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## **ICT in Canterbury Growth Pilot**

# **FORECAST OF SKILLS DEMAND IN THE HIGH TECH SECTOR IN CANTERBURY: COMPARING THE 2004 AND 2006 SURVEYS**

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## Introduction

The Electrotechnology Industry Training Organisation (ETITO) is coordinating a Growth Pilot funded by the Tertiary Education Commission (TEC) to develop mechanisms to ensure the timely delivery of an appropriate number of suitably qualified individuals across the range of competence required by enterprises in the Canterbury ICT sector. In 2004, the AERU research unit at Lincoln University was contracted to undertake the first phase in Stream One of the Growth Pilot, headed **Industry Skill Demand**. The primary objective of this stream is to produce a comprehensive picture of current and forecast industry skill demand in the Canterbury ICT Sector to steer the provision of education services and talent pipeline efforts.

Consequently, the AERU carried out two surveys, one in November 2004 and the second in September 2006, to map skills demand in the Canterbury ICT sector. Details of the methodology and results have been reported in two previous research reports:

- Dalziel, P., C. Saunders and G. Taylor, *Forecast of Skills Demand in the High-Tech Sector in Canterbury* (AERU Research Report 275, March 2005).
- Dalziel, P., C. Saunders and E. Zellman, *Forecast of Skills Demand in the High-Tech Sector in Canterbury: Phase Two* (AERU Research Report 288, October 2006).

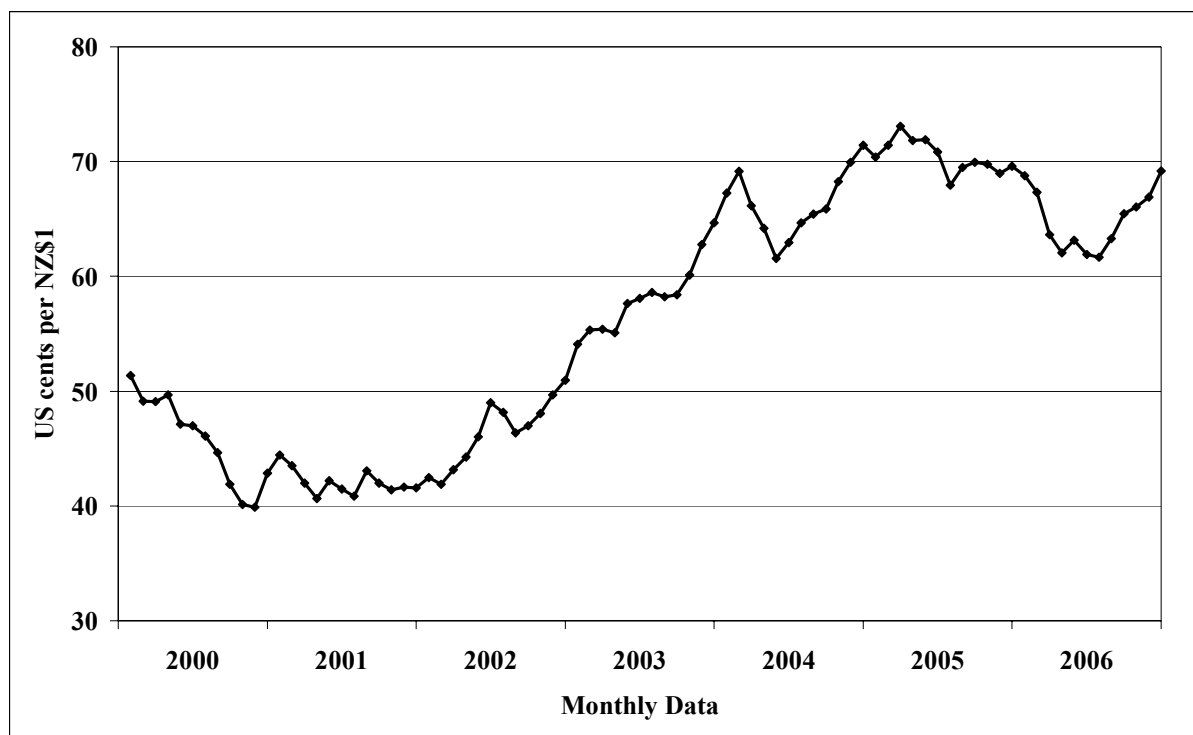
This third report in the series compares the results of the two surveys. This is the first step towards creating a dynamic picture of skill demand in Canterbury's ICT sector. For the purposes of the ETITO Growth Pilot project, the ICT sector is defined as those firms in Canterbury that are either:

- engaged in the research and design, and/or the production, of high-tech electronics products; or
- engaged in creating specialist software products.

It should be emphasised that two years is a short period for the comparisons reported here. Firms in each survey were asked, for example, to indicate their projected employment in *five* years time, and therefore a longer time period will be needed to evaluate the robustness of those reported projections. There were also some differences in the macroeconomic environment that may have affected firms' expectations in the two surveys. Previous research by two of the authors (C. Saunders and P. Dalziel, *The High Tech Sector in Canterbury: A Study of its Potential and Constraints*, AERU Research Report, August 2003) noted the high value of production for export by the high tech sector in Canterbury, which means that firms in the sector can be sensitive to trends in the New Zealand exchange rate. Figure 1 overleaf depicts the US-NZ exchange rate since 2000. The exchange rate was at a high level throughout the period between the two surveys (lowering the returns to exporters) and this is likely to have affected employment in the sector in 2006.

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**Figure 1**  
**The US-NZ Exchange Rate, January 2000 to December 2006**



Source: Reserve Bank of New Zealand ([www.rbnz.govt.nz](http://www.rbnz.govt.nz)).

This research report is structured as follows. Chapters 1 and 2 summarise and then compare the main results of the two surveys. Chapter 3 discusses the firms in the 2004 survey that appeared to be no longer in business by 2006. Chapter 4 analyses the change in size of the 132 firms that responded to the telephone surveys in both years. Chapter 5 analyses the data provided by the 39 firms who responded to the e-mail surveys in both years. The report ends with a brief conclusion.

## Chapter 1

### Summary of the Results in the Two Surveys

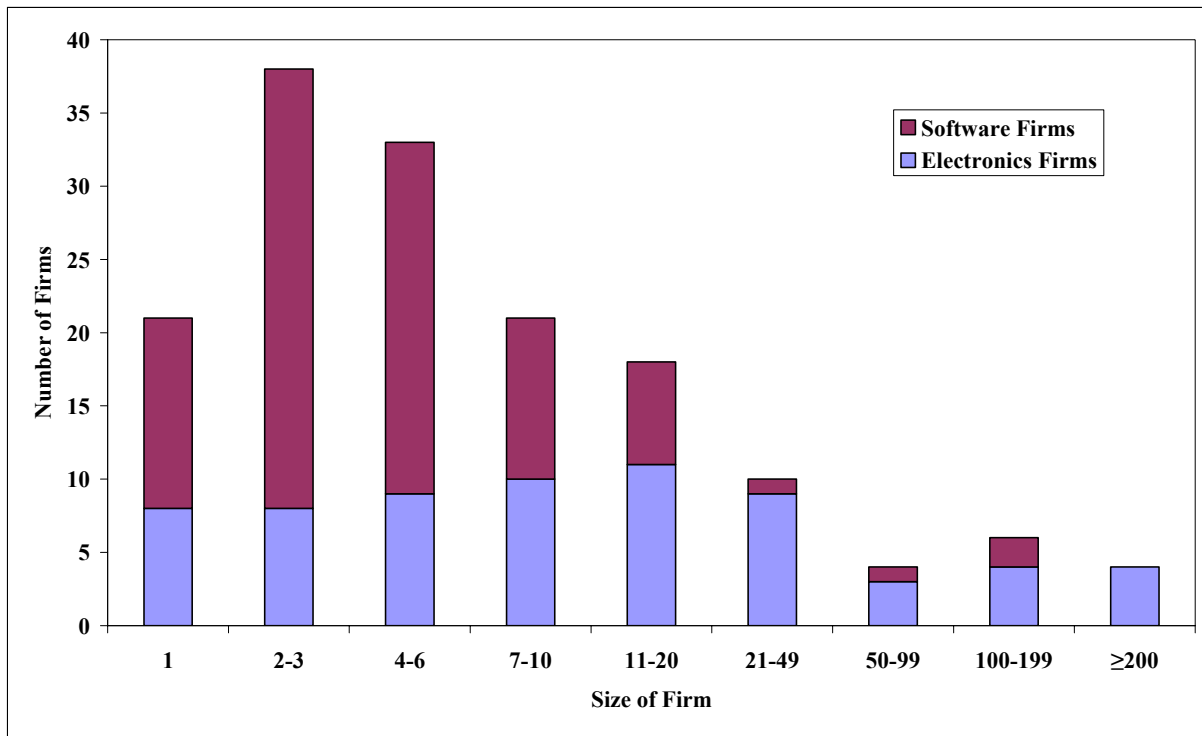
The studies in 2004 and 2006 each involved a telephone survey seeking information about total employment, followed up with an e-mail survey requesting more details about current and projected employment. The telephone survey in 2004 covered 155 firms, of which 66 were in electronics and 89 were in software. Total employment in 2004 was recorded as 2,618 staff in the electronics industry and 755 staff in the software industry (Table 1). Figure 2 depicts the distribution of electronics and software firms by size in the 2004 database.

**Table 1**  
**Telephone Surveys, 2004 and 2006**

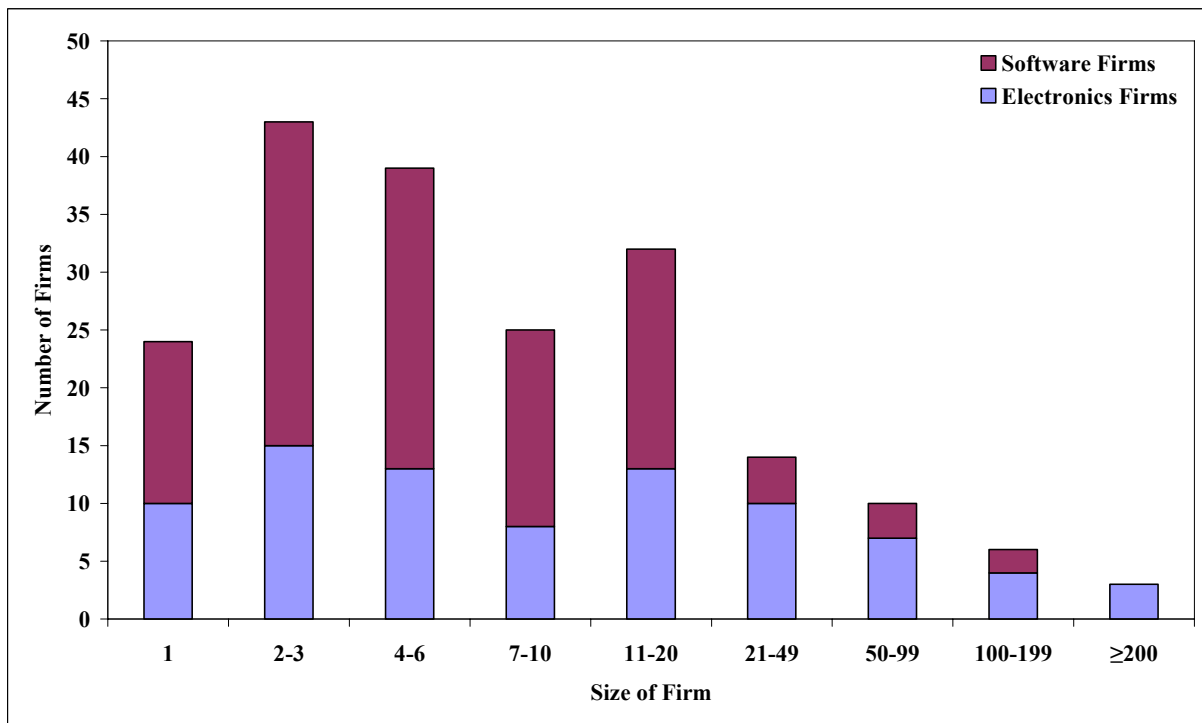
	<b>2004</b>	<b>2006</b>
Number of Electronics Firms	66	83
Number of Software Firms	89	113
<i>Total Number of Firms</i>	<i>155</i>	<i>196</i>
Employment in Electronics Firms	2,618	2,669
Employment in Software Firms	755	1,271
<i>Total Employment</i>	<i>3,373</i>	<i>3,940</i>

The 2006 telephone survey identified 68 electronics and software firms not included in the 2004 database. Of the 155 firms in the 2004 survey, two companies had merged with each other by 2006, two companies were no longer offering electronic or software services, one company had moved to Wellington, and 16 companies were reported as appearing no longer to exist (but see Chapter 4). This produced a database of 203 firms, of which 7 declined to participate in the study (including two from the 2004 survey). Thus, total employment data were obtained for 196 businesses, of which 83 were in electronics and 113 were in software (see Figure 3). Total employment was recorded as 2,669 in the electronics industry and 1,271 staff in the software industry.

**Figure 2**  
**Distribution of ICT Firms in Canterbury by Firm Size, 2004**



**Figure 3**  
**Distribution of ICT Firms in Canterbury by Firm Size, 2006**



**Table 2**  
**Survey Response Rates, 2004 and 2006**

Firm Size	Electronics		Software	
	2004	2006	2004	2006
<b>1</b>	50.0%	30.0%	53.8%	28.6%
<b>2-3</b>	50.0%	33.3%	56.7%	25.0%
<b>4-6</b>	55.6%	69.2%	50.0%	38.5%
<b>7-10</b>	30.0%	25.0%	54.5%	47.1%
<b>&gt; 10</b>	64.5%	51.4%	18.2%	42.9%
<b>TOTAL</b>	54.5%	45.8%	49.4%	36.3%

E-mail surveys were sent to all of the 196 firms who participated in the 2006 telephone survey. Table 2 presents the response rates by categories for the e-mail surveys in both years. These were very good response rates for surveys of this type, but the number of firms that responded in both years was only 39 (20 electronics and 19 software firms; see Table 3).

**Table 3**  
**Number of Responding Firms, 2004 and 2006**

Number of Firms who:	Electronics	Software
Responded to only the 2004 e-mail survey	16	25
Responded to both the 2004 and 2006 e-mail surveys	20	19
Responded to only the 2006 e-mail survey	18	21



## Chapter 2

### Comparison of the Results in the Two Surveys

Table 4 compares the structure of current employment between the two surveys. The data for the electronics industry are very similar. There is no more than 1.5 percentage points difference in any of the employment groups, which could easily reflect industry trends over the two-year time gap. These data show that sales and marketing is still the smallest category, but that it has grown its share at the expense of each of the other three categories. There is a significant difference in the software data, however, which shows a reduction in the share devoted to research and development from three-quarters to two-thirds. This is likely to have been a consequence of the small response rate from the large software firms in 2004, leading to an under-estimate of the shares of the industry's employment involved in management, sales and marketing, and production and support.

**Table 4**  
**Comparison of Employment Structure, 2004 and 2006**

	<b>2004</b>	<b>2006</b>
Electronics: Management	10.0%	9.7%
Electronics: Research and Development	41.7%	41.4%
Electronics: Sales and Marketing	5.0%	6.5%
Electronics: Production and Support	43.3%	42.4%
<i>Electronics Totals</i>	<i>100%</i>	<i>100%</i>
Software: Management	12.8%	16.9%
Software: Research and Development	75.3%	66.4%
Software: Sales and Marketing	8.3%	9.3%
Software: Production and Support	3.6%	7.4%
<i>Software Totals</i>	<i>100%</i>	<i>100%</i>

The 2006 survey produced higher projections for future employment growth in the ICT sector, compared to the 2004 survey, as shown in Tables 5 and 6. Table 5 shows the number of extra jobs projected to be created over the next five years in the two surveys. Partly the higher numbers in 2006 were due to the higher number of firms in that survey, but the percentage figures reveal that both the electronics industry and the software industry were more optimistic in 2006 than in 2004.

**Table 5**  
**Comparison of Projected Employment Growth, 2004 and 2006**

Firm Size	Electronics		Software	
	2004	2006	2004	2006
<b>Current Employment</b>	2,618	2,669	755	1,271
<b>Projected Growth (No.)</b>	549	689	573	995
<b>Projected Growth (%)</b>	21.0%	25.8%	75.9%	78.3%

Table 6 compares the projected growth rates of the four occupation groups in the two surveys. At the aggregate level, the projections for electronics firms and for software firms were both higher in 2006 than in 2004, but not by a large amount. The electronics growth rates were 21.0 and 25.8 per cent in 2004 and 2006 respectively; for the software sector they were respectively 76.0 and 78.4 per cent. Both industry groups saw the strongest growth being in the area of sales and marketing. For the electronics group, this dominance was less pronounced in 2006 (40.6 per cent, compared to 65.0 per cent in 2004), but the software industry repeated that it expected to more than double its employment of sales and marketing staff over the next five years.

**Table 6**  
**Comparison of Projected Growth Rates, 2004 and 2006**

	2004	2006
Electronics: Management	35.5%	34.8%
Electronics: Research and Development	19.5%	30.7%
Electronics: Sales and Marketing	65.0%	40.6%
Electronics: Production and Support	13.9%	16.7%
<i>Electronics Totals</i>	<i>21.0%</i>	<i>25.8%</i>
Software: Management	40.2%	66.2%
Software: Research and Development	73.5%	73.5%
Software: Sales and Marketing	127.4%	135.5%
Software: Production and Support	135.7%	78.6%
<i>Software Totals</i>	<i>76.0%</i>	<i>78.4%</i>

**Table 7**  
**Comparison of Extra Technical Qualifications, 2004 and 2006**

<b>Technical Qualification</b>	<b>2004</b>	<b>2006</b>
Masters or PhD Degree	9	21
Graduate Diploma	89	190
Engineering Degree	224	473
Science/Technology Degree	89	190
Computing/Software Degree	108	236
Diploma in ICT Subjects	92	188
Certificate in ICT Subjects	32	69
Vendor Qualification	32	71
External Short Course	59	122
In-House Training	99	196
Other Technical Qualification	126	272

**Table 8**  
**Comparison of Extra Business Qualifications, 2004 and 2006**

<b>Business Qualification</b>	<b>2004</b>	<b>2006</b>
Masters or PhD Degree	0	0
Graduate Diploma	6	15
MBA Degree	17	44
Masters of Engineering Mgmt	8	21
Commerce/Business Degree	162	321
Diploma in Business Subjects	49	93
Certificate in Business Subjects	200	426
External Short Course	200	426
In-House Training	20	50
Other Business Qualification	37	76

The higher growth rates (and the larger base of current employment found in the telephone survey) meant that the projections for extra qualified staff required in five years time were higher in 2006 than in 2004. This comparison is presented in Table 7 for the technical qualifications and in Table 8 for the business qualifications. The same mapping mechanism from occupations to qualifications was used in both surveys, and so the differences between 2004 and 2006 were entirely due to changes in projected occupation numbers. Compared to 2004, the respondents in the 2006 survey reported approximately twice as many qualifications required in five years time. The pattern of high demand for graduates with engineering degrees and with some knowledge of commerce (short course, certificate or degree) was apparent in both sets of data.

### Chapter 3

## The Firms from 2004 not in Business in 2006

The AERU report of the 2006 survey recorded that 16 firms in the 2004 database appeared not to be in business two years later. A further search was undertaken by the AERU research team for the current report. This exercise discovered that 7 of the 16 firms do still operate in the local ICT sector, but confirmed that the other 9 firms do not have any identifiable presence in Christchurch. Four of these firms had completed an e-mail survey in 2004, and so information is available on their projections for the next five years. Table 9 presents the data for the nine firms, without identifying their names.

**Table 9**  
**The Firms Not in Business**

	<b>Electronic/ Software</b>	<b>Responded to E-mail Survey</b>	<b>Employment in 2004</b>	<b>Projected Employment</b>
<b>Firm 1</b>	Electronic	Yes	1	7
<b>Firm 2</b>	Electronic	No	2	n.a.
<b>Firm 3</b>	Software	Yes	1	3
<b>Firm 4</b>	Software	Yes	1.5	3.5
<b>Firm 5</b>	Software	Yes	2	12
<b>Firm 6</b>	Software	No	1	n.a.
<b>Firm 7</b>	Software	No	2	n.a.
<b>Firm 8</b>	Software	No	2	n.a.
<b>Firm 9</b>	Software	No	4	n.a.

The data in Table 9 reveal that the firms who were no longer in business in 2006 had typically been one- or two-person enterprises in 2004, with one exception (firm 9, which reported four people). There were 44 firms with two or fewer staff members in the 2004 database, so that the failure rate among this cohort was 18.2 per cent over the two years. Four of these firms returned the e-mail survey in 2004; they had all expected to grow over the next five years, by between 2 and 10 staff. These projections were not out of line with the other small firms in the 2004 survey.



## Chapter 4

### Comparison of the 2004 Firms in 2006

There were 155 firms who responded to the telephone survey in 2004. By 2006, two of these firms had merged (reducing the number by one), one firm had moved to Wellington, two firms were excluded because they are no longer involved in software design, and nine firms did not participate in the telephone survey (including the seven firms not found until the research for this latest report). This leaves 142 firms whose employment numbers can be compared between the two years, including the nine firms that were no longer in business in 2006 (see Chapter 3). Table 10 analyses the change in employment that were reported in these 142 firms.

**Table 10**  
**Change in Employment, 142 Firms, 2004 and 2006**

	Electronics	Software	Total
Number of Firms (2004)	64	78	142
Employment in 2004	2,604	718	3,322
Employment in 2006	2,390	815	3,206
Difference	– 214	97	– 116
Percentage Change	– 8.2%	13.6%	– 3.5%

The table shows that employment had fallen by 8.2 per cent in the 64 electronics firms, but had increased by 13.6 per cent in the 78 software firms. The overall effect was reduced employment in the ICT sector of 116 people, or 3.5 per cent.

The aggregate figures in Table 10 are the result of changes in just 8 of the 142 firms in the sample. The reduction in the electronics sector is accounted for by just three firms who each reduced their total employment by between 70 and 90 staff. Similarly, the increase in the software sector is accounted for by five firms who each increased their employment by between 10 and 30 staff.

Table 11 shows the patterns of change in the two sectors. In the electronics sectors, exactly half the firms in the sample were either no longer in business or had fewer employees in 2006 than in 2004. More firms in the software sector had gone out of business than in the electronics sector (7 compared to 2), but 36 firms (compared to 24 in electronics) had experienced growth.

**Table 11**  
**Changes in Business Size, 142 Firms, 2004 and 2006**

<b>Changes in Business Size</b>	<b>Electronics</b>		<b>Software</b>	
	<b>Number</b>	<b>Per Cent</b>	<b>Number</b>	<b>Per Cent</b>
<b>No longer in business</b>	2	3.1%	7	9.0%
<b>Fewer employees</b>	30	46.9%	30	38.5%
<b>Same size</b>	8	12.5%	5	6.4%
<b>More employees</b>	24	37.5%	36	46.2%
<b>TOTAL</b>	64	100.0%	78	100.0%

It is worth recalling the note made in the introduction of this report that two years is not a long period for an analysis of this type, and is likely to have been affected by a number of short-term factors. Nevertheless, the analysis reveals both the diversity of change within the ICT sector, and the importance of a relatively small number of firms for determining the overall change in the sector.

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## Chapter 5

### Comparison of the Firms who Replied to Both E-mail Surveys

Table 3 in Chapter 1 of this report recorded that 39 firms replied to both e-mail surveys. This is not a large number for drawing firm conclusions, and is too small to allow a sensible division between electronics and software firms. It does allow, however, an analysis at the occupational level, and also allows an initial examination of whether changes in actual employment affect projections for growth.

**Table 12**  
**Actual and Predicted Employment, 39 Firms, 2004**

	Actual	Predicted	Change	Per Cent
<b>Senior Management</b>	163.0	200.5	37.5	23.0%
<b>Research &amp; Development</b>	912.5	1,013.5	101.0	11.1%
<b>Sales &amp; Marketing</b>	96.0	133.5	37.5	39.1%
<b>Production &amp; Support</b>	697.5	542.5	- 155.0	- 22.2%
<b>TOTAL</b>	1,869.0	1,890.0	21.0	1.1%

Table 12 presents the actual and expected employment reported by these 39 firms in the 2004 survey. It shows that this sample of 39 firms were conservative in their expectations that year, reporting an overall projected growth rate over the next five years of just 1.1 per cent. They expected that there would be 101 new jobs in research and development, and 75 new jobs split equally between senior management and sales/marketing, offset by a reduction of 155 jobs in production and support.

Table 13 shows that by 2006 the firms' expectations about declining opportunities for production and support workers were on track. Close to 80 jobs had been lost in this category during the two years. There had also been an increase in sales and marketing positions (although at less than the rate of expansion that would be required to reach 37.5 new positions by 2009). Expectations about increased employment of senior managers and of employees in research and development showed little sign of being realised. There was a slight reduction in the number of senior employees reported by this group of firms (down 2.8 per cent), and a more significant retrenchment in research and development.

**Table 13**  
**Actual Employment, 39 Firms, 2004 and 2006**

	<b>2004</b>	<b>2006</b>	<b>Change</b>	<b>Per Cent</b>
<b>Senior Management</b>	163.0	158.5	- 4.5	- 2.8%
<b>Research &amp; Development</b>	912.5	806.5	- 106.0	- 11.6%
<b>Sales &amp; Marketing</b>	96.0	105.3	9.3	9.6%
<b>Production &amp; Support</b>	697.5	618.1	- 79.4	- 11.4%
<b>TOTAL</b>	1,869.0	1,688.4	- 180.7	- 9.7%

Table 14 indicates that the firms were not expecting their retrenchment to continue. Indeed, they reported a projected growth rate over the next five years of 19.3 per cent, with increases in all four employment categories. The largest number of extra positions was expected to be in research and development, despite the experience of reducing employment in this category by more than 100 during the previous two years. The largest percentage increase in positions was again expected to be in the category of sales and marketing.

**Table 14**  
**Actual and Predicted Employment, 39 Firms, 2006**

	<b>Actual</b>	<b>Predicted</b>	<b>Change</b>	<b>Per Cent</b>
<b>Senior Management</b>	158.5	220.5	62.0	39.1%
<b>Research &amp; Development</b>	806.5	988.5	182.0	22.6%
<b>Sales &amp; Marketing</b>	105.3	148.3	43.0	40.9%
<b>Production &amp; Support</b>	618.1	657.0	38.9	6.3%
<b>TOTAL</b>	1,688.4	2,014.3	325.9	19.3%

Despite the retrenchment between 2004 and 2006, the 39 firms were more optimistic about their medium term prospects in the later survey. This is shown in Table 15, where the 5-year projections in 2006 were 6.6 per cent higher than in 2004, despite actual employment being nearly 10 per cent lower in 2006 (Table 13). Table 15 also shows that the only category where the retrenchment had led to lower expectations was in research and development. In this category, employment was expected to recover back above its 2004 level, but was not expected to reach the level that had been projected for 2009.

**Table 15**  
**Predicted Employment, 39 Firms, 2004 and 2006**

	<b>2004</b>	<b>2006</b>	<b>Change</b>	<b>Per Cent</b>
<b>Senior Management</b>	200.5	220.5	20.0	10.0%
<b>Research &amp; Development</b>	1,013.5	988.5	- 25.0	- 2.5%
<b>Sales &amp; Marketing</b>	133.5	148.3	14.8	11.0%
<b>Production &amp; Support</b>	542.5	657.0	114.5	21.1%
<b>TOTAL</b>	1,890.0	2,014.3	124.3	6.6%



## Conclusion

This report is a first step towards creating a dynamic picture of skill demand in Canterbury's ICT sector, hampered by the short time period between the two surveys in 2004 and 2006. Nevertheless, the comparisons reported here do offer some useful insights for the Industry Skill Demand stream of the Canterbury ICT Growth Pilot.

- Although the response rates in 2006 were less than in 2004, they were still high for a survey of this type (Chapter 1). This indicates a high level of interest in this project from the sector, which continues to experience genuine skill shortages in recruiting ICT professionals (see Department of Labour, *Information Technology Professional: Occupational Skill Shortage Assessment*. Wellington: Department of Labour, December 2006, available at: <http://www.dol.govt.nz/publications/jvm/professionals/2005/ict.asp>).
  - The reported employment structures in 2004 and 2006 were very similar for the electronics sector, but suggest that a low response rate by large software firms in the 2004 survey may have led to an underestimate in the earlier survey of the share of software employment by staff in the categories of senior management, sales and marketing, and production and support (Table 4, Chapter 2).
  - The responding firms were slightly more optimistic in their projections in the 2006 survey, and there were also some differences in the projected growth rates for the four occupational categories in the two surveys (Tables 5 and 6, Chapter 2). The largest area for percentage growth in both the electronics and the software industries was sales and marketing.
  - The pattern of relative demand for qualifications was similar in both surveys, but firms reported a greater demand for qualified staff in the 2006 survey (Tables 7 and 8, Chapter 2).
  - The firms who were no longer in business in 2006 had typically been one- or two-person enterprises in 2004 (Table 9, Chapter 3).
  - Despite the positive expectations for growth over the next five years reported in the 2004 survey, overall employment in the electronics firms fell by 8.2 per cent by 2006 (Table 10, Chapter 4). Employment in the software firms increased by 13.6 per cent over the same two years. These results could be accounted for by changes in just three electronics firms and in five software firms.
  - There was considerable diversity of experience by individual firms between 2004 and 2006. 24 out of 64 electronics firms experienced growth, for example, and 37 out of 78 software firms either did not continue in business or reduced their number of employees (Table 11, Chapter 4).
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- There were 39 firms who replied to both e-mail surveys (Chapter 5). Their reported expectations in 2004 of declining opportunities for production and support workers were on track to being realised in 2006, but there had also been a significant retrenchment in research and development workers, contrary to expectations in 2004. These firms were not expecting the retrenchment to continue, and indeed were more optimistic about their medium term prospects in 2006 than in 2004.

This last result is interesting, suggesting that the sector is confident that the reductions in employment reported between 2004 and 2006 were a temporary response to adverse external conditions. The authors hope to be able to repeat the Skills Demand survey in 2008 to allow a longer-term perspective on dynamics in the Canterbury ICT sector.

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