEWR, ICT&T Labour Market Indicators, presentation July 2010.

## ***The Industry View.***

Australian Computer Society and CIIER define ICT employment with the following, slightly broader ANZSCO definitions. For the purpose of the analysis below, these occupations are grouped into CIIER occupation grouping categories:

<b>ANZSCO code</b>	<b>Anzco 4 level Description</b>	<b>CIIER ICT occupation Grouping</b>
1351	ICT Managers	ICT Management and operations
2232	ICT Trainers	ICT Management and operations
2247	Management and Organisation Analysts	ICT Management and operations
2249	Other Information and Organisation Professionals	ICT Management and operations
2252	ICT Sales Professionals	ICT sales
2324	Graphic and Web Designers, and Illustrators	ICT Technical and Professional
2611	ICT Business and Systems Analysts	ICT Technical and Professional
2612	Multimedia Specialists and Web Developers	ICT Technical and Professional
2613	Software and Applications Programmers	ICT Technical and Professional
2621	Database and Systems Administrators, and ICT Security Specialists	ICT Management and operations
2631	Computer Network Professionals	ICT Technical and Professional
2632	ICT Support and Test Engineers	ICT Management and operations
2633	Telecommunications Engineering Professionals	ICT Technical and Professional
3123	Electrical Engineering Draftspersons and Technicians	Electronic Trades and Professional <sup>10</sup>
3124	Electronic Engineering Draftspersons and Technicians	Electronic Trades and Professional
3131	ICT Support Technicians	ICT Trades
3132	Telecommunications Technical Specialists	ICT Technical and Professional
3423	Electronics Trades Workers	Electronic Trades and Professional
3424	Telecommunications Trades Workers	ICT Trades
6212	ICT Sales Assistants	ICT sales

<sup>10</sup> Electronic Trades and Professional employment (3123/3124) is included by CIIER in ICT totals where such employment is within major ICT industry categories

**ICT Employment – ACS and CIER analysis, Feb 2010**

ICT jobs by employer group <sup>11</sup>	ICT Technical and Professional	ICT Management and operations	ICT Trades	Electronic Trades and Professional	ICT sales	ICT Admin/logistics support	ICT Industry	ICT Workers (ACS/CIER definition)
Professional, Scientific and Technical Services/ Information Media and Telecommunications <sup>12</sup>	126317	66408	35359	6695	14122	58000 <sup>13</sup>		306901
Public Administration and Safety	18711	21010	6212	2969	0			45933
Financial and Insurance Services	21852	16770	2288	422	78			40989
Retail Trade	4592	3351	4137	4275	11801			23882
Manufacturing	15538	4053	2924	4307	806			23321
Wholesale Trade	7225	6693	2494	2782	4097			20509
Education and Training	8250	6920	6495	1333	0			21665
Other Services	3031	2889	1734	10587	420			8073
Construction	2717	2262	7353	5235	0			12332
Health Care and Social Assistance	2813	5332	1890	445	351			10386
Electricity, Gas, Water and Waste Services	2289	4197	493	826	422			7401
Administrative and Support Services	3001	3971	429	682	0			7401
Transport, Postal and Warehousing	3694	3493	0	410	0			7187
Arts and Recreation Services	3475	1524	651	723	0			5650
Mining	1483	955	325	90	0			2762
Rental, Hiring and Real Estate Services	0	739	0	0	0			739
Agriculture, Forestry and Fishing	301	122	0	0	0			423
Accommodation and Food Services	0	0	0	403	0			0
Total	225289	150689	72786	42186 (6695 included in ICT total)	32096	58000		545556

National Employment growth in the (DEEWR) ICT&T workforce<sup>14</sup>

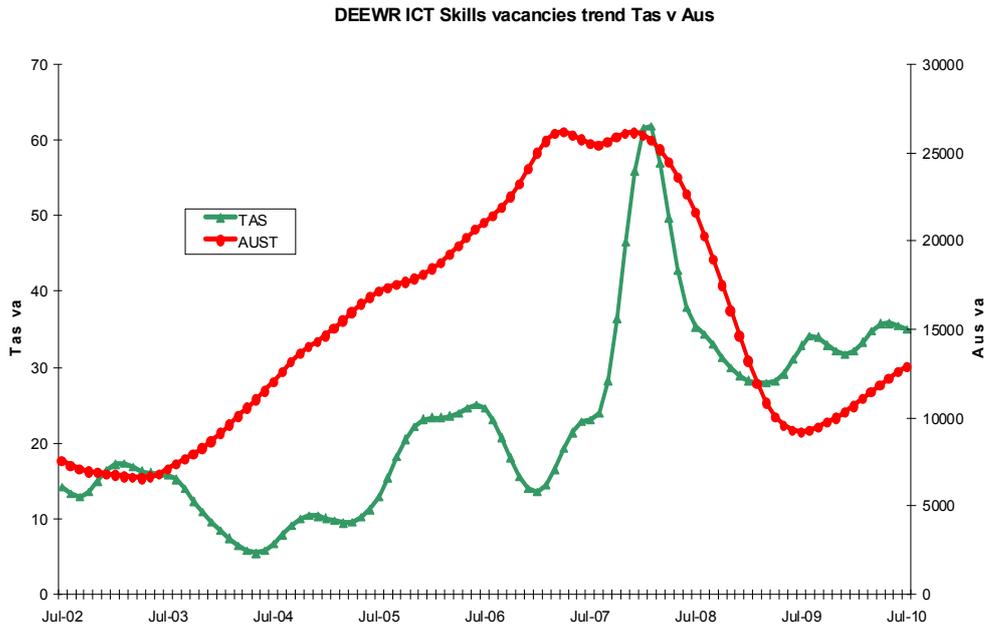
<sup>11</sup> CIER extract from ABS Labour market statistics Feb 2010, Electronic trades and professional data for major ICT industries sectors included in totals

<sup>12</sup> Includes major ICT Industry categories (CIER designation)

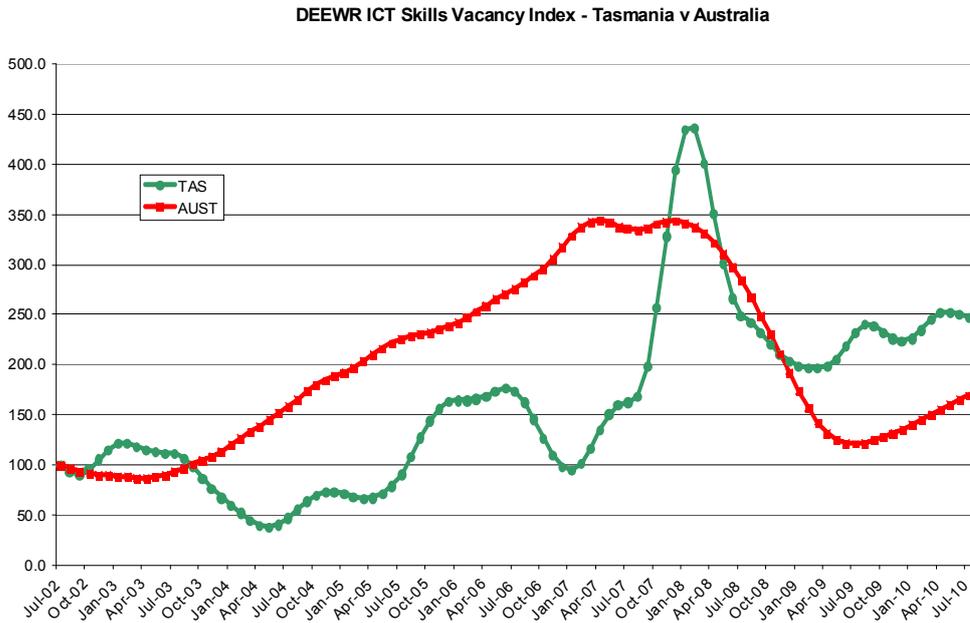
<sup>13</sup> CIER estimates from Top250 Industry model Dec 2009

<sup>14</sup> Source:DEEWR, ICT&T Labour Market Indicators, presentation July 2010.

## Tasmanian trends

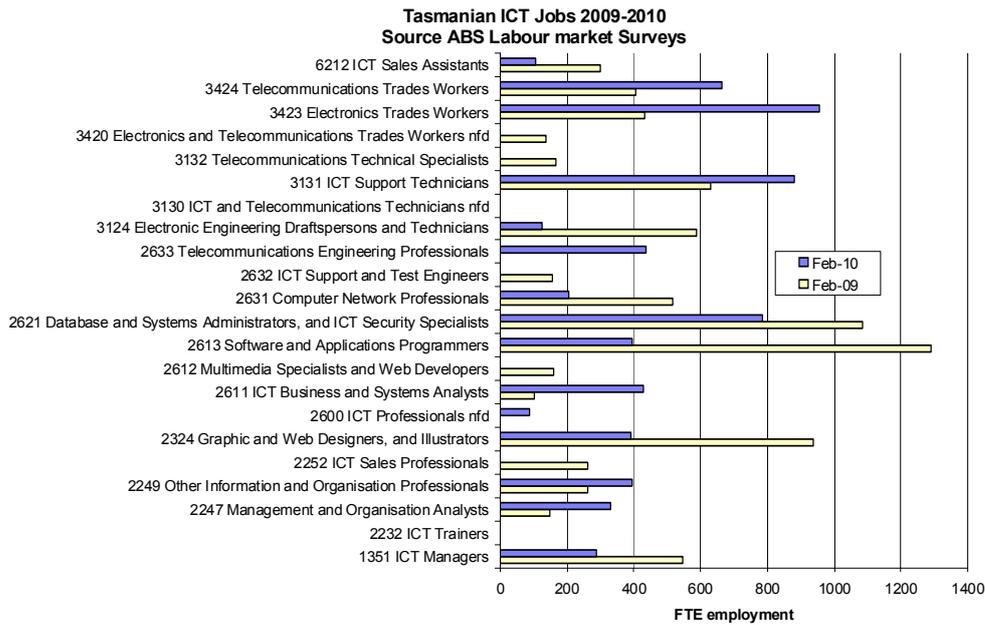


The national analysis of ICT skills vacancies shows that the Tasmanian trend broadly follows the gross national trend, and increasingly does so since 2007.



The index of skills vacancies displays a similar correlation, with Tasmania displaying slightly more volatility, deriving, quite naturally from the smaller volumes of data involved at a single State level.

Both indicators show an increase in demand, consistent with economic recovery.

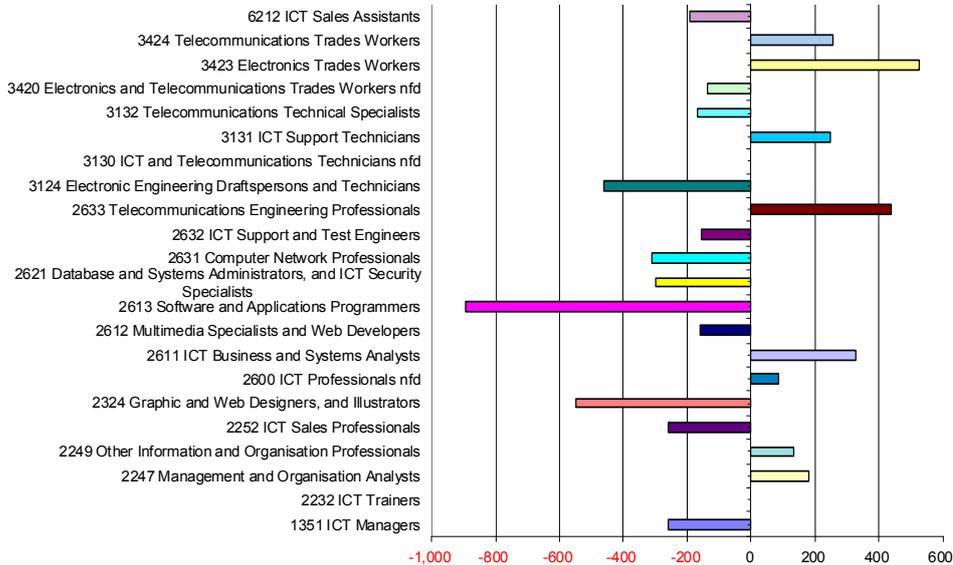


Official data at the occupation level, however, amplifies this apparent volatility, with significant fluctuations between occupations shown over a one year period.

CIER do not believe this data is accurate in its detail form, and ascribes much of the recorded volatility to classification changes between Labor Market Surveys. E.g. some people classified as “software and applications programmers” in 2009 may have been counted as “ICT support technicians” in 2010, reducing the apparent growth in the latter and decline in the former to mostly statistical “noise”

Centre for Innovative  
Industry Economic  
Research Inc.

**Feb 2009-Feb 2010 ICT Tasmanian employment variations by Occupation**  
(Source ABS labour market surveys)



In addition to these classification problems, the absolute quantity of ICT workers in Tasmania indicated by this data, for the 21 major ICT occupations, reduced from 8,122 in Feb 2009 to 6,474 in Feb 2010 – an over 20% reduction !

Needless to say, 1 in 5 Tasmanian ICT workers did not, In fact, lose their job during this period, as the ICT industry survey data earlier in this report shows growth, the DEEWR skills vacancies show correlation to the national trend, and the National Labor Market data increase in national ICT employment for the same occupations underscores.

Either the DEEWR ABS Labor market survey data for 2009 was inaccurate at this level or that for 2010 was – or, more likely, both were. Few, if any, useful conclusions on ICT occupation variation in Tasmania can therefore be drawn from this data.

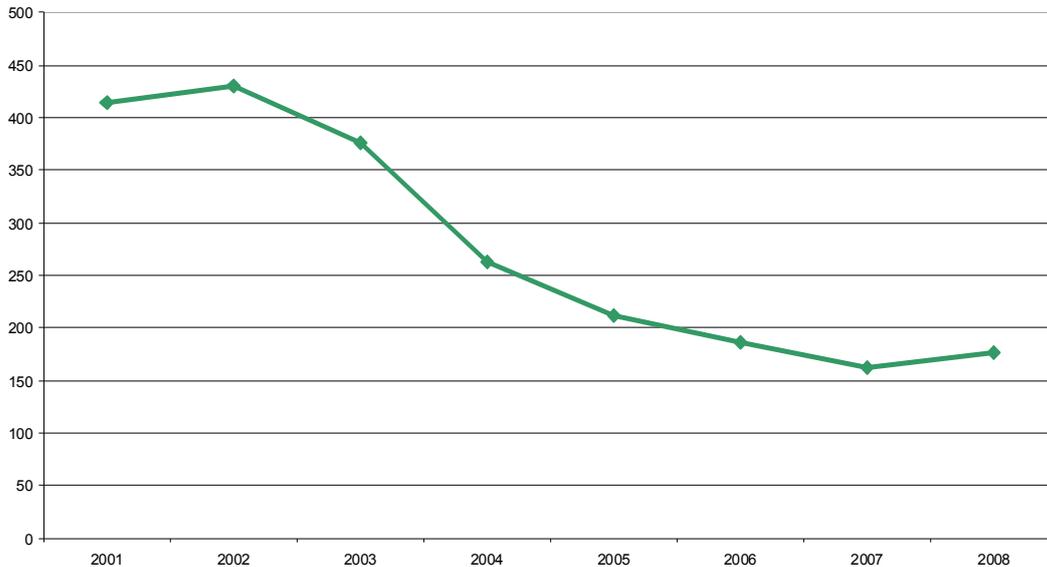
**Economic input – ICT students**

Regardless of the actual ICT occupation state in Tasmania, it is increasingly unlikely that the less than 120 domestic graduates per year (based upon the normal percentage of graduates to enrolments), contribute even enough people to replace those retiring or leaving ICT occupations in the same period.

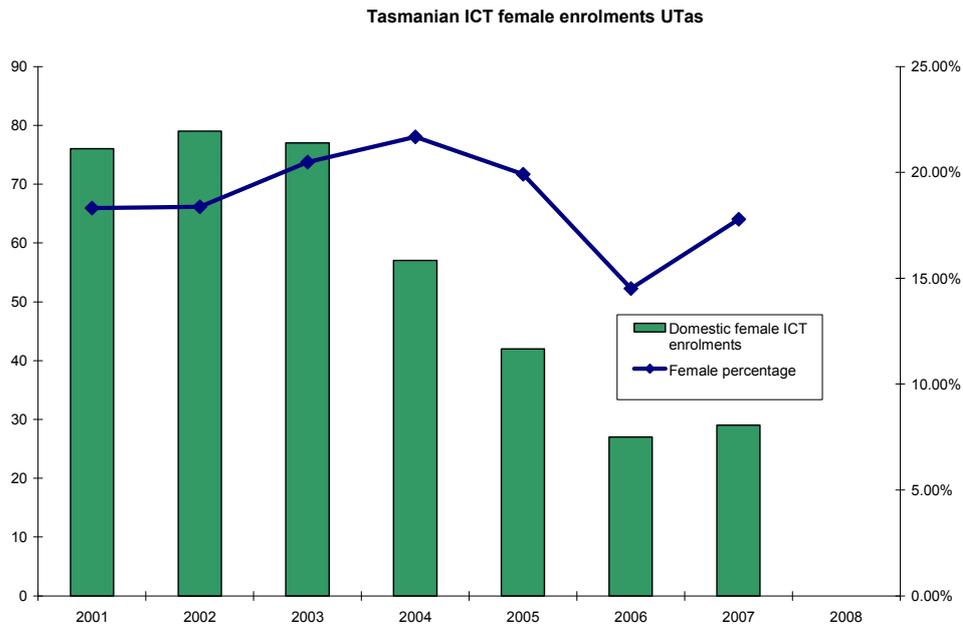
Commencing Domestic Students by State, Higher Education Provider and Broad Field of Education, Full Year 2008									
State/Provider	Information Technology domestic	Total domestic(a)	ICT International students	Total international	Information Technology total	TOTAL domestic and international(a)	ICT % of total students at provider	Domestic ICT % of total ICT at this provider	
<b>Tasmania</b>									
University of Tasmania	177	6,526	854	2,421	1,031	8,947	11.52%	17.17%	
Colleges not offering ICT		65	0	1		66			
<b>State Sub-total(b)</b>	177	6,591	854	2,422	1,031	9,013	11.44%	17.17%	

Whilst the Tasmanian decline in ICT enrollments and commencements is similar to that in other States, the very low percentage of ICT domestic students in Tasmania leads to the conclusion that ICT education in the State is oriented primarily to the export market , and thus, whilst contributing to the overall economy of the State, through export earnings, has a more limited contribution to the ICT economy of the State.

ICT Commencing domestic students - Masters , Post grad. Undergrad, Tasmania

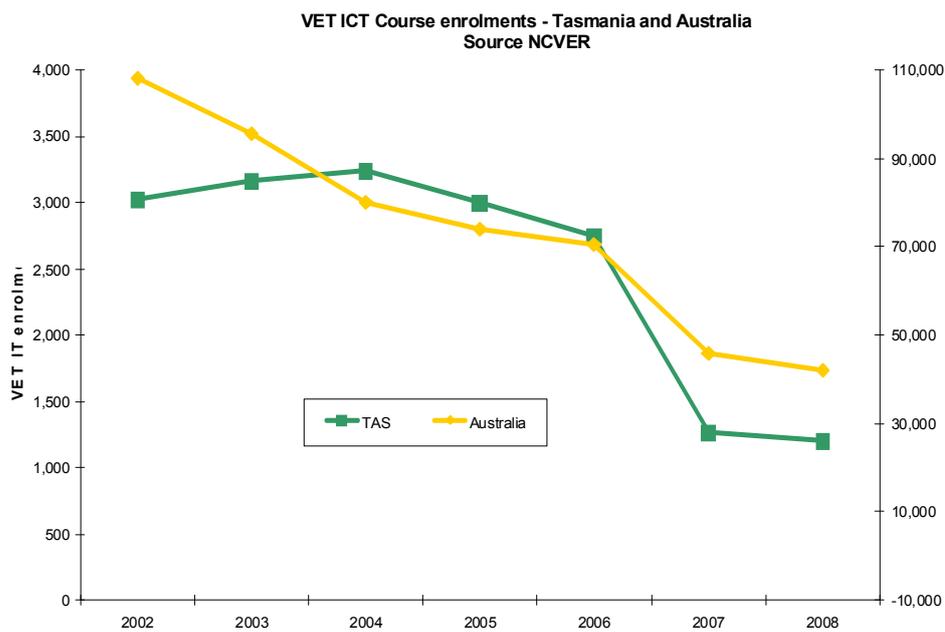


The trend in domestic students is, however, starting to pick up, with an encouraging increase in 2008. ( latest figures available) . It may be that the decline in overseas students across the board may lead to a re-orientation of ICT education priorities back to supply for the domestic market.



But it is encouraging to see that this increase has a lot to do with an improved gender balance, reversing a long term decline in female participation in ICT courses.

## VET v University



Some authorities have suggested that University tertiary decline has been offset by increases in VET ICT education. The data indicates that this is not the case, either nationally, or in Tasmania.

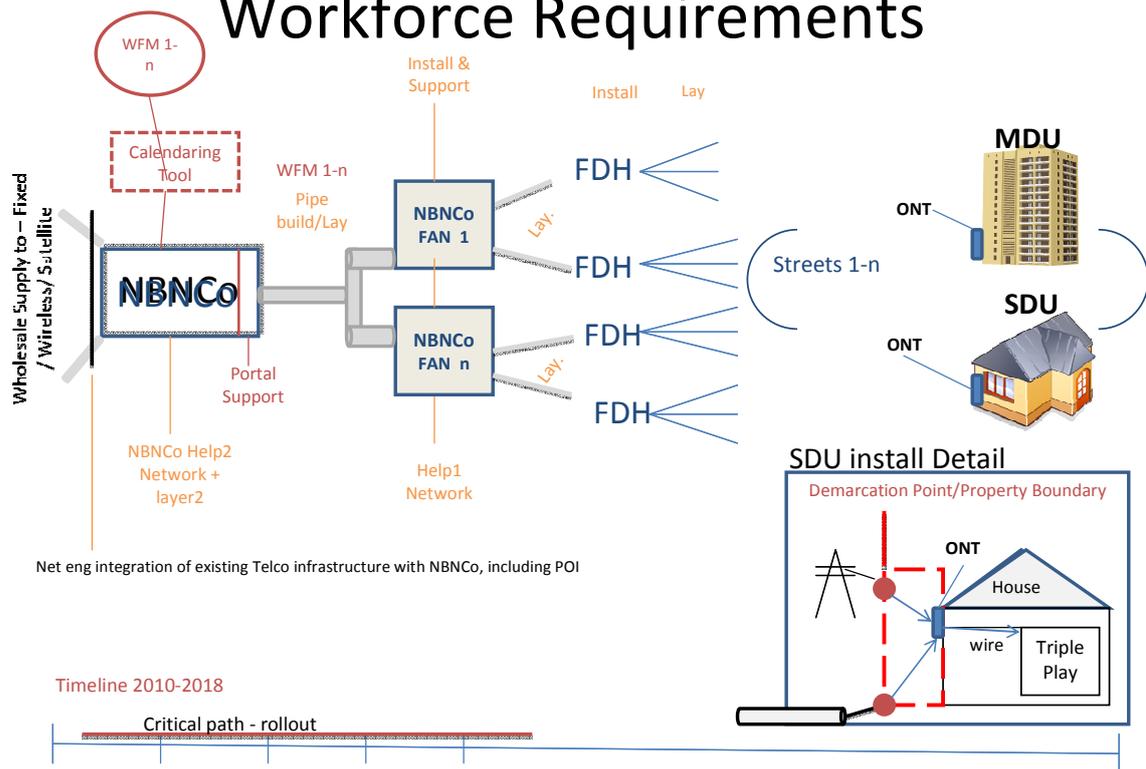
## The NBN Effect

There have been many theories put forward in respect to the potential impact of the NBN on ICT in Australia. They have ranged from fanciful concepts of a panacea to all ills, to Luddite rejections of necessity or impact. One common problem in applying rational analysis has been the frequent tendency of commentators to forget that advances in communications and ICT applications are, and were, taking place with or without the NBN, so it is its role as an additional facilitator and catalyst that becomes important in the long run, rather than the underlying continuation of gains in productivity, efficiency and the range of products and services impacted by or created by ICT.

The range of theories extends to those relating to skills need and demand. The original conjectured “25,000 jobs” to be created were not categorised into skills mixes, nor was a difference made between the development phase and steady-state. This lack of clarity has led to presumptions about the quantification and qualification of potential NBN skills demand, many of which must inevitably be poorly founded.

The true position is still emerging, but within NBN Co and in those bodies most concerned with ICT technical education and forward skills requirements, some consensus is now emerging in respect to the roll-out stage.

# NBN Rollout Workforce Requirements



In this diagram,

NBNC Co –represents all NBNC Co domain; FAN (Fibre Access Node) includes OLT (Optical Termination) and Ethernet Fanout Switch; WFM is Work Force Management; FDH (Fibre Distribution Hub); 1-n – refers to one or many; MDU (Multi Dwelling Unit); SDU (Single Dwelling Unit); ONT (Optical Termination Unit) (note: can be internally or external unit).

During the rollout, the critical points are assumed to be in the initial Build / lay components and in the build and operation of the POIs or Points of interconnect (not shown in the diagram).

Resource requirements will also need to consider not just the Physical laying/ building of the access infrastructure on the entry side of the total rollout, but also the detailed install

requirements per unit, be it SDU or MDU internal or external or where the VDSL2 has to be maintained in older apartments or non fibre accessible sites.

As indicated in the diagram, the skills mix is a complex one, and since different parts of the network will be at different stages of rollout at different times, it is anticipated that a significant mobility of work-force will inevitably occur. Local supply/demand issues are less likely to be of import, therefore, that the national and, in some cases, global, demand and supply of particular skills.

No stage is however “pure” in its skills mix, even the pipe lay and build requires engineering, scheduling, calendaring and other support, from such skills as project managers, software developers, and engineers. The ONT connection work will require some retraining of electricians and communications trades-people, and as this is more complex for multi dwelling structures, additional grades of such skills for such sites.

The critical path for the rollout has been outlined by NBN Co; however a number of additional factors may now affect it, including the Queensland, NSW and Victorian floods.

These events are likely to pull some existing resources off the project or WFM rollout schedule and divert them, and many other relevant resources, to the cleanup and reinstatement of services. Alternatively a decision could be made to benefit from the opportunity of replacing the current infrastructure with Fibre, especially in those circumstances in which damage to the copper infrastructure is extensive.

Prior to the floods, various estimates suggested a short-fall of around 5-6,000 nationally for the build/lay phase.

As the critical mass of high capacity infrastructure grows, products and services will emerge to serve them. It is in this space that the skills of the Tasmanian ICT industry come to the fore, since these skills are, in the main, focussed on web-based applications. CIIER analysts concern is that the same issues of financial, market, and distribution support that constrain parts of the Tasmanian ICT industry today will continue to do so, and that this, rather than technical skill constraints related to the NBN, will be the single most important limiting factor for economic growth.

## Conclusions

Despite the official Labor Market data, there is no confirming evidence for a decline in ICT occupations in Tasmania in 2010. On the contrary, ICT industry data, evidence from the Case studies, and all of the key national trends, point to growth both in the ICT industry and in ICT occupations across all industries.

A lot of conjecture has taken place in respect to the ICT employment and economic impact of the NBN. CIIER consider that some of the skills shortages concerns have been overstated, as NBN Co itself has indicated through statements by CEO Mike Quigley, however the real impact on ICT software skills, as distinct from skills related to installation processes, will not occur for some years yet, as the rollout gathers pace and critical mass.

But we should remember that the NBN is simply a catalyst for the improved ICT infrastructure that we will require in this century, and its inevitable impact on all aspects of service provision.

The recent controversy about the impact of online retail trading on larger retailers is an illustration of the fact that vested interests will always attempt to slow down changes that they do not consider are in their interests, but it is likely that consumer demand will prevail. Similar scenarios will play out in all of the areas most likely to be impacted by improved ICT infrastructure – Government services, health, education, legal and accounting, as well as retail and entertainment.

ICT skill will not be enough. Domain skills (ie expertise in the field being subject to ICT), will also be needed. With the inevitable dislocation of some traditional occupations (bureaucrats, health professionals, teachers and education administrators etc) it is more likely that people already working in these fields will need to gain ICT skills and qualifications, rather than that ICT students will be required to gain significantly enhanced skills before graduation.

The lowest possible jobless rate before labour shortages fuel wages pressure and inflation (NAIRU)<sup>15</sup>, according to most economists, is 5% per annum.

The real ICT jobless rate rarely comes even close to this, mostly it is effectively negative, ie there are more jobs unfilled than suitable people to fill them.

The primary economic impact of ICT is to improve productivity. Therefore, conversely, a lack of ICT resources will have a negative economic impact, which worsens as the rest of the economy becomes more dependant on ICT.

The Tasmanian ICT Industry is growing to accommodate the increasing need for ICT skills in all parts of the economy. NBN will increase the pace of change, and thus exacerbate the skills demand.

Tasmania is not resupplying its ICT work-force through its educational institutions, and, accordingly the Tasmanian ICT industry can only grow by absorbing ICT people from interstate, or by training internally. This is a clear economic constraint, not only for the industry, but for the Tasmanian economy.

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<sup>15</sup> Non-accelerating Inflation rate of Unemployment



## Appendix A - Sources of information

The following were the main sources of information for the report

- Statistical survey and industry model of Tasmanian ICT companies
- National survey and industry model of ICT companies
- In-depth research by Australian Bureau of Statistics on Feb 2010 ICT Labour market (Specially commissioned by CIER)
- ABS Labour market industry sector time-series data
- ABS national accounts and research data
- Tradedata/CSES and ABS Export statistics
- Online Tasmanian ICT attitudinal Survey
- Interviews and focus groups
- ABS Labour market occupational time-series data
- CIER ICT Industry modelling
- Published and unpublished ICT occupation reports
- ACS Remuneration Survey report

### **Survey and Analysis Process**

The primary mechanism that is used to provide the ICT Industry quantification data for this and other Reports is a detailed survey of ICT companies in Australia, known as the 'Whitehorse Top 250'. 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 Whitehorse "Top 250" database contains detailed data since 1998 on now over 800 operating companies with 140,000 staff, \$80 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 between June and November 2009, represents approximately 54% of total current industry employment and 90% of total current industry revenues in the ICT industry in Australia.

Of this sample, Tasmanian employing entities included over 60 companies, employing over 53% of ICT industry employment in Tasmania. A further 6 unusable responses (either unverifiable, due to anonymity; out of scope as not within the Tasmanian ICT industry; or abusive) were received from Tasmanian companies.

### **Statistical verification**

There are two methods for deriving industry sectoral data. They are to conduct a comprehensive Census, or to undertake a statistical survey and model.

A comprehensive Census is expensive, intrusive, and time-consuming, (which is why the Australian government only conducts the National household census approximately every four years). We note specifically that a Census of the Tasmanian ICT Industry is not part of this project.

Industry surveying and modelling is undertaken by ABS from time to time; however the last such ABS survey for the ICT Industry was in 2006-7<sup>16</sup>. (Prior ABS ICT Industry reports are 1996/1998/2001/2003/2005).

The ABS methodology surveys a statistically representative sample in an industry sector, and then models that data to produce estimates of overall industry size and shape (employment, revenue, sub-sectoral structure etc). The number of companies in the sample is limited, and rarely more than 5% of the total number of companies operating in the sector.

The models CIIER creates are tested by reference to other available data on employment and income. The ABS national and State model for the ICT industry in 2006-7, published in October 2008, was consistent with the CIIER national and State model for the same period. We are in continued dialogue with the ABS, and ABS has advised that it has no plans to undertake a further ICT industry survey and model for at least the next two years. The ABS 2006-7 summary data for Tasmania for 2006-7 is shown below.

CIIER, and its predecessor Whitehorse, have used a very similar approach to that of the ABS for ICT Industry modelling, with 14 Surveys, at least annually, since 1998. CIIER has tested its models against ABS models throughout this period, as they have become available, with very high levels of correlation recorded. CIIER samples for the ICT industry are at a significantly higher employment density level than those of ABS. CIIER national samples are approximately 55% of total ICT industry employment, across all industry sub-sectors and

<b>Tasmanian ICT Industry 2006-7<sup>17</sup></b>		<i>Manufacturing</i>	<i>Wholesale trade</i>	<i>Information media and telecommunications</i>	<i>Computer system design and related services</i>	<i>Electronic and precision equipment repair and maintenance</i>	<i>Total ICT industry</i>
<b>Number of businesses (b)(c)</b>	no.	11	^71	^58	^209	^41	^391
<b>Employment</b>	no.	^59	545	1 504	^922	^149	3,180
<b>Wages and salaries</b>	\$m	^2.0	^26.0	92.2	^38.8	*3.6	162.5
<b>Sales of goods and services (d)</b>	\$m	^5.9	np	np	^117.6	^12.3	^135.8

States.

ABS also undertakes regular quarterly national labour market surveys of all industry sectors. The data for August 2010, published in September 2010, has also been utilised for this report.

CIIER has commissioned special ABS detailed extracts of February 2009 and 2010 labour market data, focussed on ICT occupations and State estimates not normally available, which has also been accessed for these reports. ABS advises, however, that some caution is required when analysing such data at micro levels, as the RSE (survey sample potential error level) rises at the lower data levels ( i.e. whilst totals for a group of cells may have a variation of plus or minus say 2%, individual cell numbers may vary by say 5%. Categorisation variances – e.g. calling someone an ICT manager in one survey, and a Business analyst in another, will also occur between such surveys.

17 ABS 8126.0 2006-7 Selected state and territory indicators, by ICT industry grouping(a)

(a) Refer to the ABS Glossary for ANZSIC classes contributing to each industry grouping.

(b) Provided for contextual purposes only, refer to Explanatory Notes 21 and 22.

(c) Multi-state organisations are counted in each state in which they operate

^ estimate has a relative standard error of 10% to less than 25% and should be used with caution

\* estimate has a relative standard error of 25% to 50% and should be used with caution

np not available for publication but included in totals where applicable, unless otherwise indicated

## Appendix B - CIIER ICT Industry & sector mapping

During a recent CIIER project for the (then) Department of Communications, Information Technology, and the Arts, DCITA), analysing the Australian Software Industry, an industry and sector mapping analysis structure tailored for ICT, and especially for software and services, was developed. That research underpins this study and lays the foundation for our analysis.<sup>18</sup>

To map ICT industry activities, we developed a framework for analysing the ICT industry and ICT value chain and a schema for presenting the actors and activities involved in the ICT industry. These *analytical* and *presentational* frameworks are described in turn.

### Mapping the ICT product system (the analytical framework)

The ICT product system analytical framework was developed by Dr John Houghton, of the Centre for Strategic and Economic Studies at Victoria University, and extended with other CIIER researchers.

As was noted in the DCITA study, there are many possible approaches to mapping ICT industry activities and markets, ranging from various forms of cluster analysis to value chain/value system, product and innovation systems analysis. Each provides a particular perspective that is more or less suitable to a particular type of study or enquiry.

Within these approaches there are many overlapping and cross cutting dimensions. One basic distinction is that between those studies using clusters in a statistical sense (i.e. a grouping of entities according to some specific characteristic) and those intending to imply actual relationships between the objects (i.e. networks, value or product systems). When clustering is studied it can be in terms of any number of characteristics (e.g. location, activity or product field, firm strategy, behaviour, innovative or competitive performance, size, technology or science base) and involve a range of methodological approaches (e.g. factor analysis, cluster analysis, multi-dimensional scaling, etc.).

Network, value chain or product system relationships include linkages of various kinds (e.g. supply chain, user–producer relations, supplier–producer relations, innovation linkages, information and/or knowledge flows) and study typically involves more qualitative methods (e.g. case studies or representative sampling).<sup>19</sup> One such approach, the product system approach, was pioneered by the United Kingdom’s Complex Product Systems Innovation Centre.<sup>20</sup> It is a technique that focuses on linkages between actors in a complex system that affects the transformation of activities and materials into goods and services through the processes of creation, production and distribution. Hobday, Rush and Tidd (2000) suggested that: because each new product tends to be different, and because development and production involves feedback loops from later to early stages and other unpredictable, ‘emerging’ properties, innovative organisational structures are required to coordinate production, particularly where there are uncertain and changing user requirements and technological possibilities. There is often high production and innovation complexity, not only because a wide variety of distinct components, skills and knowledge inputs are involved, but also because large numbers of firms or different organisations often have to work together in production (e.g. prime contractors and systems integrators, users, buyers, other suppliers, small and medium sized enterprises, government agencies and regulators).<sup>21</sup> Such a characterisation fits the ICT industry.

A typical schematic product system includes five major elements, with three groups of key actors and activities forming the core value chain. Figure 1 illustrates a basic schematic product system:

- At the centre are the *ICT firms* engaged in the development of ICT and ICT based solutions;

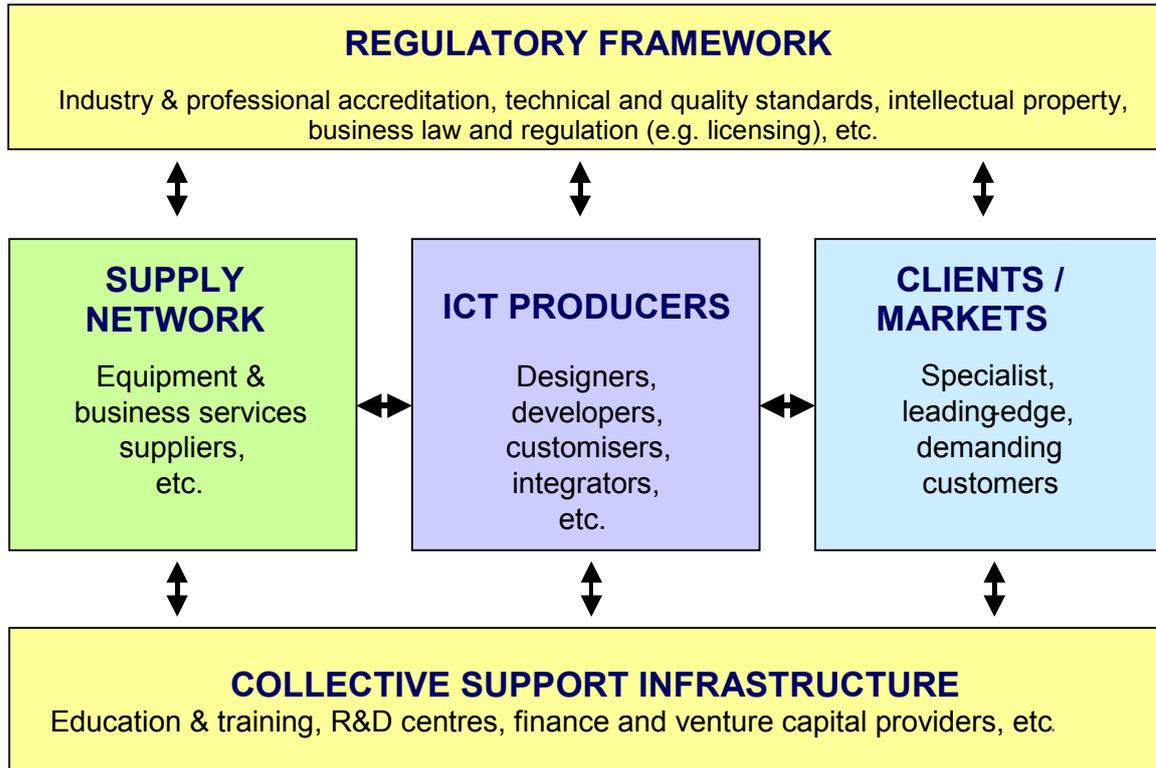
<sup>18</sup> CIIER report “ Software Industry in Australia, Globally Competitive, Domestically Undervalued” , 2005  
<sup>19</sup> Vock, P. (1997) ‘Swiss Position Paper on Mapping Innovative Clusters,’ OECD Workshop, Amsterdam, October 1997.

<sup>20</sup> See Hobday, M., Rush, H. and Tidd, J. (2000) ‘Innovation in complex products and system’, *Research Policy* 29(2000), pp793-804 and related papers in that special issue of *Research Policy* for an overview and introduction.

<sup>21</sup> Hobday, M., Rush, H. and Tidd, J. (2000) ‘Innovation in complex products and system’, *Research Policy* 29(2000) pp793-804.

- To their left, the *supply network*, which includes all the providers of specialist equipment and financial, business and other services to ICT producers; and
- To their right, the *distribution network*, which includes all the clients of ICT firms (be they intermediaries or final customers).
- Their activities of these groups are supported by a collective support infrastructure and operate within an overarching regulatory framework.
- The *collective support infrastructure* includes R&D centres, education and training institutions, professional associations, specialist consulting firms, finance and venture capital providers, etc.; and
- The *regulatory framework* includes a wide range of industry and professional accreditation, technical and quality standards, intellectual property, licensing, etc.

### A schematic product system

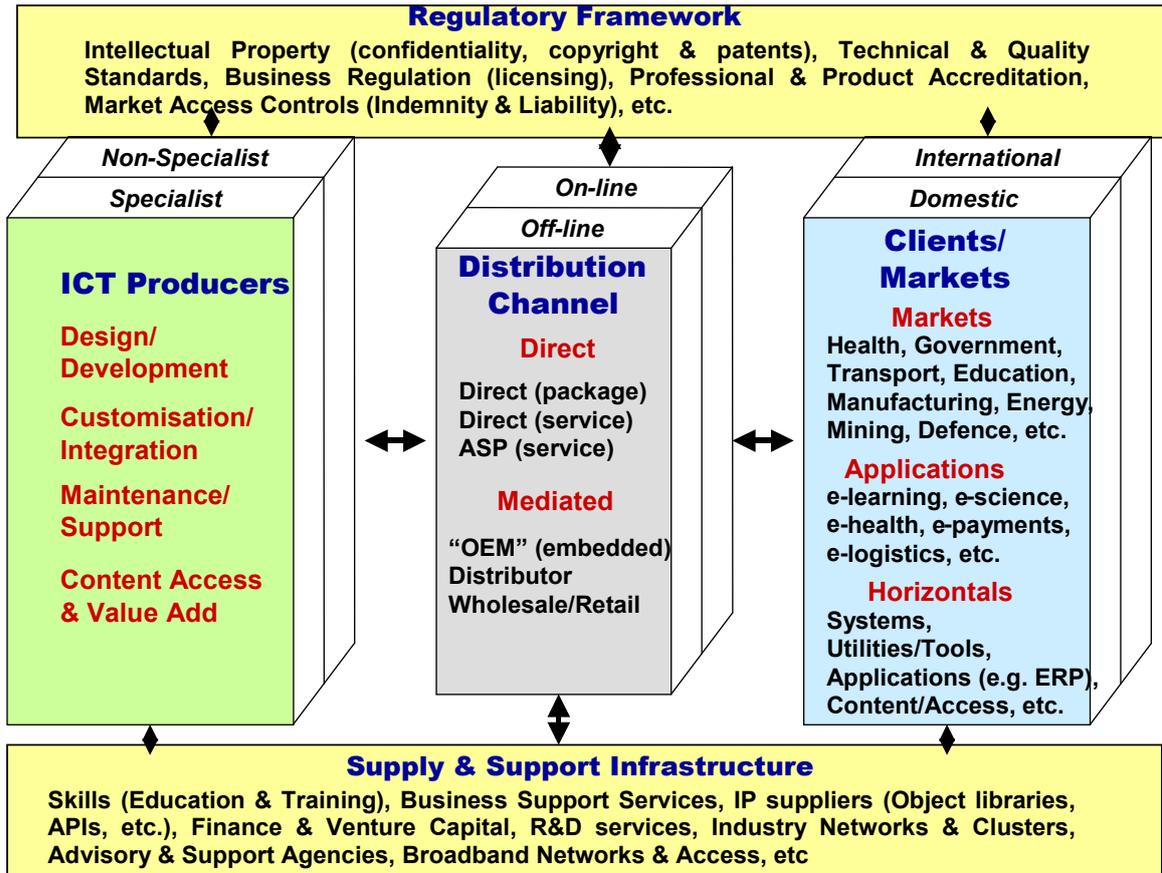


Source: CSES Analysis.

This basic schema was modified to draw out particular insights, taking into account that ICT-related capabilities can cut across applications and markets. For example, digital image manipulation capabilities can be an essential ingredient in the development of computer games, medical scanning and imaging, film and video special effects, production and editing, etc.

In the DCITA study, we identified the role of key actors in the value chain – as, for example, developers, distributors, integrators and/or value-added services providers. Given the importance of the distribution channel and distribution business models in the ICT industry, as well as the limited requirements of ICT firms for specialist inputs, we modified the traditional schematic product system structure outlined above – with the supply network included within the support infrastructure, and the distribution channel separated from clients/markets. This formulation reflects both the importance of the distribution channel in the ICT industry, and the focus of ICT sectoral studies on overall sectoral activities.

## The ICT product system



Source: CSES/CIER Analysis.

Taking these considerations into account, we developed an ICT product system map (Figure 2) which includes:

- *ICT producers*, including specialist firms and major non-specialist developers and producers, defined by their main activities – i.e. design, development, customisation, integration, support, etc.;
- *The distribution channel*, defined by major channels of direct and mediated ICT distribution – i.e. direct (package or service) and mediated (embedded, wholesale/retail), be they on-line or off-line, etc.;
- *Their clients and markets*, defined by industry/market or application and ICT industry linkages – i.e. market verticals (e.g. health, government, transport, education, etc.), application verticals (e.g. e-learning, e-logistics, e-payments, etc.) and horizontals (e.g. systems, utilities, tools, ERP applications, etc.), be they domestic or export;
- The collective *supply and support infrastructure*, defined by activity and contribution – i.e. education and training, business support services, R&D centres, finance and venture capital providers, industry networks and clusters, etc.; and
- The overarching *regulatory framework*, defined by scope and area of activity – e.g. intellectual property, business law (e.g. licensing), technical and quality standards, product and professional accreditation, etc.

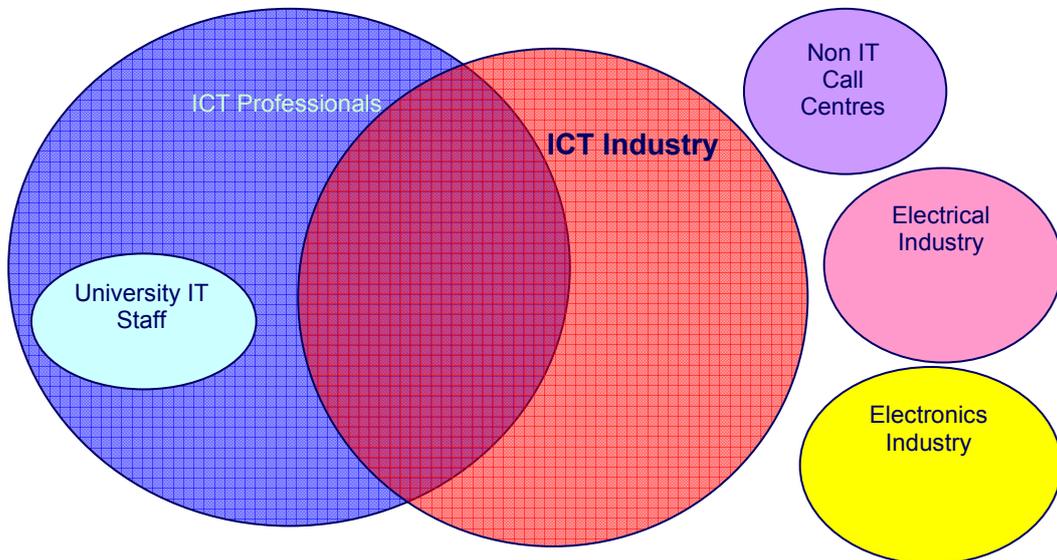
The map provides a framework for thinking and analysis, which focuses on ICT production, distribution and market applications. This report addresses the ICT producers and distributors, defined as the Tasmanian ICT Industry. Further scheduled reports in this series will address aspects of the Tasmanian ICT Supply and Support Infrastructure.

## CIER "ICT Worker" Model

One of the other 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 analysing 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 who also employ a large number of specialists to help them apply their ICT purchases.
- 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.

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.

### **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.

We consider 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<sup>22</sup>, but perhaps "loosened" to embrace the other ICT goods and

<sup>22</sup> ABS 8126-0

services covered by the more globally accepted OECD (2003 and 2004) definition, in order that international comparisons be made more meaningfully.<sup>23</sup>

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.

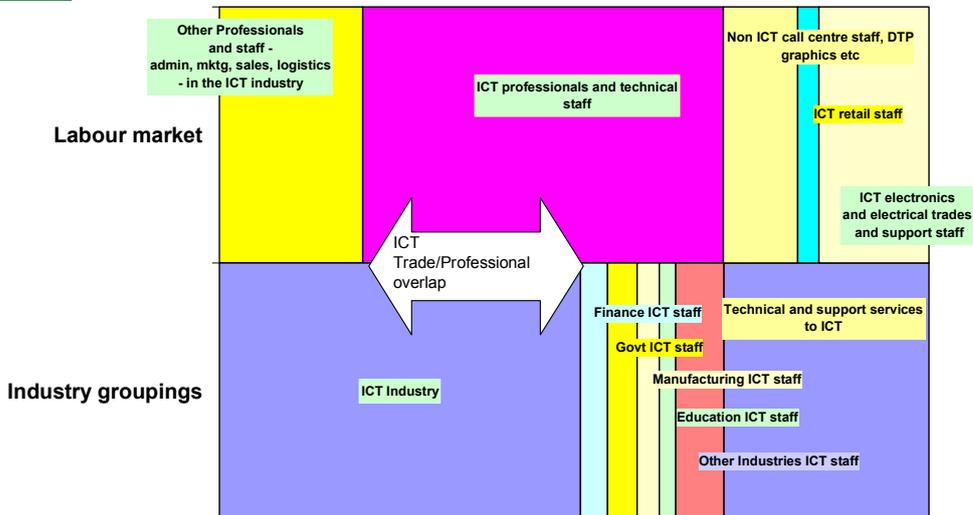
The diagram below illustrates a Model, developed by CIIER and Whitehorse, which allows us to reconcile these differences, regardless of the employment and classification paradigm selected, and to calculate the relative proportion of ICT employment that makes up the Australian ICT employment structure, by both Labour market and industry sector measures.

Perhaps as significantly, the Model also demonstrates the significant 65% 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. (CIIER and Whitehorse include communications and engineering professional and technical staff within this definition of ICT professionals and technical staff)



**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



This model also allows us to model ICT technical and professional employment, and therefore potential work-force demand, by industry sector. This can help in analysing, and quantifying skills needs, since each industry has some more specific ICT skill-sets among the more generic needs of every industry.

<sup>23</sup> A Proposed Classification of ICT goods, OECD, Paris, 2003; Classifying Information and Communication Technology services, OECD, Paris, 2004