Statistics on Information Technology in New Zealand 2000

Information Technology Policy Group
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1. Introduction

1.1 Information Included

This is the seventh annual release of the Ministry of Economic Development's (previously, the Ministry of Commerce) information paper on IT Statistics in New Zealand. This paper includes:

- figures for IT hardware imports and exports updated either for the 1999 calendar year, or to March 1999;
- figures for trade in software and services and the size of the New Zealand information technology (IT) market updated to March 1999;
- figures for employment in segments of the IT industry from the 1996 census (repeated from previous reports);
- information on the numbers of computers in New Zealand homes compared with a selection of other electronic amenities;
- information on the size of the Internet in New Zealand and the number of World Wide Web sites updated to February 2000;
- information on the number of computers and Internet connections in New Zealand schools updated from a 1999/2000 survey of IT in Schools;
- a new section providing information about the number of students enrolled in IT related courses in New Zealand universities, based on a survey carried out by the Ministry of Economic Development over the 1999/2000 summer.

1.2 Acknowledgements

Information in this paper has been derived mainly from public sources, or from specially commissioned surveys by Statistics New Zealand, the Ministry of Economic Development or the Information Technology Advisory Group. References and sources are detailed in Section 9.

Special acknowledgement is made of the statistics and other information about the Internet in New Zealand collected and made available by Mark Davies of Victoria University of Wellington.

1.3 Defining Information Technology

Information technology is now acknowledged to be much broader than the traditional computing and data processing industry and is taken here to include telecommunications and broadcasting.

2. Imports and Exports

Information in this section is derived from two different areas:

- IT hardware import and exports are measured at the border by the Customs Department as goods leave or enter the country by calendar years and provided by Statistics New Zealand (Statistics NZ 2000a);

- A survey of IT businesses is conducted by Statistics New Zealand which measures both IT hardware and software exports (Statistics NZ 2000b).

The survey, now in its sixth year, is sponsored by the Ministry of Economic Development, the Information Technology Association of New Zealand (ITANZ), Tradenz, and Statistics New Zealand. The survey asks all businesses for information as at their previous annual balance date, with a cut-off of 30 September each year. The average balance date in each sample is therefore assumed to be March.

From 1998, the survey has attempted to provide better coverage of activity than previous surveys by including business units where IT activity is a secondary activity. This lead to some increase in the figures for 1998 and 1999 over previous years as firms not previously covered are now included. The survey does not cover IT businesses with two full time equivalent staff or less, which will tend to cause the survey to underestimate the actual export figures.

Note that information from the two sources (Customs and the Statistics New Zealand survey) cannot be directly compared because of differences in the accounting year, differences in the treatment of export costs such as freight and insurance, and restrictions imposed by the sample used for the survey.

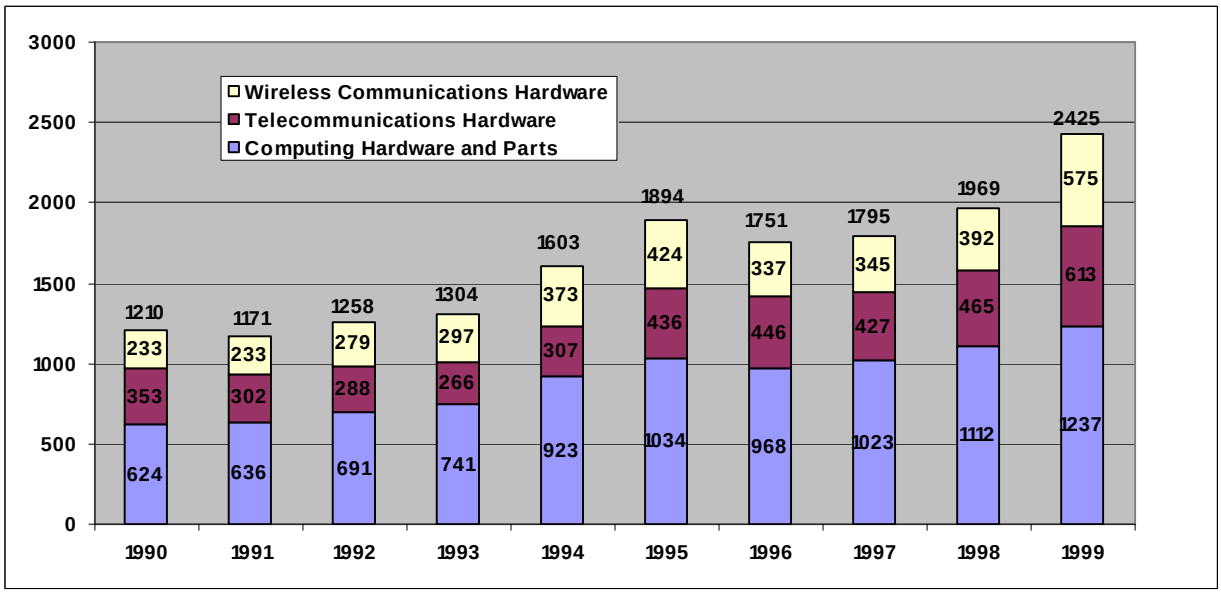
The lower level of the New Zealand dollar in 1999 compared with 1998 and, particularly, earlier years would be expected to have a major influence in both imports and exports.

2.1 Hardware Imports

Figures 2.1.1 and 2.1.2 summarise New Zealand IT hardware imports for the last decade, based on Customs figures (Statistics NZ 2000a). The 1999 year shows a 23.2% overall increase in IT hardware imports from 1998 (compared with a 10% increase the year before), comprising 11.2% for *Computing Hardware and Parts*, 31,8% for *Telecommunications Hardware* and 46.7% for *Wireless Communications Hardware.*

Figure 2.1.1 IT related hardware imports by type

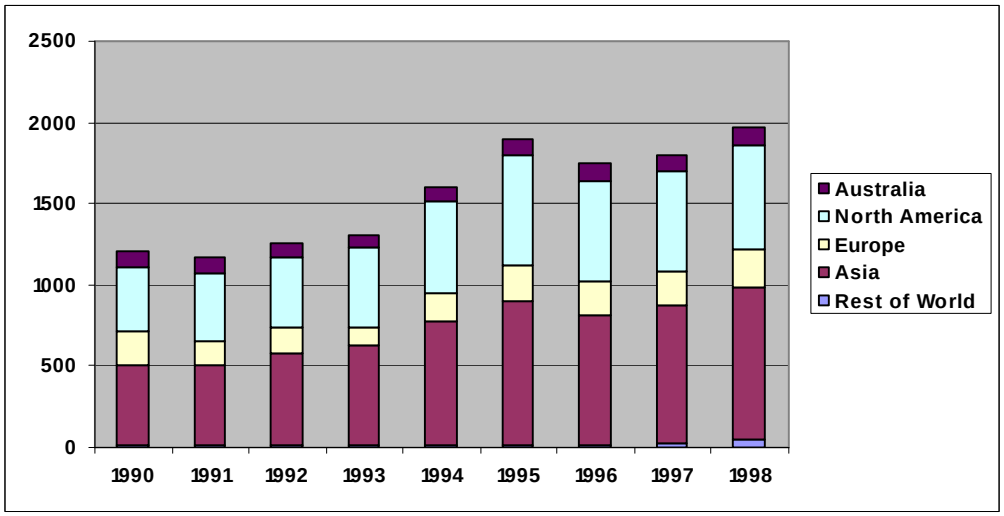
$NZD Millions



The information in the previous figure is reproduced in Figure 2.1.2 subdivided by source, showing that the bulk of IT hardware imports come from Asia and North America. Between 1995 and 1997 there was a decline in IT hardware imports from North America with small increases in each of the past two years (3% in 1999). Imports from Asia increased by 28% in 1999. Imports from Australia increased by 21%, from Europe by 58%, and from the 'Rest of the World' by 39%.

Figure 2.1.2 IT related hardware imports by source

$NZD Millions



2.2 Hardware Exports

The following three figures show export figures based on Customs data (Statistics NZ 2000a), by calendar year.

Figure 2.2.1 shows a summary of New Zealand IT hardware exports since 1990. The steady growth in exports (averaging 25% per year from 1990 to 1997) began to tail off in 1998 (8% growth), and has fallen for the first time in a decade in 1999, by just over 8%. The export value of *Computing Hardware and Parts* fell by 16% and *Telecommunications Hardware* by 29%, while *Wireless Communications Hardware*, which comprises 62% of the total value of IT hardware exports, grew by just 2%.

Figure 2.2.1 IT related hardware exports by type

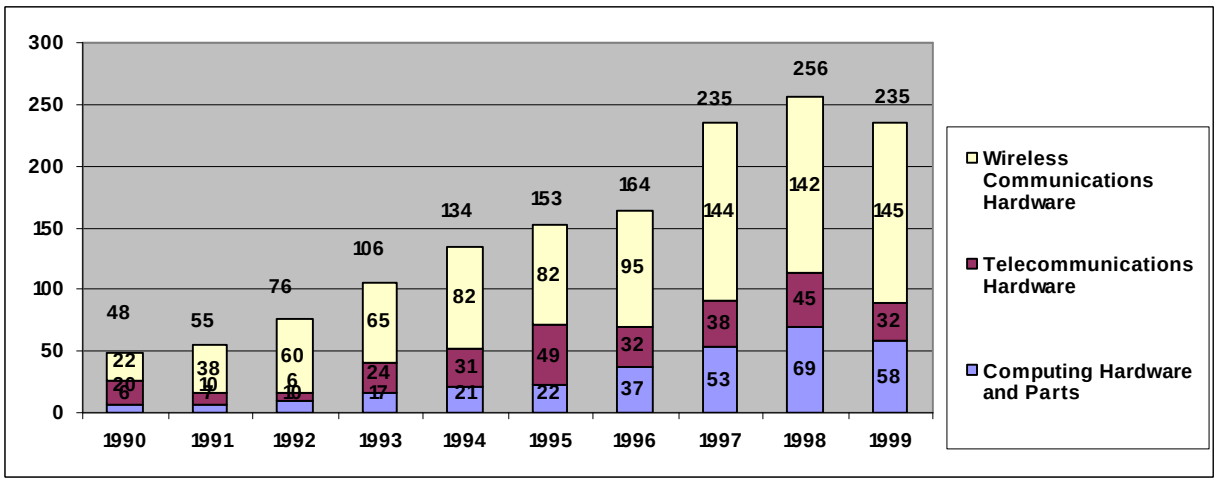
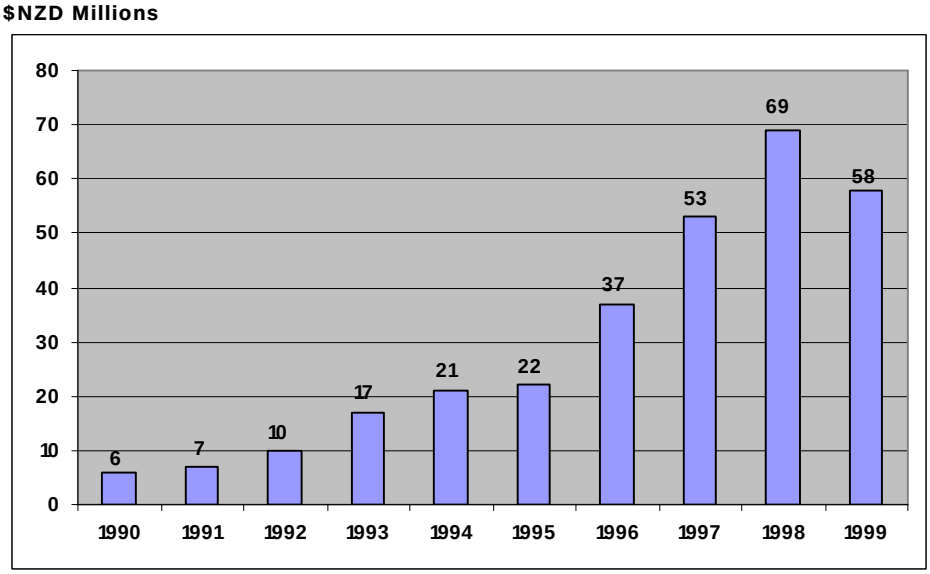


Figure 2.2.2 shows just the contribution of *Computer Hardware and Parts*. This category has shown strong growth from 1990, averaging about 36% increases per annum to 1998, with a 30% increase in 1998 over 1997. In 1999 however, there was for the first time a sharp drop of 16% over 1998 exports.

Figure 2.2.2 Computer hardware and parts exports



In Figure 2.2.3, the total IT hardware exports are shown split by export destination. The fall in 1999 exports was due primarily to large decreases in exports to Asia (22%) and Europe (36%), partly offset by a 39% rise in exports to North America and more modest increases of 3% to Australia and 2% to the Rest of the World. Exports to Australia have increased steadily throughout the decade apart from a fall in 1996. Exports to Europe have also increased steadily since 1990, the fall in 1999 only partly offsetting a huge 84% increase in 1998. There has been quite wide fluctuation in levels of exports to Asia and North America over the period.

Figure 2.2.3 IT related exports by destination

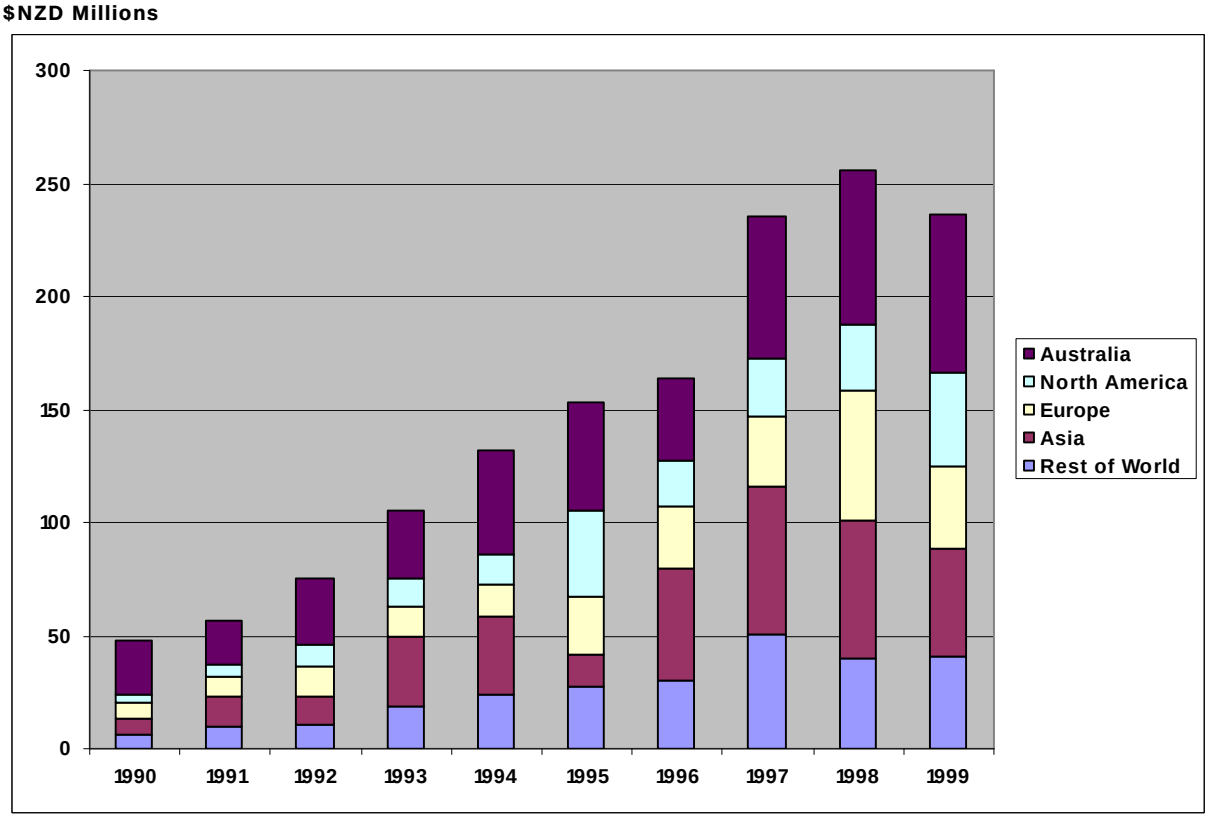
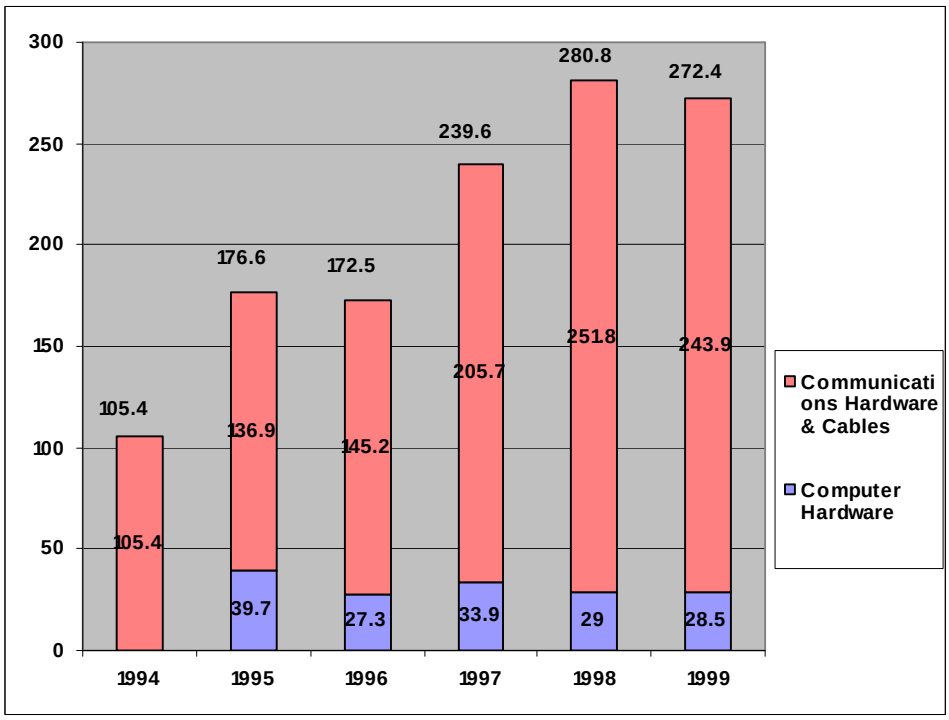


Figure 2.2.4 is based on the 1999 Statistics New Zealand survey of IT firms (Statistics NZ 2000b). The value of hardware exports was found to be $272 million for the 1999 financial year, slightly down from $281 million in 1998. Note that these data are not directly comparable to the IT hardware export data captured at the border, and given earlier in this paper (for example, Figures 2.2.1 and 2.2.2). The figures do, however, follow similar trends. Figure 2.2.4 shows an average annual increase from 1994 to 1998 of 25% per annum but a decrease of 3% in 1999.

Figure 2.2.4 IT hardware exports

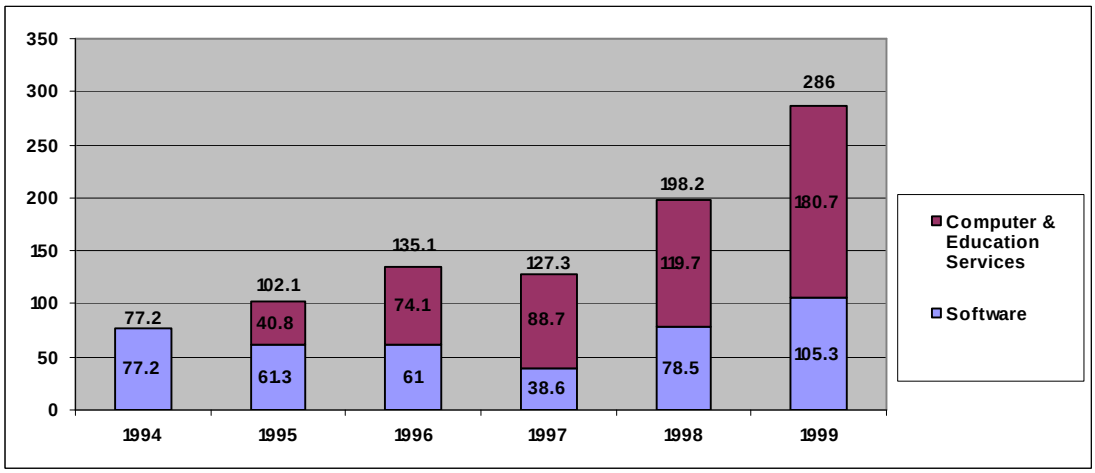


Note: Figure for 1994 combines both categories

2.3 Software and Services Exports

The information in this section is taken from the Statistics New Zealand survey of IT firms (Statistics NZ 2000b). Except for a drop in Software exports in 1997, both software and services have increased rapidly over the period of the survey, with an increase of 56% in 1998 over 1997, followed by a further 44% increase in 1999.

Figure 2.3.1 Software and services exports



Note: The 1994 figure combines both categories

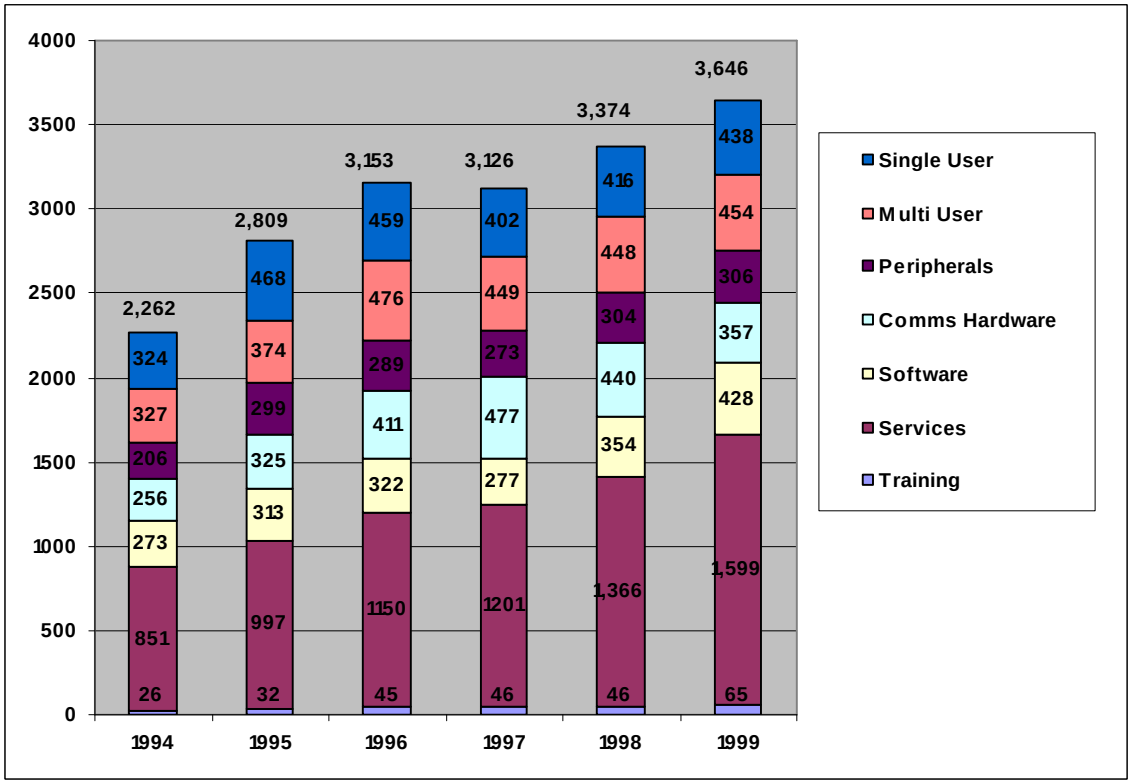
3. New Zealand IT Market

The information in this section is taken from a 1999 survey of IT firms conducted by Statistics New Zealand (Statistics NZ 2000b) and applies to the financial year. For more information about the survey see the previous section, Software and Services Exports. Data for 1998 have been revised since the previous report, as more accurate information has become available (similar revisions were also made in previous years).

The total value of the New Zealand IT industry (excluding telecommunications) is $6,030 million, up 7.2% from the previous year. Figures for telecommunications services are excluded from the survey for confidentiality reasons. However, if information is imputed from the Telecom New Zealand annual report, the total is $9,464 million, compared with $9,020 million in 1998 (up 4.9%).

These gross figures include an unknown level of double counting of retail and wholesale sales. Consequently, the data used in Figure 3.1.1 represents goods and services sold to end users only and, in 1999, exclude $1,826 million reported in the survey as 'other customer sales'.

Figure 3.1.1 New Zealand end user computer hardware, software and services market (NZ$ millions)



* The 1998 figures include a number of revisions due to more accurate information becoming available since the 1999 report.

The *Single User Hardware* category refers to complete computers intended for use by only one person at any one time and so mainly comprises desktop and laptop PCs and Macintoshes. *Multi User Hardware* refers to computers intended for use by many people at the same time and includes file servers, midrange systems and mainframes. Parts of computer systems (other than the CPU) when sold separately appear under *Peripherals*. The split between *Software* and *Computer Services* is unreliable because of the difficulty of accounting for software maintenance revenue.

Table 3.1.1 Changes in end user sales since 1995 (percent)

	1996	1997	1998	1999
Computer h/w: single-user systems	-1.9	-12.4	3.5	5.2
Computer h/w: multi-user systems	27.5	-5.8	-0.2	1.4
Peripheral computer equipment	-3.5	-5.7	11.6	0.6
Communications hardware and cables	26.5	15.9	-7.8	-18.9
Software sales	2.9	-13.9	27.7	20.8
Computer services	15.3	4.5	13.7	17.1
Training and education in IT	39.5	2.4	-1.3	41.1
Total New Zealand end-user sales	12.3	-0.9	7.9	8.1

Sales in the New Zealand IT market rose by 8% in the 1999 financial year, which is similar to 1998. Increases occurred in all categories except *communications hardware and cables*, with an increase of 41% in *training and education in IT*, following two years of little or no growth. The strong growth in sales of *software* and *computer services* in 1998 have continued on into 1999. In 1998, Statistics New Zealand attributed Y2K compliance and a shift away from computer hardware selling into computer service sales as contributing to these trends.

4. IT Industry Employment

4.1 People Working in IT Occupations

The data in used in this section is taken from the 1991 and 1996 Censuses of Dwellings carried out by Statistics NZ (Statistics NZ 1997).

The IT Industry comprises those industry sectors whose business is IT related such as software companies. IT occupations are defined here as those jobs whose focus is on IT, for example, a programmer. However, there are non-IT occupations within the IT industry (an accountant in a computer company), and IT occupations in non-IT industries (a programmer in a bank).

Table 4.1.1 shows the number of people working in IT occupations in the IT industry and in the working population as a whole for 1991 and 1996. The table shows the number of people working in an IT occupation in the IT industry increased from 8,826 in 1991 to 10,695 in 1996. The number of people working in the IT industry has also increased by 4% to 41,823. However, as a proportion of the working population, the percentage of people working in the IT industry decreased to 2.6% (as shown in Table 4.1.2).

Table 4.1.1 Numbers working in IT occupations

	IT Occupations		All Occupations	
No. Employed	**1991**	**1996**	**1991**	**1996**
IT Industry	8,826	10,695	40,200	41,823
All Industry	27,717	33,642	1,400,376	1,630,809

In addition to those in the IT industry, there are also people working in IT occupations outside of the IT industry. Combining those in IT occupations in the IT industry and in other industries gives the number of people in IT occupations as 33,642 in 1996, a 21% increase between the two Censuses.

Table 4.1.2 shows that at the 1996 Census, 4% of the working population in New Zealand was in an IT occupation and/or working for an IT industry company. This is the virtually the same proportion as at the 1991 Census, despite an increase of 9.6% from 59,091 to 64,770 in the number of people employed in IT occupations and IT companies. The proportion has remained the same due to the increase in the working population over the same period.

The right hand column of the table shows the change in each category adjusted for the change in the working population. It shows the overall proportion of people in an IT occupation and/or working for an IT company (IT Employed) fell by 5.9% between the two Censuses, despite the rise in people working in an IT occupation. This indicates that the number of people supporting the work of each person employed in an IT occupation has fallen.

Table 4.1.2 Proportion of workforce in IT occupations

	No. Employed		% Change of Working Pop
	1991	**1996**	
Working Pop.	1,400,376	1,630,809	
IT Occ. IT Ind.	8,826 (0.6%)	10,695 (0.7%)	4.1%
IT Occ. All Ind.	27,717 (2.1%)	33,642 (2.1%)	4.2%
All Occ. IT Ind	40,200 (2.9%)	41,823 (2.6%)	-10.7%
IT Employed*	59,091 (4.2%)	64,770 (4%)	-5.9%

* The *IT Employed* category is the number of people working in an IT occupation and/or in the IT industry and is derived as the sum of IT occupations in all industry and all occupations in the IT industry minus the IT occupations in the IT industry, (already counted in the all occupations in the IT Industry category).

While there has been a decline in the proportion of people in the IT Employed category - those people in actual IT jobs and/or working in the IT industry - there appears to be no fewer computers in use in the economy. This suggests that the IT industry is becoming more efficient as fewer people in relative terms provide IT goods and services to a larger working population.

4.2 IT Industry

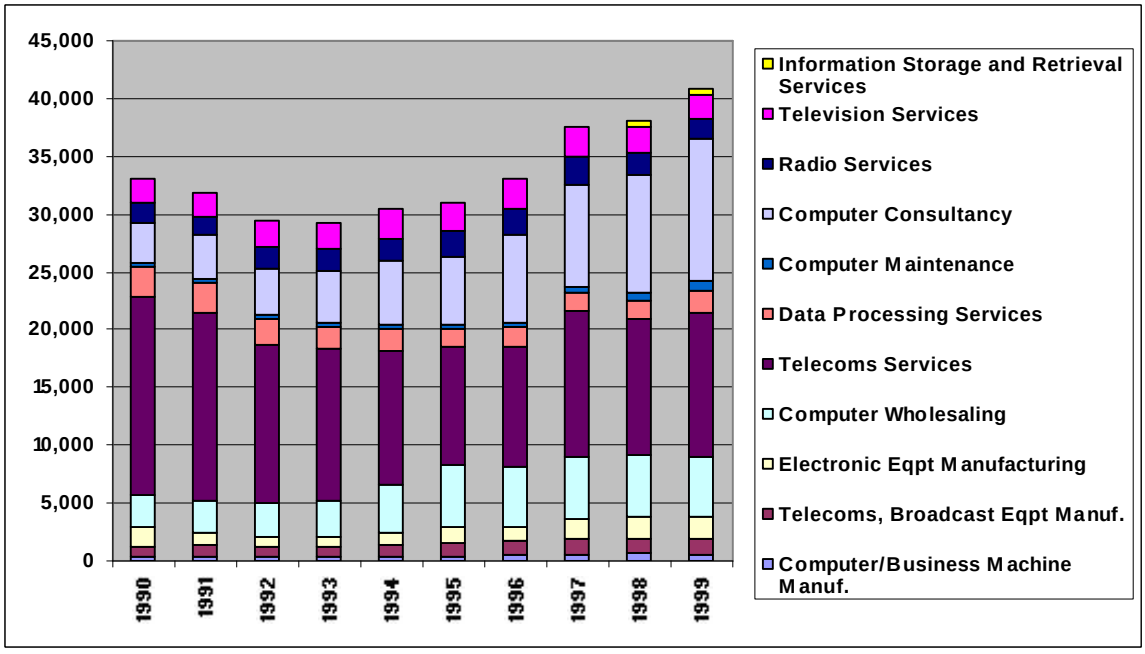
Digital convergence is increasingly tying computer technology to telecommunications and broadcasting. For this reason the definition of IT industry used in this paper is broad, encompassing telecommunications and electronic media. It could be argued that some of the industry sectors chosen do not deal exclusively with IT even under this broad definition. However, these figures are based on the standard industrial codes in use in New Zealand at the time this data was collected.

The information for Figures 4.2.1 and 4.2.2 on employment in the IT industry is based on a target population of all ‘activity units’ with more than two full-time equivalents (FTEs) engaged in IT activity in New Zealand. Industries in the designated categories are chosen as shown in Table 4.2.1.

Table 4.2.1 Industry ANZSIC classifications (Statistics NZ 1996)

ANZSIC Code	Industry Group
C284100	Computer and Business Machine Manufacturing
C284200	Telecommunication, Broadcasting and Transceiving Equipment Manufacturing
C284900	Electronic Equipment Manufacturing
F461300	Computer Wholesaling
J712000	Telecommunication Services
L783100	Data Processing Services
L783200	Information Storage and Retrieval Services
L783300	Computer Maintenance Services
L783400	Computer Consultancy Services
P912100	Radio Services
P912200	Television Services

Figure 4.2.1 Employment in IT industries 1990-99 by ANZSIC classification



As Figure 4.2.1 indicates, following a slump in employment in 1993 to 29,282, employment in all the IT occupations grew strongly through to 1997, and again (by 7.3% overall) to reach 40,830 in 1999. Note that the *Information Storage and Retrieval Services* category is not included prior to 1998. Overall, there has been an increase in employment in this area of 7,725 since 1990 (23.3%) and 11,558 since the low point of 1993 (39.5%).

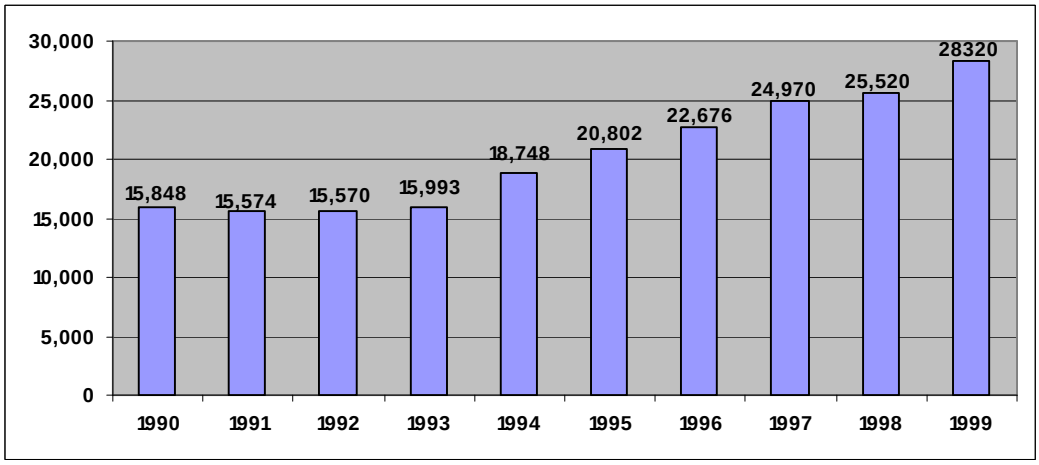
There was consistent growth in the manufacturing categories over the period since 1992/3 until 1999, *when Computer and Business Machine Manufacturing* and *Telecommunication, Broadcasting and Transceiving Equipment Manufacturing* fell by 16% and 4% respectively. On the other hand, *Electronic Equipment Manufacturing* has continued to expand, by 16% in 1999.

Computer Maintenance Services and *Computer Consultancy Services* have also grown over the period and this continued very substantially in 1999, by 38% and 21% respectively.

Most other categories declined by between 2% and 11% over the past year. The notable exception is *Telecommunication Services* which expanded by 6%. This category steeply declined between 1990 (17,267) and 1995 (10,254) since when it has been increasing slowly, reaching 12, 520 in 1999.

Figure 4.2.2 shows the same data as Figure 4.2.1 but excludes those employed in *Telecommunications Services*. It follows much the same trend as Figure 4.2.1. Flat or very limited growth through the 1991-93 period is followed by substantial increases from 1994 to 1999. This gives an overall percentage increase in employment in IT industries excluding *Telecommunications Services* of 78.7% over the decade.

Figure 4.2.2 Employment in IT Industries 1990-98 by ANZSIC Classification (excluding *telecommunications services*)



4.3 IT Occupations

The information in this section is taken from the 1991 and 1996 Censuses (Statistics NZ 1997).

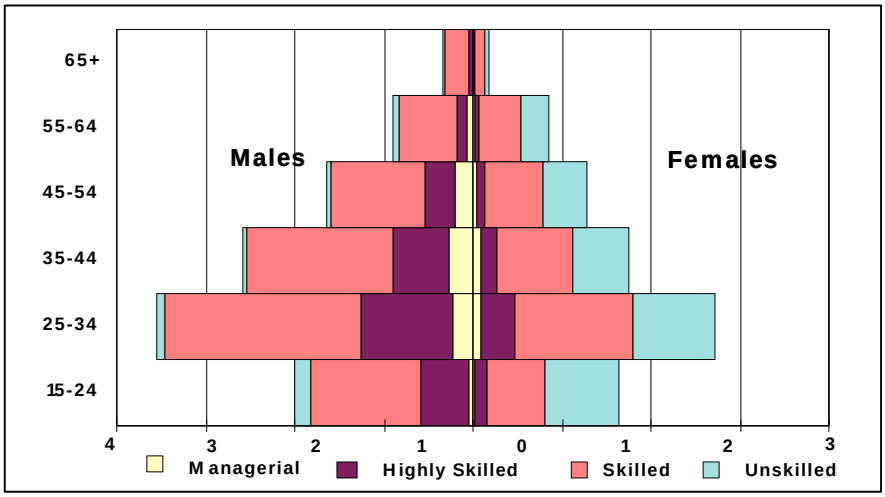
Occupations are categorised according to the occupation classification codes used by Statistics New Zealand. For the purpose of this paper, the following codes are deemed to be IT occupations. The only change to these classifications in 1996 was a change to the occupation previously classified as Computer Systems Engineer (code 21312) to a new classification of Computer Application Engineer.

Code	Description	Category
12271	Computing Services Manager	Managerial
21311	Systems Analyst	Highly Skilled
21312	Computer Application Engineer	Highly Skilled
31142	Computer Systems Technician	Skilled
31211	Computer Programmer	Skilled
31212	Computer Operator	Skilled
33152	Technical Representative	Skilled
41121	Data Entry Operator	Unskilled

The category column is used as an indication of skill level.

The age and sex breakdown for those working at various skill levels in IT occupations for 1991 and 1996 is shown in Figures 4.3.1 and 4.3.2.

Figure 4.3.1 Employment of the working population by age and sex in IT occupations at various levels (1996)



Each bar in Figure 4.3.1 represents the numbers employed in IT occupations as a percentage of the numbers working in all occupations for a given age/sex group. These percentages are known as participation rates.

The figure indicates the IT industry remains a youthful industry, with 81.4% of men working in IT occupations being in the 35-44 or younger age groups and 80.9% of female IT workers in the 35-44 or younger age groups. It also shows that men had higher participation rates than women in IT occupations in all age groups in 1996.

Men also had higher participation rates than women in managerial IT positions and in the more highly skilled non-managerial occupations such as Systems Analysis and Computer Applications Engineer. By contrast, women still dominate the Data Entry occupation with significantly higher participation in this occupation than men.

A comparison with the same data from the 1991 Census in Figure 4.2.2, shows a relatively similar pattern to that in 1996. However, it also reveals a slight 'maturing' of the industry between 1991 and 1996. In 1991 85.2% of men in IT occupations were 44 or younger, while 86.4% of women in IT occupations were 44 or younger.

Figure 4.3.2 Employment of the working population by age and sex in IT occupations at various levels (1991)

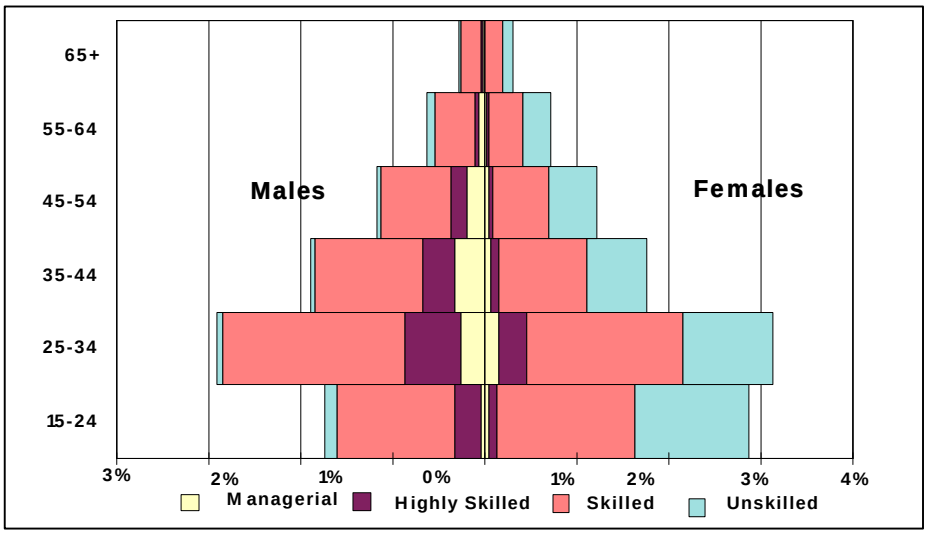


Figure 4.3.3 shows the breakdown by ethnic origin of those in IT occupations for 1991 and 1996, excluding data entry operators. The only changes of note between the two surveys is a large decrease in the proportion of people classifying themselves as Other and an increase in the NZ European category.

Figure 4.3.3 Breakdown of those employed in IT occupations by ethnic origin excluding data entry (1991 & 1996)

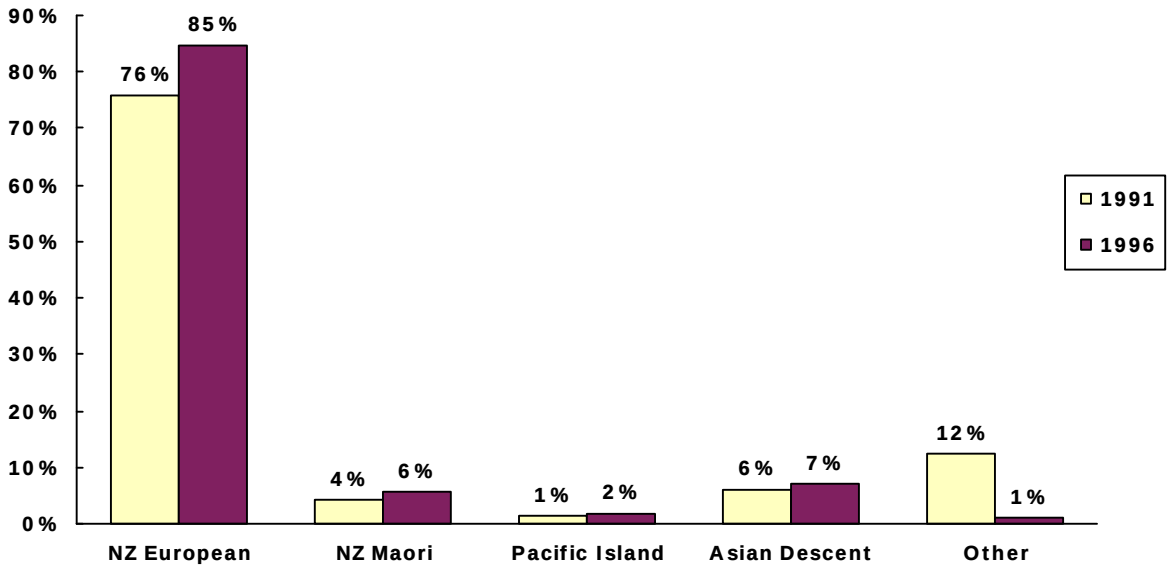


Figure 4.3.4 shows the numbers working in skilled IT occupations as a percentage of the working population in each ethnic group. While the participation of men and women identifying themselves as NZ European is higher than those of Maori and Pacific Islanders, the outstanding feature of the chart is the very high rates of participation among those of Asian descent. Men have higher participation rates than women in all of the ethnic origin categories considered.

Figure 4.3.4 Percentage of working population in IT occupations by ethnic origin excluding data entry (1996)

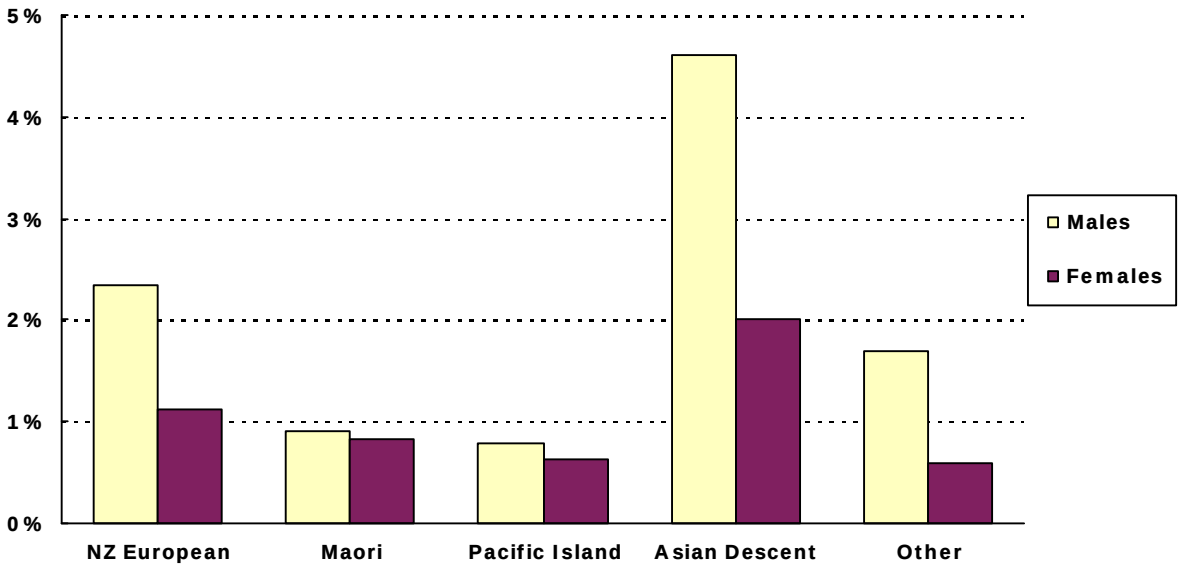
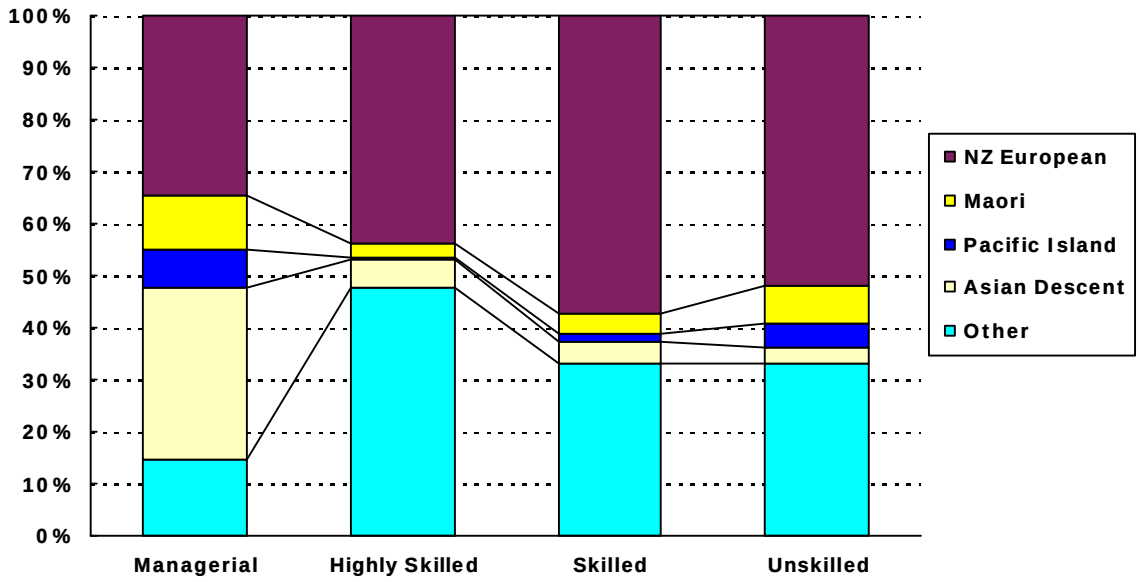


Figure 4.3.4 shows the participation rate of each ethnic group in IT occupations at each level of skill. The graph answers the question: what would be the ethnic breakdown of each level of IT occupation if the working populations of each ethnic group were the same.

Figure 4.3.5 IT occupations at various levels as a percentage of total numbers in IT occupations for each ethnic group (1996)

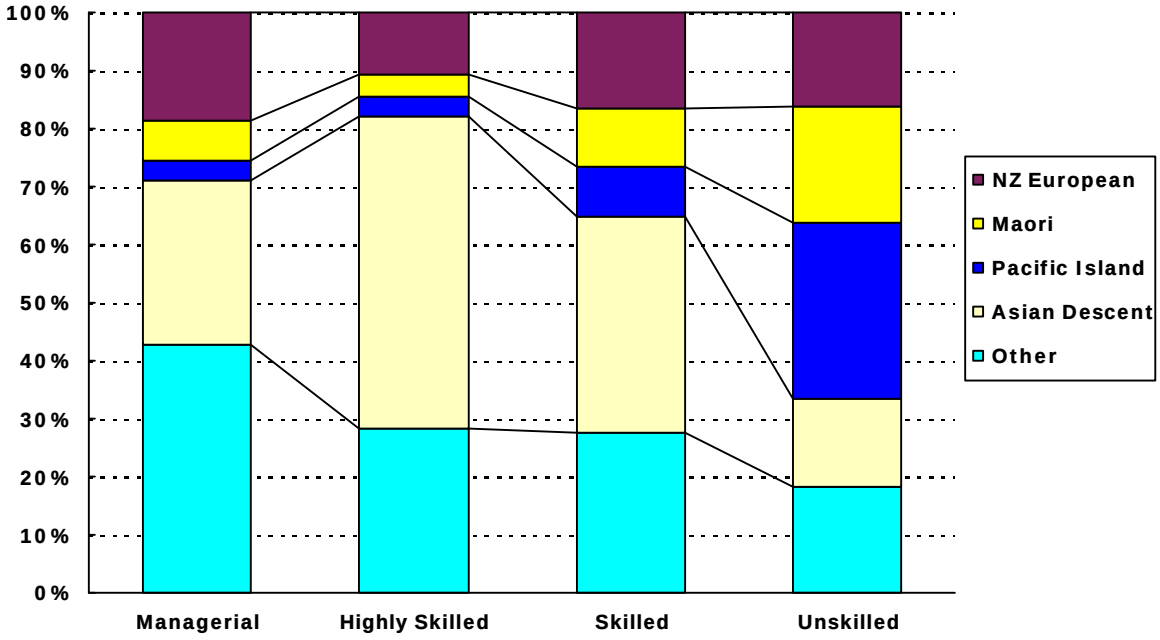


People categorising themselves as NZ European have high participation rates across all four levels of IT occupations. The Other group also shows relatively high participation rates, except at the managerial level. This is reflected by the significantly higher participation rate of people of Asian descent at the managerial level than at other levels. What is also clear from the graph is that Maori and Pacific Islanders have low participation rates across all IT occupations.

Comparing the 1996 data in Figure 4.3.5 with the same data from 1991 in Figure 4.3.6, gives a quite different picture. In 1991, those classifying themselves as NZ European had much lower participation rates across all IT occupations, while people of Asian descent had much higher participation rates at the highly skilled and skilled levels. There was also a much more even distribution of people at the unskilled level in 1991 and a higher participation rate by people in the Other category at the managerial level.

Although it is not clear why this change has occurred, there was at the same time a significant change in numbers of people in each ethnic group in the working population, which is likely to have at least partly affected the ethnic composition of those in IT occupations. Overall the working population grew by 16% between 1991 and 1996. However, the number of people classified in the Other grouping fell during this time by 75%, being compensated by rises in the working population of Maori by 52%, Pacific Islanders by 40%, Asians by 65% and NZ Europeans by 18%.

Figure 4.3.6 IT occupations at various levels as a percentage of total numbers in IT occupations for each ethnic group (1991)



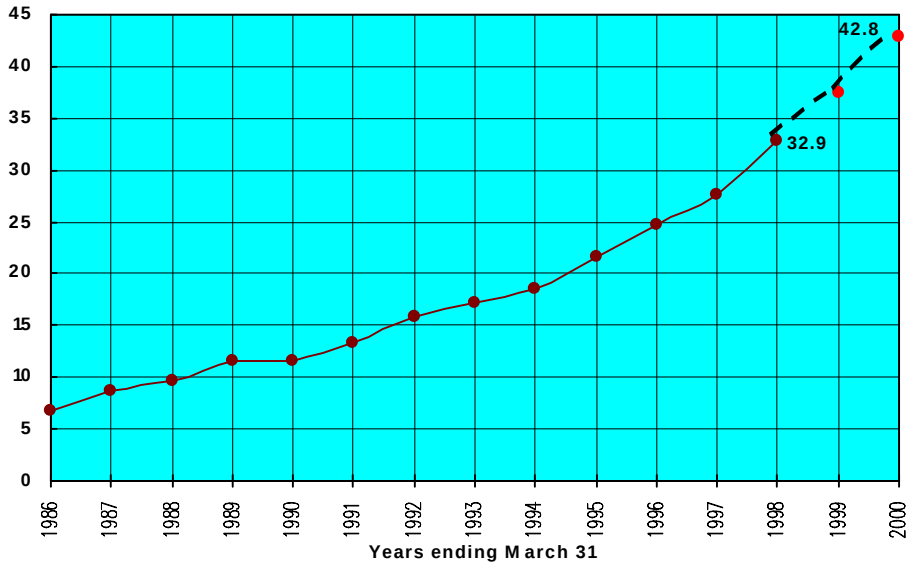
5. Personal Use of Information Technology

5.1 Computers in Homes

The figures used in this section are taken from the Household Economics Survey conducted by Statistics New Zealand (Statistics NZ 1998), which from March 1998 has become a triennial survey instead of an annual one, with the next survey to be carried out in the 12 months to March 2001. Since the survey assesses each household in a sample of 3000 over a 12 month period ending in March, it is reasonable to attach the figures to a March year end.

Figure 5.1.1 shows the percentage of homes with a computer (mains operated with keyboard). Note that the survey does not distinguish between households with only one computer and those with more than one. The average increase from March 1986 to March 1998 was 14% pa. The dotted line extends the curve assuming this rate has been maintained, giving a projected figure of about 43% of households with a computer in March 2000.

Figure 5.1.1 Percentage of households with a computer



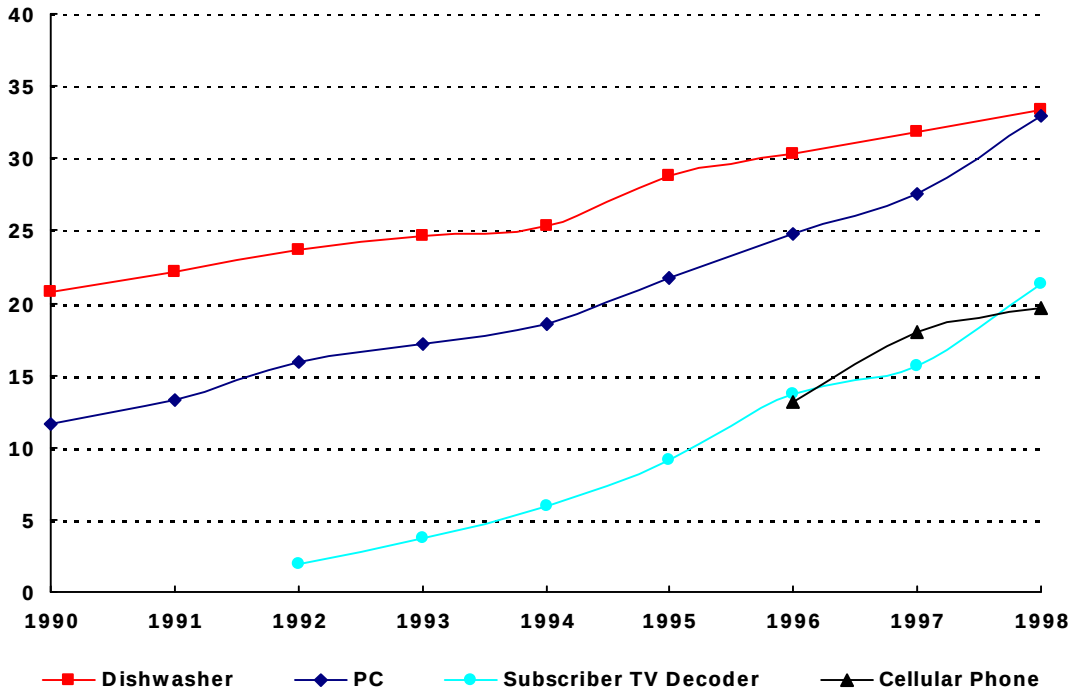
In addition to home computers, the survey also asks about the availability of a number of other electronic amenities. Table 5.1 shows the percentage of households responding to the survey that reported the presence of a range of these amenities in 1998.

Table 5.1.1 Percentage of households with selected amenities (March 1998)

Amenity in dwelling	Percentage of Households
	1998
Clothes Washing Machine	97.7
Colour Television	97.2
Telephone	96.0
Video Recorder	79.3
Microwave Oven	80.0
Dishwasher	33.3
Home Computer	32.9
Cellular Phone	21.3
Subscriber TV Decoder	19.7

Figure 5.1.2 shows the percentage of households owning four of these amenities from 1990 to 1998. In 1998, the number of households with a computer was roughly equal to the number owning a dishwasher. Despite flattening a little in 1997, the percentage of households with a subscriber TV decoder grew rapidly.

Figure 5.1.2 Household amenities (percentage of households)



5.2 Personal Use of the Internet

Information in this section is drawn from a National Business Review – Compaq Poll (NBR 2000). The data is reproduced with the permission of the National Business Review. The survey was carried out in late February 2000, based upon a telephone survey of a nationally representative sample of 750 New Zealanders 18 years of age and over.

Table 5.2.1 Proportion of respondents answering 'yes' to the relevant question

	% 'yes'
Access to the Internet	50
Possess email address	39
Made a purchase on Internet	11
Comfortable using credit card	21
Not comfortable using credit card*	21

* Answered 'no' to the previous question

The 50% responding 'yes' to the question about access to the Internet (at home or at work), gave the following information about frequency of access.

Table 5.2.2 How often do you access the Internet?

	%
More than once a day	28
Every one or two days	26
Once or twice a week	19
Once every two or three weeks	4
Once or twice a month	6
Less than once a month	12
Unsure	5

6. Size of the Internet

6.1 Computers on the Internet

The data presented in this and the next section covers the number of hosts (computers) permanently connected to the Internet in New Zealand, and the size of the New Zealand domain which gives one indication of the number of organisations connected. The prime source of information about hosts connected to the Internet is Network Wizards.

Changes to the number of “hosts” (computers) on the Internet is regarded as an indicator of the rate of growth of the Internet. To be counted as a host, a computer must have its own Internet address and be permanently and directly connected to the Internet. Home or small business computers which connect by dialling up to a service provider are therefore not counted. Consequently, it is reasonable to assume that there are many more Internet users than hosts, possibly by a factor of five or more. To stress this point: the information presented here refers to the number of computers permanently wired into the Internet in New Zealand, it does not purport to describe directly the number of individuals using the Internet.

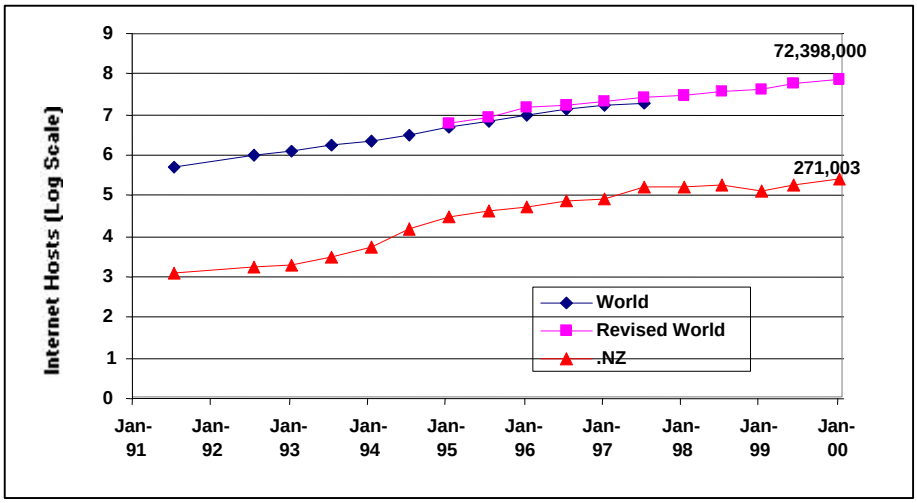
Data relating to Internet users and usage should be treated with caution due to the evolving nature of the Internet, the variety of ways it can be accessed and the difficulty in gathering reliable data. Over the last several years, information collected by Network Wizards has become less reliable because an increasing proportion of organisations now restrict access to their domain data. Because of this, Network Wizards introduced a new survey technique in July 1997. Network Wizards have provided ‘adjusted’ host counts for earlier years of the survey to enable comparisons to be made. For a full explanation of the changes to the survey visit the Network Wizards web site at http://www.nw.com/.

A more serious problem with collecting this information is due to an increasing trend for corporate networks to be screened off from the Internet behind firewalls. This means that a private network with hundreds or even thousands of computers may appear to the outside world as just one or two host computers. Unfortunately, the new methodology employed by Network Wizards does nothing to overcome the problem of networks being screened behind firewalls.

Figure 6.1.1 shows the growth in the number of hosts connected to the Internet worldwide, from July 1991 through to January 1999. A line has been added showing the revised total host counts for the earlier surveys.

Use of a logarithmic scale allows the number of hosts with domain names ending in .nz to be graphed alongside the world-wide data despite the substantial difference in the actual numbers. Note that an exponential curve plots as a straight line when a logarithmic scale is used.

Figure 6.1.1 Growth in Internet hosts - New Zealand (.nz) and the world



The graph shows a continuous exponential increase in the number of Internet hosts worldwide. The number of hosts in New Zealand has also increased rapidly although it appeared to plateau from 1996 to 1997 and actually fell in 1998.

As other information detailed below shows, use of the Internet in New Zealand is continuing to increase rapidly and the apparent fall in host numbers in 1998 indicates that this now a less useful measure of Internet activity in New Zealand. The reasons for the anomaly is not clear but it may be due at least in part to the growing use of firewalls which screen the actual number of computers on corporate Intranets from external scrutiny, and thus could be interpreted as representing a maturation of the use of the Internet in New Zealand.

Figures 6.1.2 and 6.1.3 show relative statistics for ten countries with the highest Internet host counts by population. The first is based on Network Wizards statistics and population statistics taken from the US Census Bureau, and the second on OECD figures for July 1998 (OECD 1999). Despite the different basis for the statistics, the same ten countries are involved.

Figure 6.1.2 shows changes in the number of hosts per 1000 people since January 1996. The numbers need to be treated with some caution, partly for the reasons outlined above. The unexplained dip in growth observed for .nz hosts in Figure 6.1.1 is also apparent for several other countries, for example, US, Finland, Iceland and Norway.

Data graphed in Figure 6.1.2 is based on the assumption that, except for the US, the number of hosts for each country can be derived from registrations in the country code top level domains (ccTLDs) and that for comparative purposes registrations from different countries in the generic top level domains (gTLDs) can be neglected. Examples of ccTLDs are .nz for New Zealand (see Section 6.2), .au for Australia and .ca for Canada. The most important gTLD, used world-wide for commercial organisations, is .com. The US figures are based on registrations in the generic top level domains, or

gTLDs as well as .us. From July 1998, the number of registrations in the open gTLDs (.com, .net and .org) attributed to the US have been reduced allowing for the fact that at that date approximately 24% of such registrations were from outside the US (OECD 1999). It is likely that the proportion of such non-US registrations has increased in the 18 months since July 1998 and therefore that US registrations are increasingly overestimated from January 1999 onwards.

Figure 6.1.2 Number of Internet hosts per 1000 population

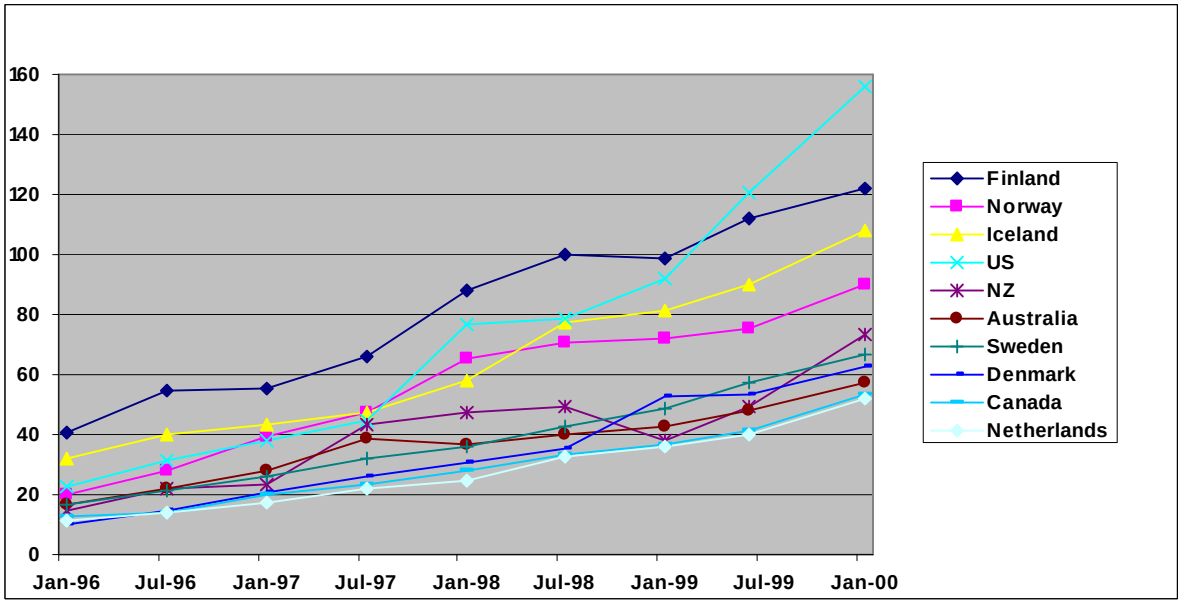
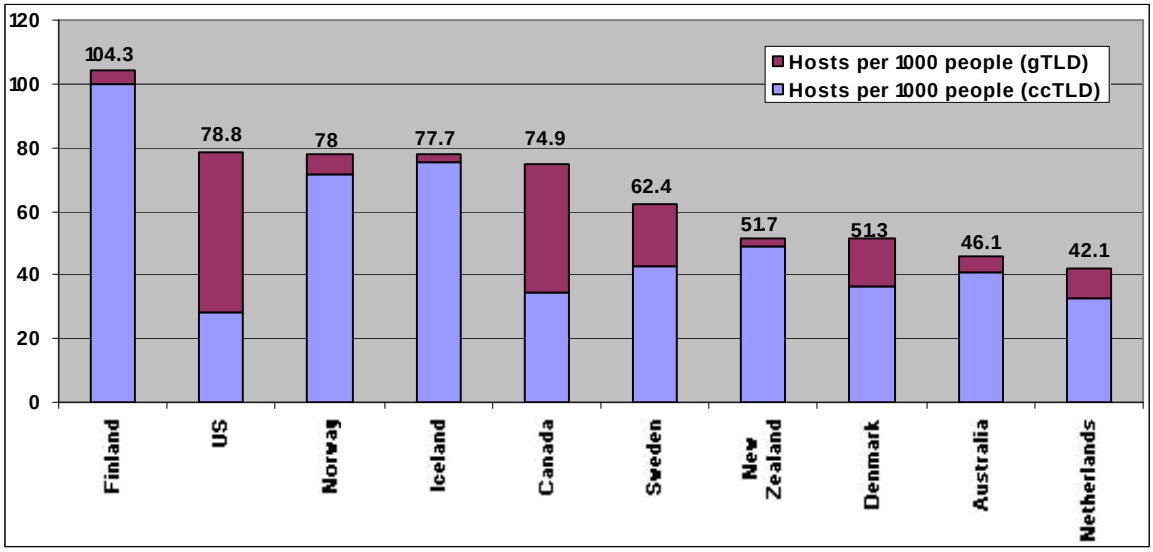


Figure 6.1.3 shows that the assumptions underlying the graphs in Figure 6.1.2 lead, at best, to a very rough approximation to the actual distribution of Internet hosts. Figure 6.1.3 is based on OECD data as of July 1998 (OECD 1999) and shows the same ten countries but differs in one significant respect in that it includes information about the apparent number of hosts in each country registered in the gTLDs as well as ccTLDs. The chart shows both the ccTLD and gTLD host counts for each country.

Figure 6.1.3 Top ten OECD countries by hosts per 1000 population (July 1998)



Inclusion of the gTLDs alters the relative ordering, but not the membership, of the top ten group of countries. Compared with the ccTLD-based statistics in Figure 6.1.2, at July 1998 New Zealand was in seventh place (compared with fifth) and Australia in ninth (compared with sixth). Two countries with a proportionately large number of hosts registered in the gTLDs, Canada and Sweden, have moved ahead of New Zealand, and another, Denmark, ahead of Australia.

One reason for the wide variability between countries with registrations in the gTLDs is that there are no restrictions on who may register in the commercially important .com domain, while there is a wide range of registration policies amongst the ccTLDs with some restricted to residents only and others being completely unregulated

6.2 Domain Name Registrations

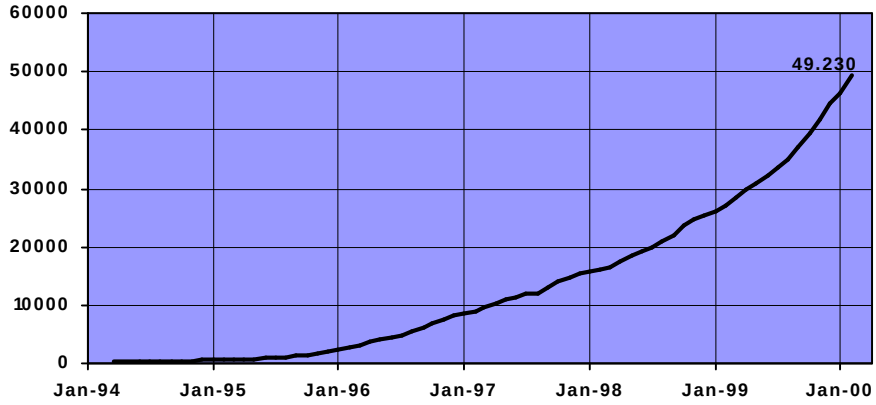
The data in this section is derived from figures compiled by Mark Davies of Victoria University of Wellington (Davies) and the OECD (OECD 1999).

When an organisation connects to the Internet, it typically registers a “domain name”. The numbers of New Zealand organisations connected to the Internet is estimated by counting the registered domain names in the .nz country code top level domain. Each third level New Zealand domain, for example name.co.nz, that has been registered is assumed to belong to a separate organisation be it a company, school, non-profit organisation or government department etc. Sub-domains are not counted, thus moc.govt.nz is counted but comms.moc.govt.nz is not.

The figures can be taken only as indicative of Internet activity rather than providing firm information about the number of organisations linking to the Internet in New Zealand. There are few restrictions on who may register in the .nz domain, especially the most popular subdomains .co.nz (commercial organisations) .org.nz and .net.nz. Some organisations have multiple registrations and some registrations are from overseas. Conversely, many New Zealand organisations have registrations in other domains, especially the generic top level domains (gTLDs), such as .com. According to the New Zealand Registry (Domainz), the number of off-shore registrations in .nz is around 5% of the total, and which is roughly equivalent to the number of New Zealand registrations in the gTLDs (see Section 6.1).

Figure 6.2.1shows the total number of network connected organisations as a time series since July 1994. There has been strong growth in the registering of domains in New Zealand, particularly over the last five years. At 1 February 2000, there were 49,250 registered domain names in the .nz domain.

Figure 6.2.1 New Zealand Internet Domains



6.3 Types of Organisation on the Internet

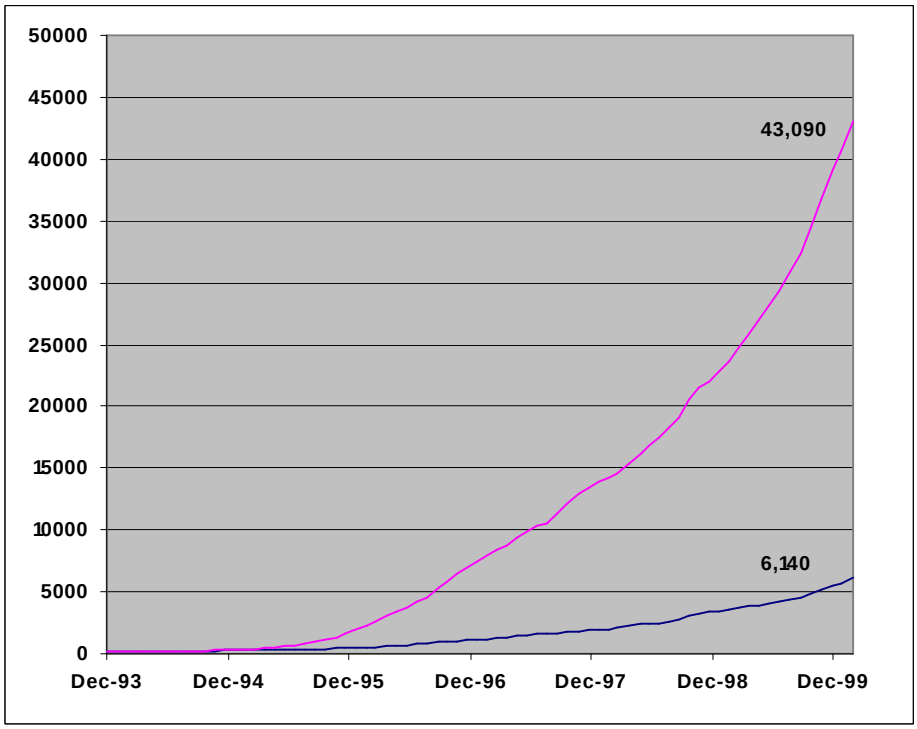
Organisations are normally allocated domain names according to organisation type, with the penultimate part of a name (or second level domain), such as the “co” in <name.co.nz> used to categorise domains. The following second level domains are used in New Zealand:

Second Level Domain	**Normally Used By:**
ac.nz	Tertiary educational institutions
co.nz	Companies
cri.nz	Crown Research Institutes
gen.nz	Individuals and organisations which do not fit the other categories
govt.nz	Central government agencies and local and regional councils
iwi.nz	Iwi organisations
mil.nz	Military organisations
net.nz	Internet Service Providers
org.nz	Non-profit organisations and incorporated societies
school.nz	Schools

Note that the table represents customary usage and registering organisations free to choose between several secondary level domains. For example, ISPs have been registered in .ac.nz, .gen.nz and .co.nz as well as .net.nz. While there is provision for individuals to have domain names of their own in the .gen.nz domain, most do not. Therefore numbers of domains registered is not a good indicator of individuals using the Internet.

Figure 6.3.1 shows the split of commercial (.co.nz) to non-commercial organisations (all other second level domain names registered).

Figure 6.3.1 Commercial vs non-commercial domains



Most of the increase in registered domain names is due to the registration of commercial domains, which have increased from 2,551 to over 43,000 in four years. There has also been strong growth in the numbers of non-commercial domains registered.

Figure 6.3.2 shows the annual growth rate of the registration of commercial domain names. The annual growth rate peaked in April 1996 at 616% when registrations were below 3,000, and fell off steadily, to 63% in 1998. Since then the annual growth rate has increased steadily, reaching 83% in February 2000.

Figure 6.3.2 Commercial registrations on the Internet in New Zealand

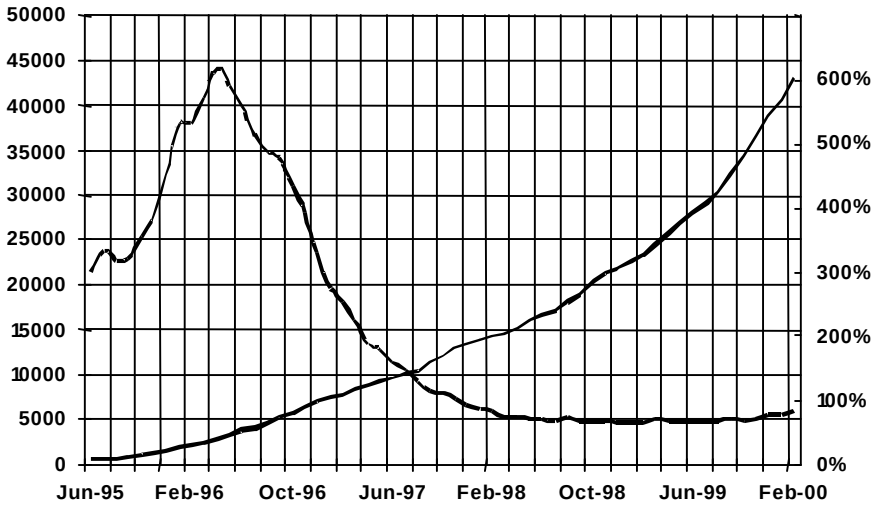
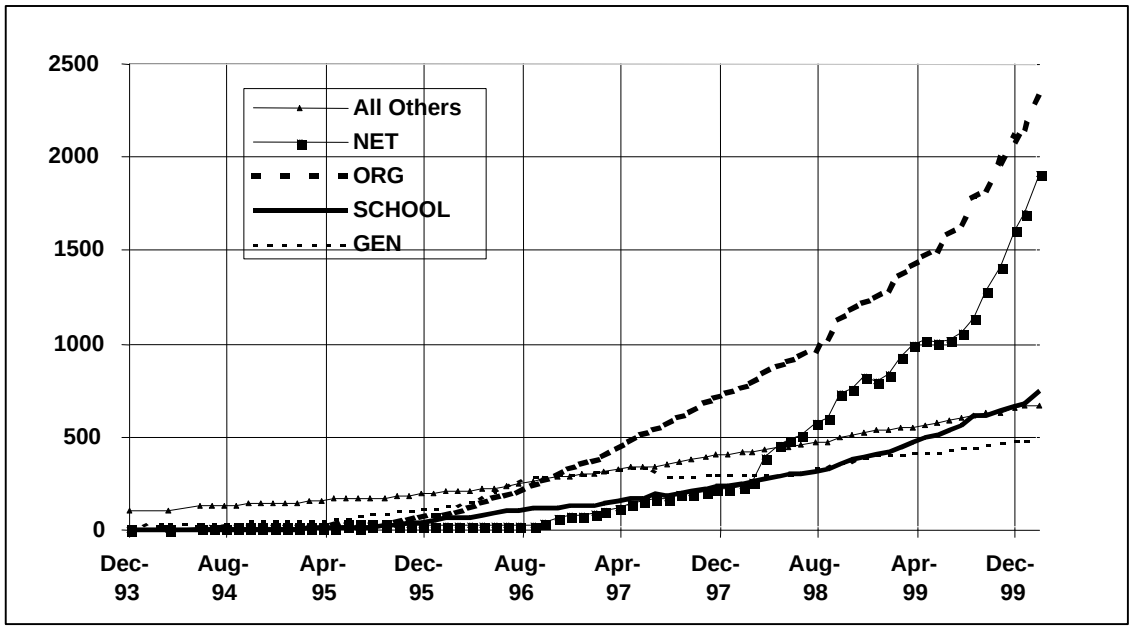


Figure 6.3.3 shows the growth in the non-commercial domains. The 'all others' category includes .govt.nz, .ac.nz, .cri.nz which were most significant in the early years of Internet development but are relatively less significant now. Also included are .iwi.nz and .mil.nz, both with very low numbers of registrations. The relatively rapid increase in registrations in .org,nz shows increasing interest in the Internet by non-profit and community organisations. In recent years there has also been increasing use of the Internet by schools as shown by the growth in .school.nz (to 740 in February 2000).

Figure 6.3.3 Non-commercial registrations on the Internet in New Zealand

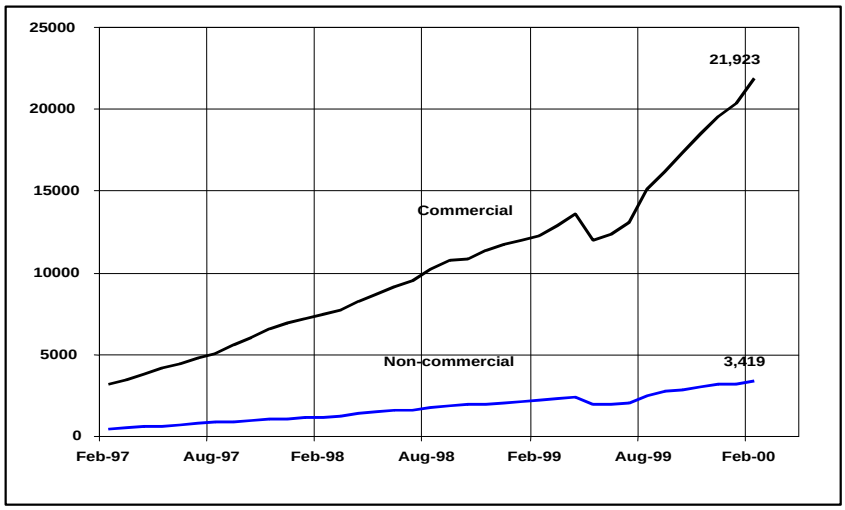


6.4 Organisations with World-wide Web Sites

The number of organisations with a World-wide Web site gives a better measure of the actual numbers of organisations actively involved in the Internet than does the number of domain names registered. Organisations will most commonly have just one Web site even if they have registered several domain names. The number of Web sites is estimated by counting all the domain names with the format: www.name.domain.nz. However, this only gives an estimate of the number of Web sites, as it over counts organisations using more than one address, excludes Web sites which to not start with 'www' and does not take into account non-active Web sites.

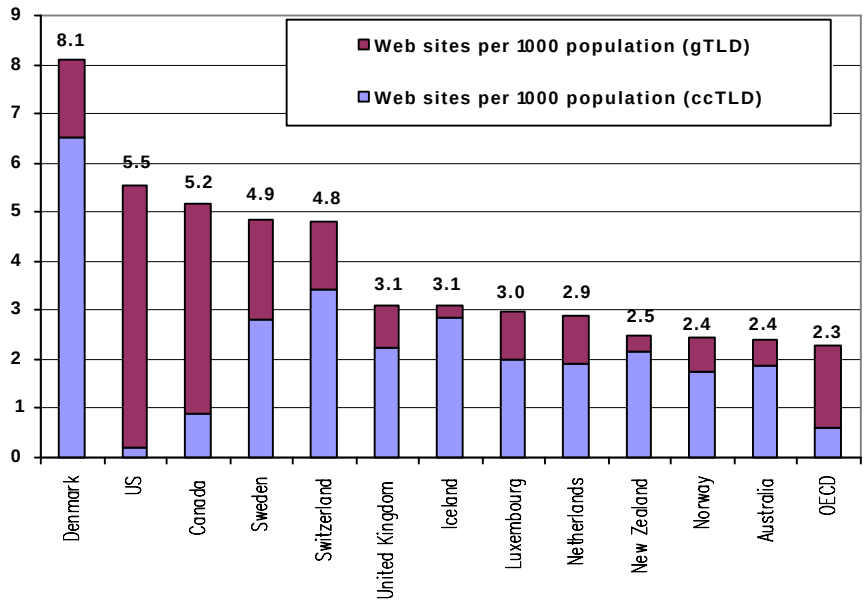
Figure 6.4.1 shows the total number of sites in the .nz domain split into commercial (co.nz) Web sites and non-commercial Web sites estimated in this way from February 1997 to February 2000. There were 25,342 Web sites in .nz as of February 2000 of which 21,923 or 87% have been set up by commercial organisations. Overall there was an increase of 75% in Web sites over the year from February 1999.

Figure 6.4.1 New Zealand (.nz) WWW sites



As noted in section 6.2, many organisations register names in the generic top level domains (such as .com), rather than country code top level domains such as .nz. Figure 6.4.2 shows the numbers of Web servers per 1000 population in the top 12 OECD countries, along with the OECD average (OECD 1999). The distribution pattern is significantly different from the host distribution shown in Figure 6.1.3, and probably gives a more accurate picture of actual Internet use by organisations in the different countries, with New Zealand just above the OECD average.

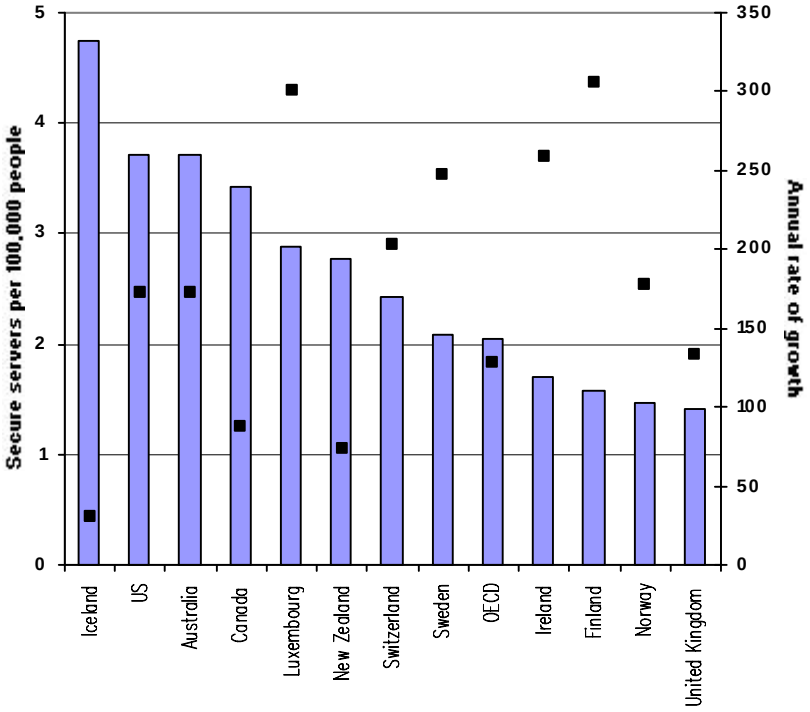
Figure 6.4.2 Web servers per 1000 population (OECD countries, July 1998)



Electronic commerce activity is probably best measured by the number of sites which provide secure services on the Web. The OECD report includes information collected by Netcraft (http://www.netcraft.co.uk/) about the numbers of secure Web sites with third party certification suitable for encrypted credit card transactions over the Internet. Note that, unlike statistics which rely on domain names for an indication of country, Figure 6.4.3 is based on the actual geographic address of the business.

New Zealand has a comparatively high level of use of secure server by international standards, but a relatively low annual level of growth (74%) compared with the OECD average (128%).

Figure 6.4.3 Secure Web servers for electronic commerce (August 1998)



7. IT Use in New Zealand Schools

This report draws on information derived from surveys carried out in 1998 and 1999/2000 by the Information Technology Advisory Group (ITAG) which were in turn based on earlier surveys carried out by the Telecom Education Foundation between 1993 and 1996 (ITAG 1999 and other references therein). It also includes information provided by the Ministry of Education from a survey of all New Zealand schools conducted in 1996.

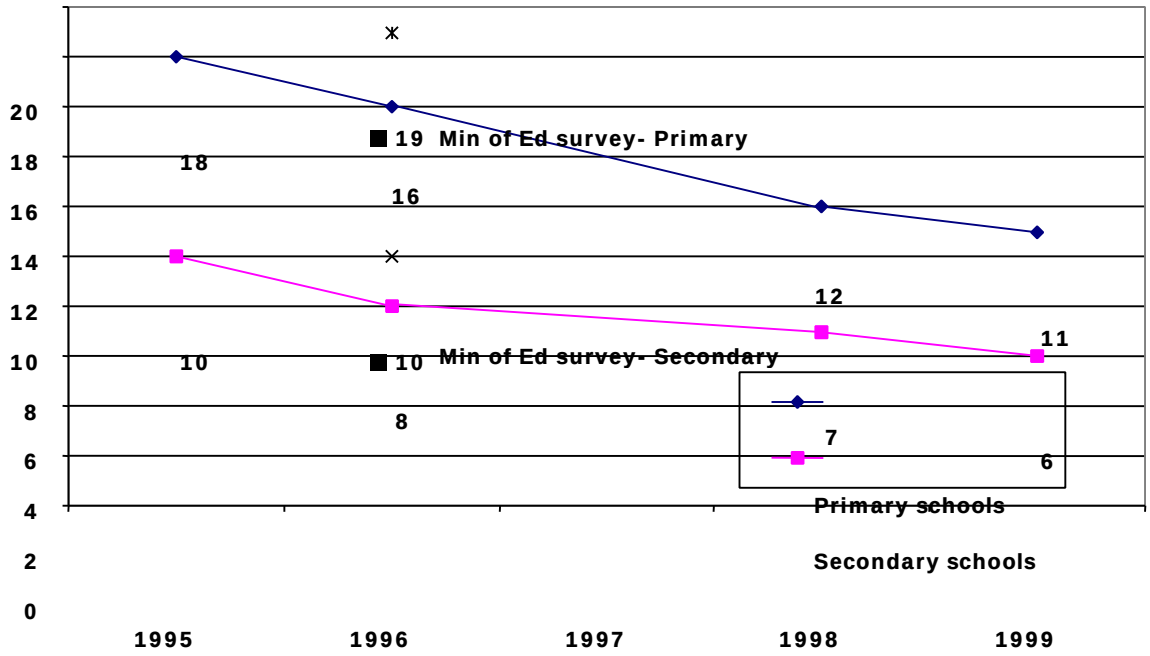
The latest ITAG survey research is from a sample of 271 primary and 167 secondary schools and the earlier ITAG and TEF surveys were of similar size. These surveys may be biased towards schools with a higher than average interest in IT issues and will therefore tend to slightly overestimate numbers.

7.1 Computers in Schools

The Ministry of Education survey indicated that there were just under 52,000 computers in schools in 1996. Extrapolation of the results of the 1998 ITAG survey indicated that there were around 75,000 computers in schools in 1998, an increase of 44% in two years.

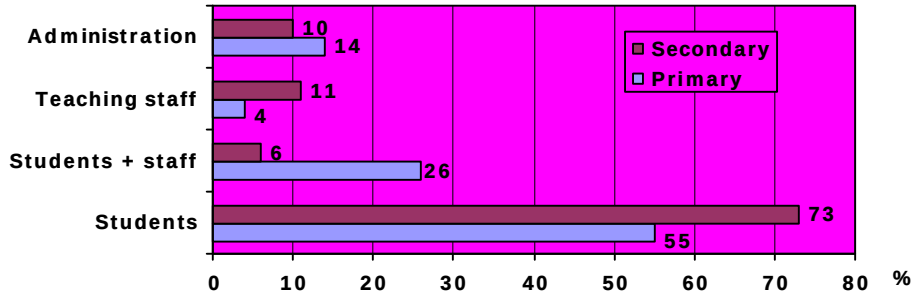
Figure 7.1.1 shows the number of students per computer combining the results of the TEF and ITAG surveys to give a time series, with the 1996 Ministry of Education figures superimposed. Note that the latter survey, despite covering 98% of schools, is considered to have underestimated the total numbers of computers because of misunderstandings about some of the questions.

Figure 7.1.1 Students per computer



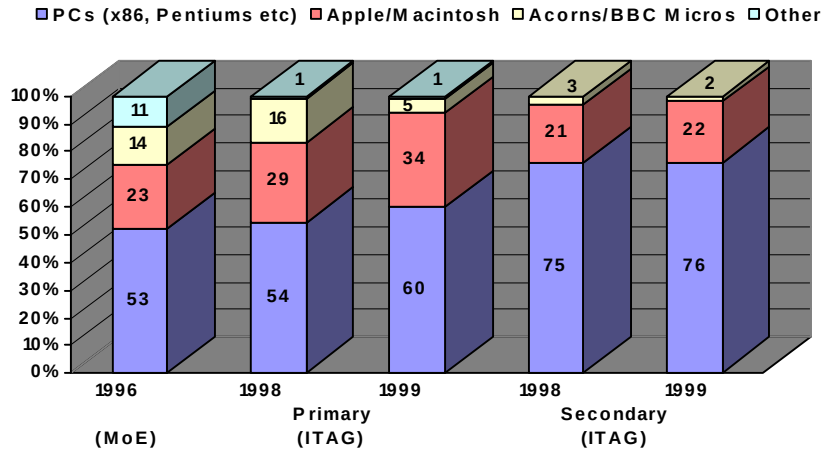
The ITAG survey asked for information about how computers were being used in schools. When administration computers are excluded, in 1999 there was one computer for every 14 students in primary schools (unchanged from 1998) and one per seven students in secondary schools (compared with eight in 1998). Figure 7.1.2 shows the main uses for computers in New Zealand schools in 1998.

Figure 7.1.2 Main uses for computers in schools (1998)



Both the ITAG and Ministry surveys asked for information about the types of computers in use in schools. The results are shown in Figure 7.1.3. Note that the Ministry survey combined results from secondary and primary schools.

Figure 7.1.3 Types of computers in schools

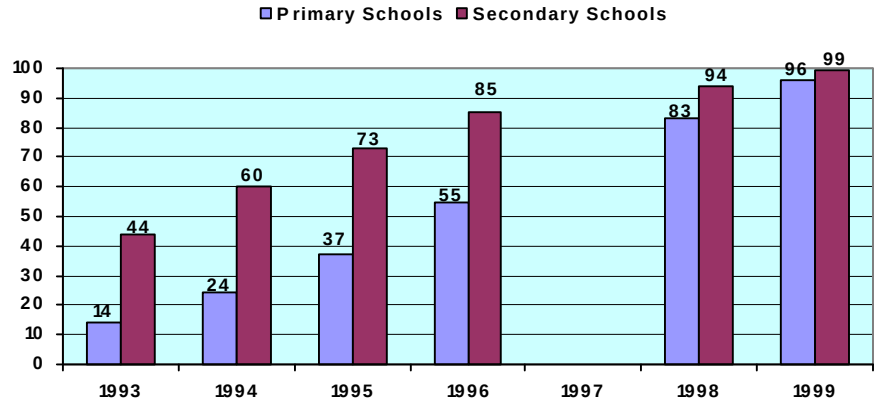


Since 1996 there has been a move to Intel/MS Windows type PCs as the older model Acorn/BBC Micros and 'Others' have been replaced to the extent that these have almost disappeared from the latest survey. The proportion of Apple/Macintosh computers has been maintained and increased slightly between the 1998 and 1999/2000 surveys, especially in primary schools.

7.2 Internet Connections in Schools

The overwhelming majority of schools now have some form of connection to the Internet. Combining the TEF and ITAG surveys provides the time series in Figure 7.2.1. The TEF surveys from 1993 to 1995 asked if the school had a modem, the 1996 survey and the ITAG survey asked about Internet access.

Figure 7.2.1 Schools with access to the Internet



Usage of the Internet is quite low, although it appears to be increasing rapidly. In 1998, about 20% of schools (primary and secondary) reported that 25% or more teaching staff used Internet email during a typical week. The 1999/2000 survey indicated that about 50% of schools reported that 25% of teaching staff are regularly using email.

The number of schools, especially primary schools, with their own domain name is low but increasing rapidly. There are about 2,750 schools in New Zealand and 740 registrations in the .school.nz domain as of February 2000, compared with 445 a year earlier (see Section 6.3).

8. Enrolments in University Information Technology Courses

Information in this section is derived from a survey of IT and closely related courses taught in New Zealand universities in 1999 conducted between December 1999 and February 2000 by the Ministry of Economic Development (formerly, the Ministry of Commerce). A search of university calendars for 1999 identified 659 courses which had some direct relevance to IT, of which 519 had students enrolled in 1999. For the purposes of the survey a course was defined as equivalent to one paper for one semester, or roughly 0.125 of an effective full time student year (EFTS). In all, there were 42,675 student enrolments (including students enrolled in several courses) of which 34,335 successfully completed, giving an overall pass rate of 80.5%.

These figures give a very conservative picture of tertiary training in IT in New Zealand. The new Auckland University of Technology has not been included and polytechnic courses were not surveyed despite many such institutions offering very relevant opportunities for study. In addition, some other university courses which could have been included were undoubtedly overlooked. It is hoped that these deficiencies will be overcome in future surveys.

8.1 Courses offered

Figure 8.1.1 shows the numbers of courses included in the survey distributed by relevance and level. ‘Relevance’ was assessed according to whether the course was intended to teach the use of development tools (such as programming languages), rated ‘highly relevant’; use of IT packages (such as drawing or modelling packages), rated ‘relevant’; or about the impact or management of IT, rated ‘somewhat relevant’.

There are generally much greater numbers of, and more specialised, courses offered at higher levels.

Figure 8.1.1 IT and related courses included in survey

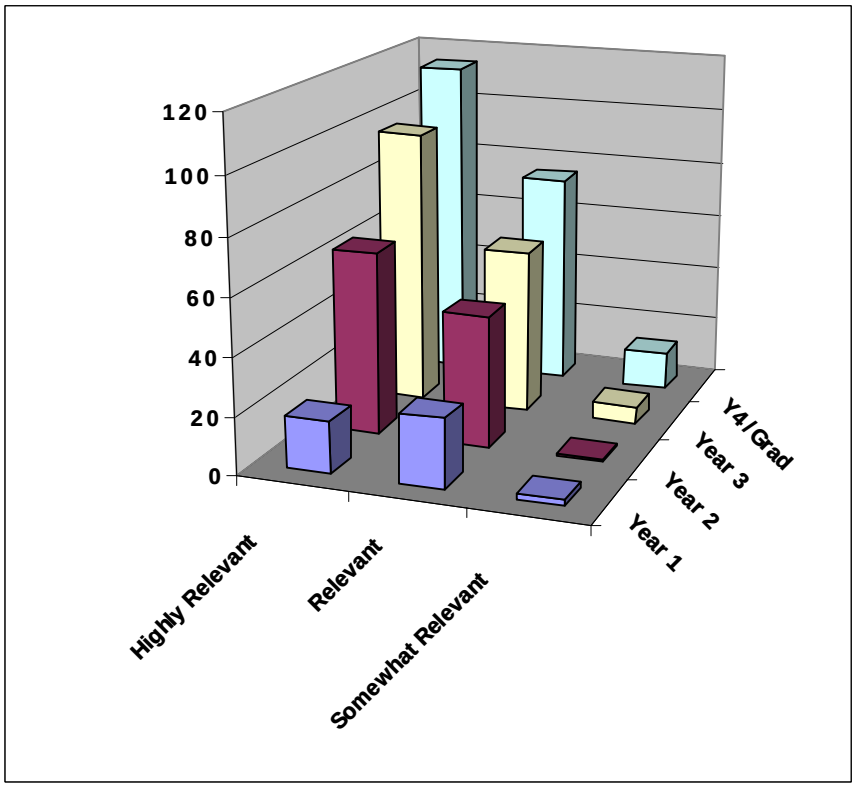
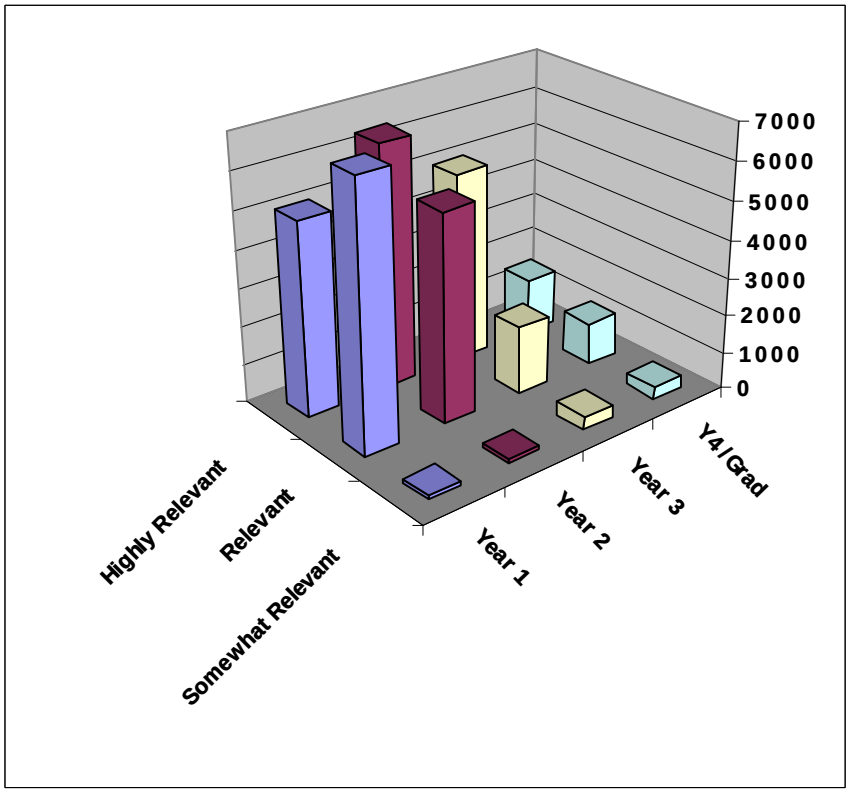


Figure 8.1.2 shows the number of students completing courses distributed by relevance and level. Student numbers completing ‘highly relevant’ courses are maintained through to the end of the normal undergraduate course (Year 3). The number of students completing Year 1 and 2 ‘relevant’ courses is substantially greater than for Year 3, possibly reflecting a high level of use of computing tools in the teaching of more introductory undergraduate material. The relatively large number of graduate students completing ‘somewhat relevant’ courses reflects a emphasis in graduate schools on management of IT and on electronic commerce, which is likely to increase in future years.

Figure 8.1.2 Numbers of students completing courses



8.2 University comparisons

Universities in New Zealand have a high degree of autonomy in the design and content of courses. In order to place courses on a comparable basis, a 'relevance value' was calculated for each course:

Relevance value = level *times* relevance *times* relative weight

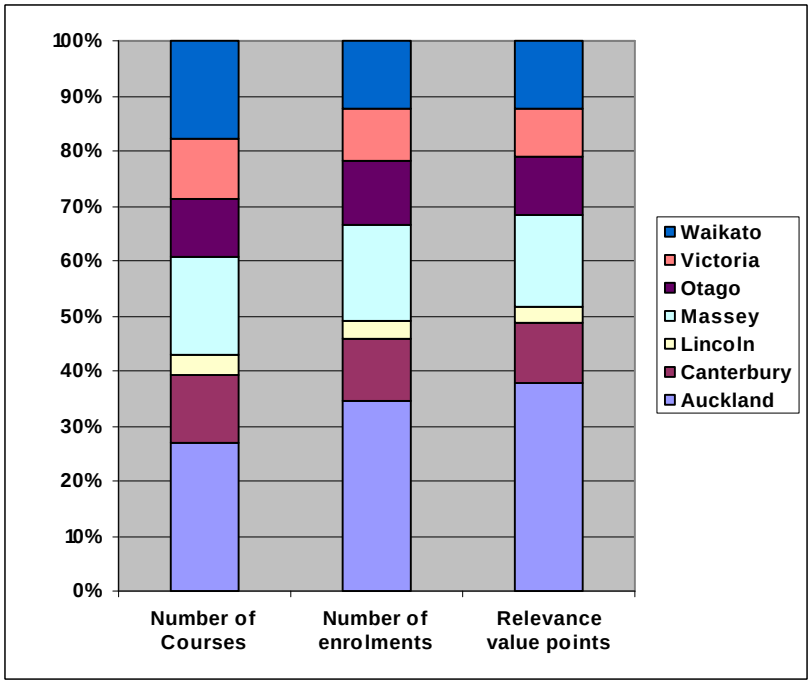
Where:

	Possible values	Multiplier value
Relative weight	0.125 EFTS	1
	0.25 EFTS	2
	Etc	
Level	Year 1	1
	Year 2	2
	Year 3	3
	Year 4/graduate	4
Relevance	Somewhat relevant	1
	Relevant	2
	Highly relevant	3

'Relevance value points' for courses were calculated by multiplying the 'relevance value' by the number of students completing the course.

The University of Auckland, being by far the largest university has the highest number of enrolled students. It has both a larger number (and range) of courses than any of the other universities, and a higher share of the 'relevance value points' than its share of enrolments suggesting that it has more 'IT relevance' proportionately compared with other universities. This is to be expected given that it has one of the country's two engineering schools. On the other hand, the University of Canterbury, which also has an engineering school, seems to have less 'IT relevance' than might be expected.

Figure 8.2.1 Comparisons between different universities



Overall pass rates between the universities range from 78.3% at Massey University to 84.6% at Victoria University. In general, pass rates for first year courses (overall, 74.3%) are much lower than subsequent years which range up to 90.6% for Year 4/Graduate level courses.

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