

**Statistics
on
Information Technology
in
New Zealand**

**Frank March
IT Policy Group
Ministry of Commerce
April 1999**

Table of Contents

1. Introduction	3
1.1 Acknowledgements	3
1.2 Defining Information Technology	3
2. Imports and Exports	4
2.1 Hardware Imports	5
2.2 Hardware Exports	7
2.3 Software and Services Exports	11
3. New Zealand IT Market	13
4. IT Industry Employment	14
4.1 IT Industry	15
4.2 IT Occupations	18
5. Computers in Homes	23
6. Computers on the Internet	25
7. Organisations on the Internet	29
7.1 Types of Organisation	30
7.2 Direct Connection vs Mail-Only Connection	34
7.3 New Zealand World Wide Web Sites	35
8. IT Use in New Zealand Schools	36
8.1 Computers in Schools	37
8.2 Internet Connections in Schools	39
9. Enquiries.....	40
9.1 Crown Copyright	40

1. Introduction

This is the sixth annual release of the Ministry of Commerce's Information paper. This paper includes:

- updated figures for IT hardware imports and exports;
- updated figures for trade in software and services and the size of the New Zealand information technology (IT) market;
- updated and revised figures for employment in segments of the IT industry;
- updated information on the numbers of computers in New Zealand homes compared with a selection of other electronic amenities;
- updated figures on the size of the Internet in New Zealand; and
- updated figures on the number of World Wide Web sites.

New information from a 1998 survey of IT in Schools has been used to provide updated information on:

- the number of computers in New Zealand schools; and
- the number of Internet connections in schools.

For the convenience of readers, information which is derived from the 1996 census has been carried over unchanged from the previous paper as published in March 1988. This information includes figures showing those employed in the IT industry and separately breakdowns of those employed in the IT industry by occupation, skill level, age, sex and ethnicity.

1.1 Acknowledgements

The majority of the figures in this paper have been sourced from Statistics New Zealand. Other sources are credited specifically where they have been used. Some of the figures are taken from a survey of IT businesses conducted by Statistics New Zealand and jointly sponsored by the Ministry of Commerce, the Information Technology Association of New Zealand, Tradenz and Statistics New Zealand. Information on the use of information and communications technology in schools is derived from a Ministry of Education survey of schools in 1996, research by the Telecom Education Foundation from 1993 to 1996 and the Information Technology Advisory Group Survey of IT in Schools carried out in August 1998.

1.2 Defining Information Technology

As well as the traditional data processing industries, telecommunications and broadcasting are shown in many of the figures in this paper. This reflects the fact that these industries process information using technological means, and the increasingly blurred distinctions between these sectors.

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.

Additionally, a survey of IT businesses conducted by Statistics New Zealand measures both IT hardware and software exports. The survey, now in its fifth year, is sponsored by the Ministry of Commerce, 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 might reasonably be assumed to be March.

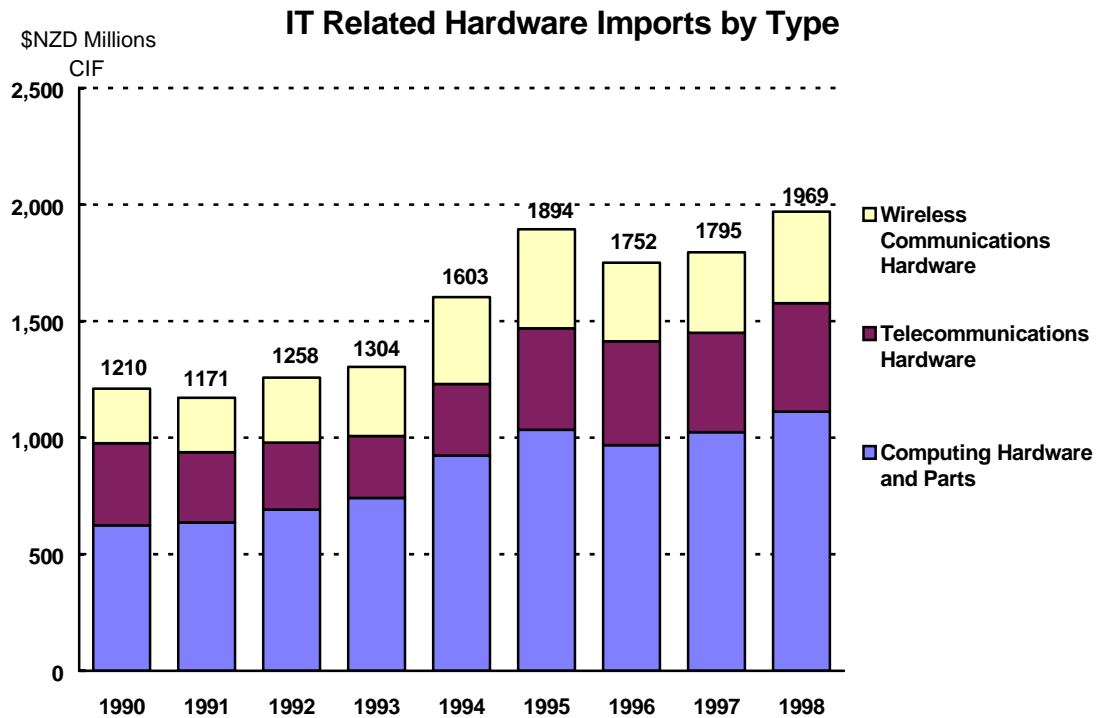
The 1998 survey attempts to provide better coverage of activity than previous surveys by including business units where IT activity is a secondary activity. This will lead to some increase in the figures for 1998 over previous years as firms not previously covered are now included. As with earlier surveys, this one does not cover IT businesses with 2 full time equivalent staff or less, which will tend to cause the survey to underestimate the actual export figures.

Information from the two sources cannot be directly compared because of differences in the accounting year, the differences in the treatment of export costs such as freight and insurance, and the restrictions imposed by the sample used for the survey.

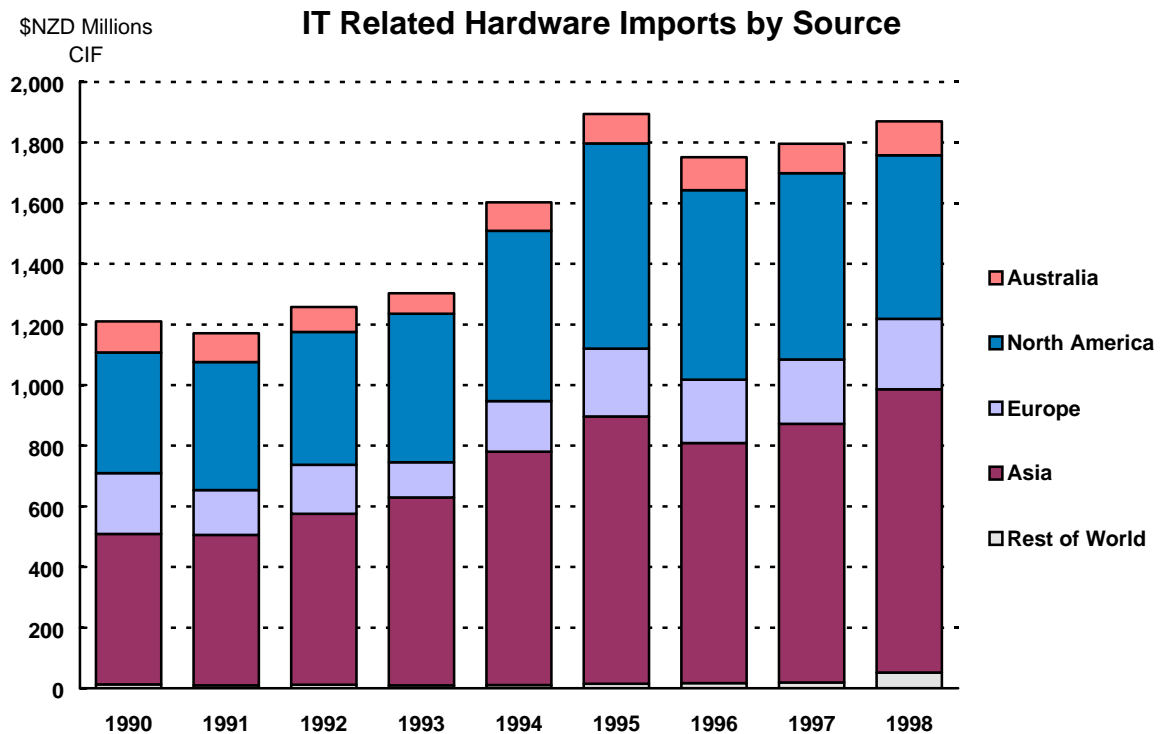
During 1998, the generally lower level of the New Zealand dollar and the collapse of the Asian currencies and markets could be expected to have a major impact on both import and export patterns.

2.1 Hardware Imports

The following chart shows a summary of New Zealand IT hardware imports for the last nine calendar years, based on Customs figures. The 1998 year shows a 10% overall increase in IT hardware imports from 1997, comprising 7% for *Computing Hardware and Parts*, 9% for *Telecommunications Hardware* and 14% for *Wireless Communications Hardware*.



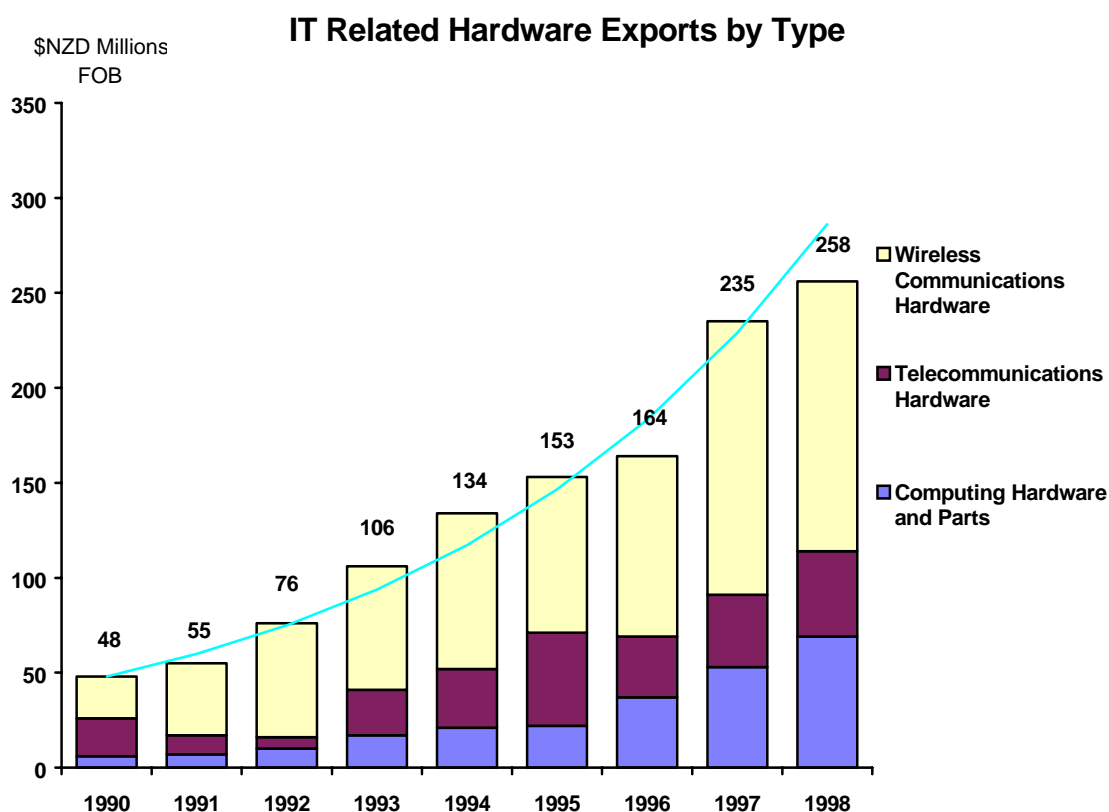
The information in the previous chart is shown again below subdivided by source, showing that the bulk of IT hardware imports are sourced from Asia and North America. Over the past three years there has been a decline in IT hardware imports from North America, by 12% in the 1998 year. Imports from Asia increased by 9% in 1998. Imports from Australia increased by 14%, from Europe by 10%, and there was a substantial jump in imports of 174% (to \$52 million) from the 'Rest of the World'.



2.2 Hardware Exports

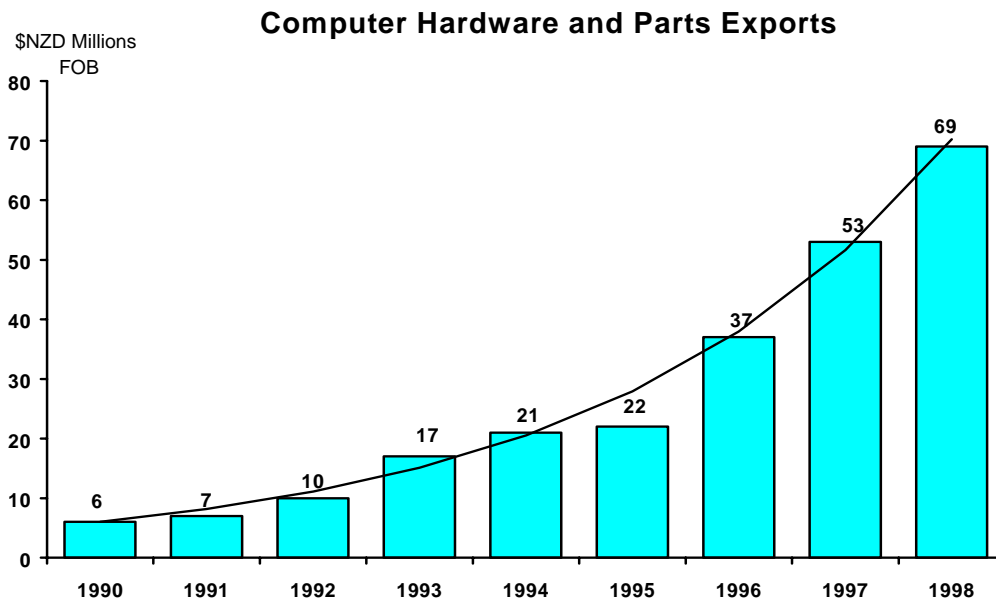
The following three charts show export figures based on Customs data, by calendar year.

The chart below shows a summary of New Zealand IT hardware exports for the last nine years.



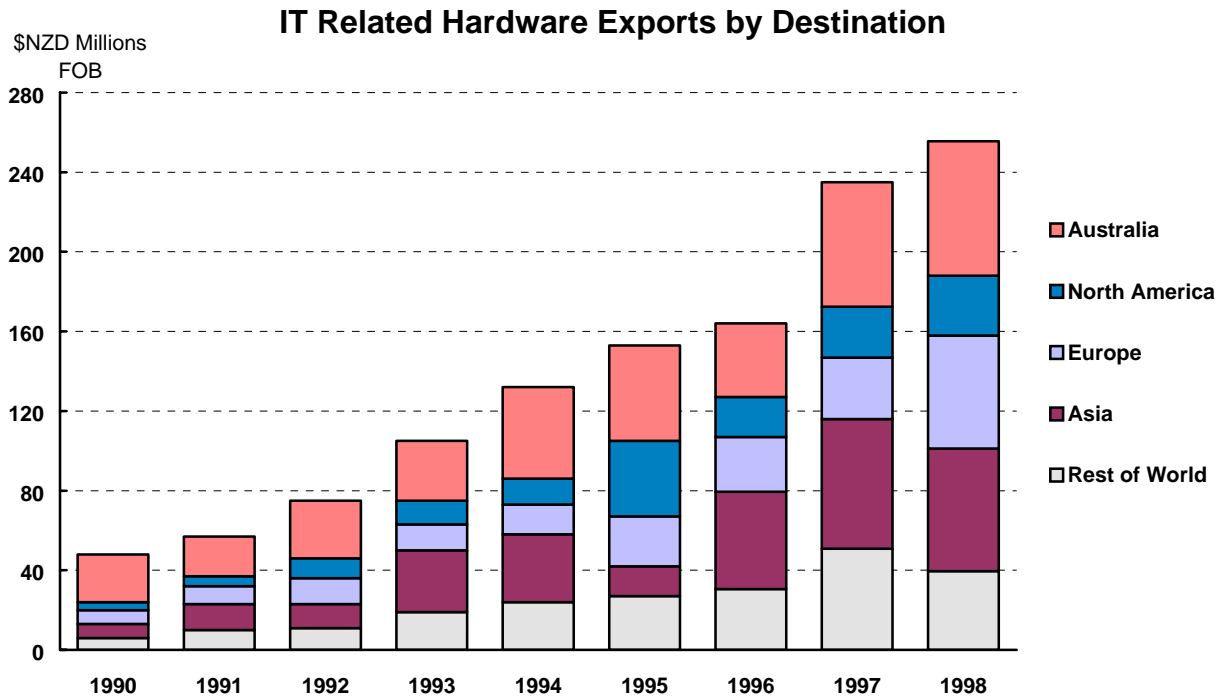
The chart shows that 1998 was a year of relatively modest overall growth for exports of IT hardware (8%), following the very strong growth of the 1997 year (43%). The export value of *Wireless Communications Hardware*, which comprises 55% of the total, was static compared with a 52% increase in 1997. On the other hand, *Telecommunications Hardware* exports grew by 18% and *Computing Hardware and Parts* grew by 30% in 1998. Overall, there has been steady growth of IT related hardware exports of around 25% per year since the beginning of the decade, as shown by the superimposed curve.

The previous chart refers to three categories of IT related hardware exports, the one below shows just the contribution of *Computer Hardware and Parts*:



There has been continued strong growth in this category, with a 30% increase in 1998 over 1997. The superimposed curve shows that overall, since the beginning of the decade there has been close to an average annual increase in exports in this category of 36%.

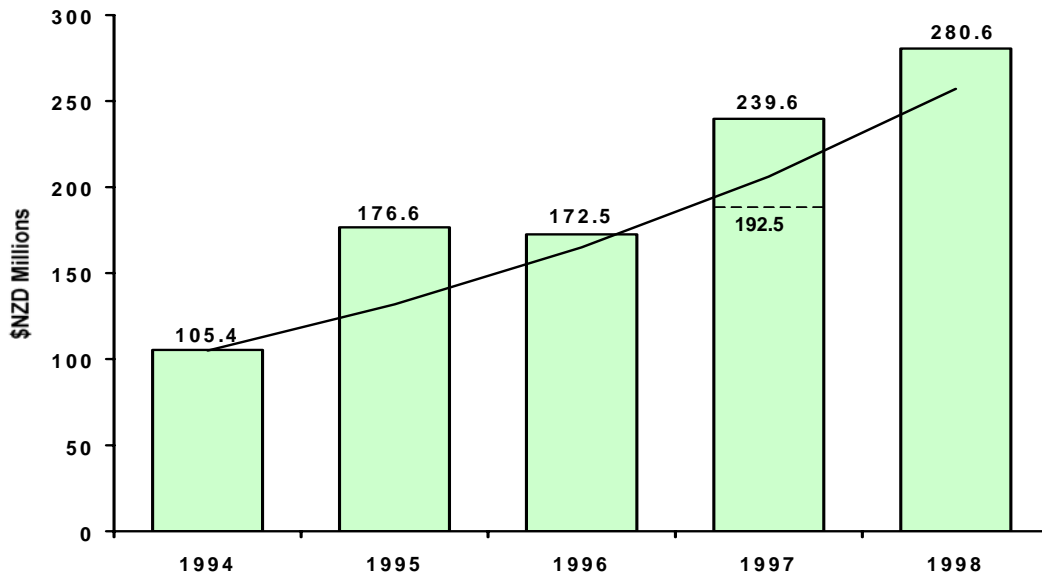
In the chart below, the total IT hardware exports are shown split by export destination.



In 1998, there was a jump of 84% in the value of exports to Europe with more modest increases in exports to Australia (8%) and North America (17%), offset to some extent by falls in exports to Asia (6%) and the Rest of the World (22%). This follows on from substantial increases in the value of exports to all five areas 1997, especially in exports to Australia, the Rest of the World and Asia.

The next chart is based on the 1998 Statistics New Zealand IT survey. The value of hardware exports was \$281 million for the 1998 financial year, up from \$173 million in 1996 and \$240 million in 1997. Note that these figures are not directly comparable to the IT hardware export figures captured at the border, and given earlier in this paper. The figures do, however, show similar trends, as illustrated by the superimposed curve which corresponds to an annual 25% growth rate.

IT Hardware Exports

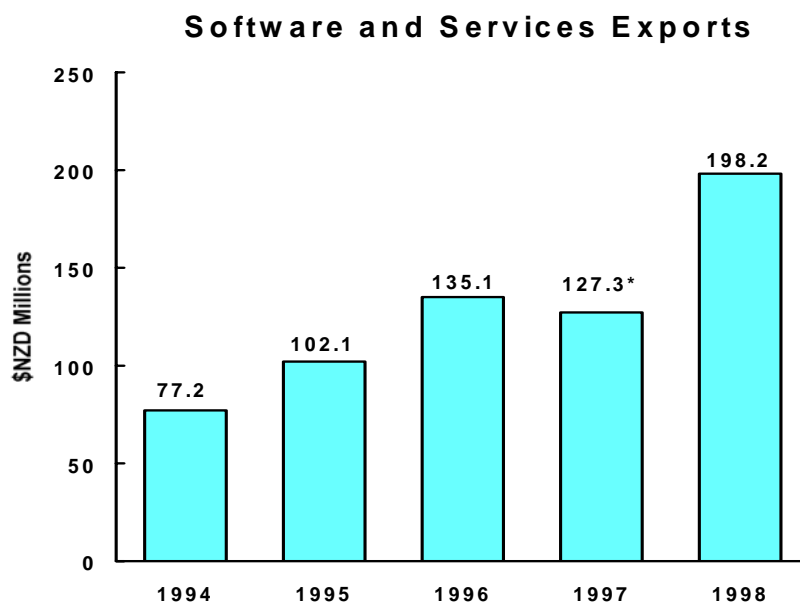


*The 1998 figure has been revised (from \$192.5 million to \$239.6 million) since first published in last year's report due to more accurate information becoming available as described below.

Note that a number of revisions were made to the 1997 survey data when the 1998 data was presented as more accurate information has become available (similar revisions were made in previous years to the 1995 and 1996 figures). In some cases, the original survey responses were inconsistent with company accounts and in others the revisions follow a re-classification of income by some firms. Additionally, improved information about non-respondent companies has become available. The data for non-respondent companies is imputed based upon the experience of similar responding firms at the time of the survey. These revisions make direct comparisons between the 1997 figures used in this paper with the figures published in last year's paper not possible.

2.3 Software and Services Exports

The information in this section is taken from the survey of IT businesses conducted by Statistics New Zealand. Software and services have not been separated due to the difficulty of accounting for software maintenance revenue. The figures have been revised this year to include training and education in IT under Software and Services.



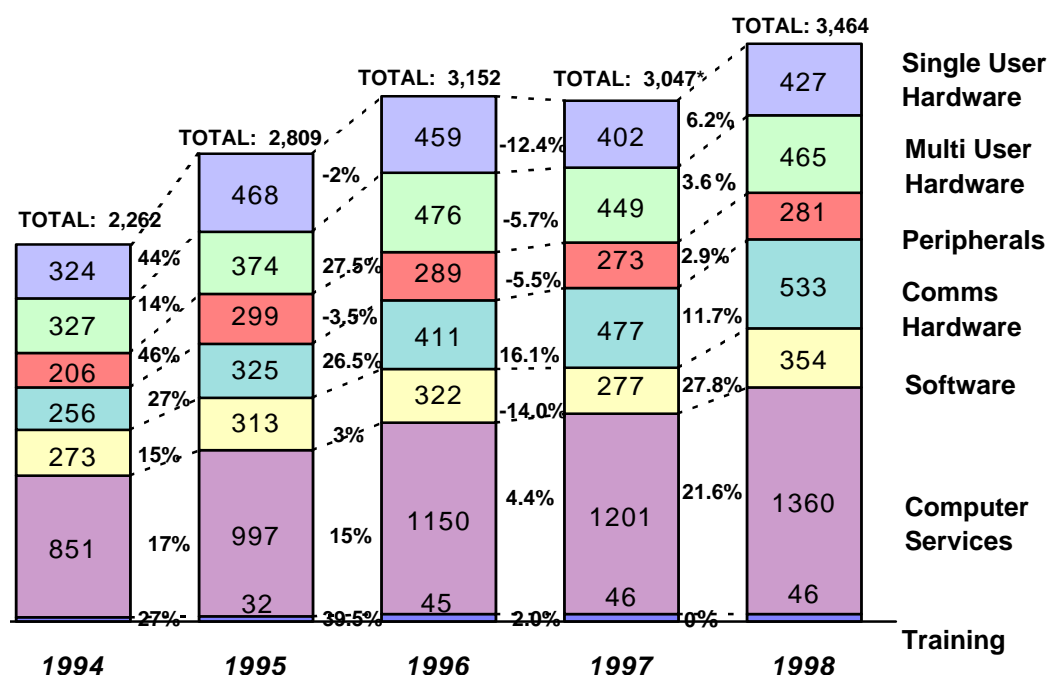
* The 1997 figure has been revised (from \$133.3 million to \$127.3 million) since first published in last year's report due to more accurate information becoming available as described in the previous section.

The survey found software and computer services exports of \$127 million (revised figures) in the 1997 financial year, a 6% decrease from 1996. The latest survey indicates a substantial increase in 1998 of 56%, to \$198 million.

3. New Zealand IT Market

The information in this section is taken from a survey of IT businesses conducted by Statistics New Zealand. For more information about the survey see the previous section, Software and Services Exports.

New Zealand Computer Hardware, Software and Services Market (NZ\$ millions)



* The 1997 figures include a number of revisions due to more accurate information becoming available as described in the previous section.

The figures used in the graph above represent goods and services sold to end users, and so do not double-count items which are sold by wholesalers and sold on by retailers.

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.

Sales in the New Zealand IT market rose by 13.7% in 1998, compared with a fall of 3.3% in the 1997 financial year, which in turn followed growth of 12.3%

in 1996 and 24% in 1995. Increases occurred in all categories but especially in *Computer Services* (21.6%) and *Software* (27.8%), in the latter case reversing a 14% decrease in 1997. Statistics New Zealand has attributed Y2K compliance and a shift away from computer hardware selling into computer service sales as contributing to this increased activity.

Combining the IT hardware categories shows that sales of IT hardware in 1998 rose by 6.6% to a total of \$1.706 billion. *Communications Hardware* sales increased substantially (11.7%) following strong growth in each of the previous years. By contrast, sales of *Single User Hardware* and *Peripherals* peaked in 1995, with the 1998 rise in sales volumes being insufficient to reverse falls in 1996 and 1997. Similarly, sales of *Multi User Hardware* in 1998 are below the level of 1996, following a fall in value in 1997. These trends may reflect ongoing and significant decreases in the prices of IT hardware and software, rather than actual decreases in sales volumes.

Sales of *Software*, *Computer Services* and *Training* increased by 15.5% to \$1.760 billion in 1998, from \$1.524 billion in 1997. This follows an increase of 12.3% in 1996 and a small increase of just 0.5% in 1997. (Note that in the previous report, this was reported as a 0.4% decrease, the difference being due to the revised figures for 1997.) The growth rate of software sales in 1998 more than reverses the decrease of 1997. Computer services sales have continued to increase strongly. By contrast, *Training and Education in IT* has remained static for the past three years.

4. IT Industry Employment

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

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

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

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 the table below).

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.

The next table 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.

	No. Employed	% Change of
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	1991	1996	Working Pop.
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.

4.1 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 below 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.

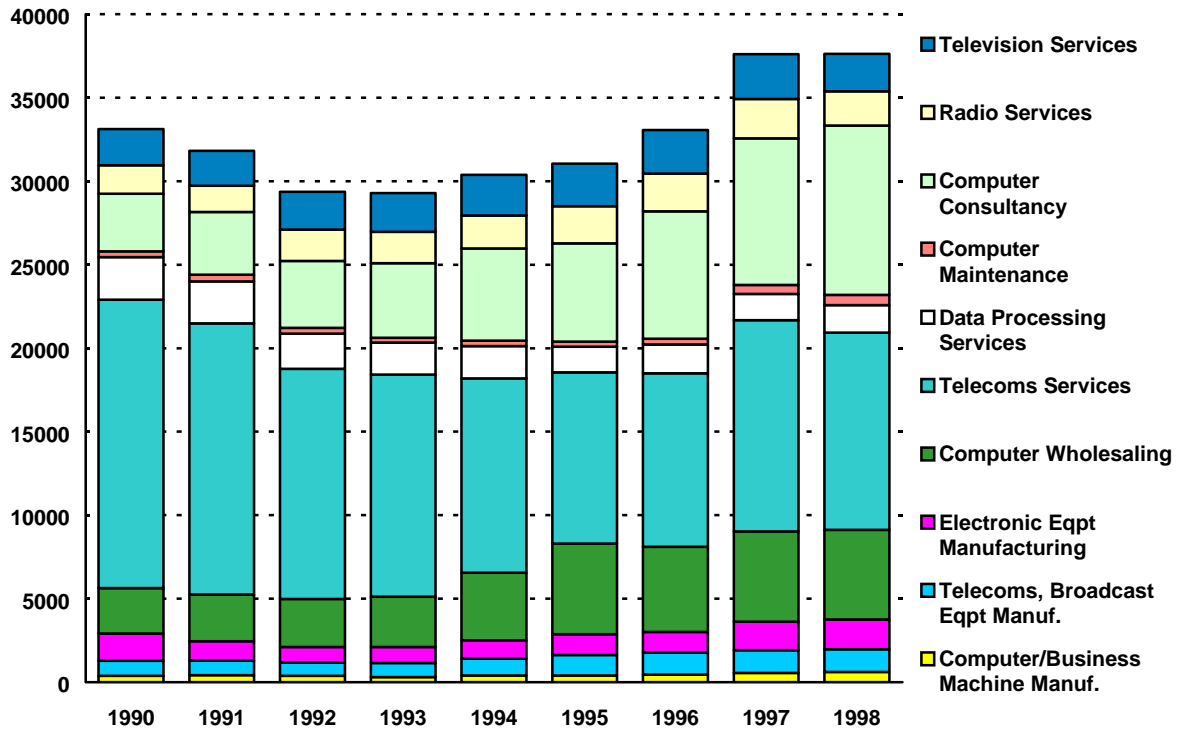
The information for the two charts below on employment in the IT industry is taken from the Statistics New Zealand Business Directory produced by Statistics New Zealand. Staff numbers are full time equivalents.

Prior to 1997, industry occupations were classified according to the New Zealand Standard Industrial Classification (NZSIC) which is no longer in use. Since 1997, the population for the output statistics has been selected using criteria based on the Australia and New Zealand Standard Industrial Classification (ANZSIC), which enables Australian and New Zealand employment data to be compared. Statistics New Zealand have been able to provide historical data based on the ANZSIC classification back to 1990, enabling comparison over time.

The 1996 business activity statistics were the first to be published using ANZSIC as the official industry classification. The population of some 5-digit ANZSIC categories in 1996 was only partially covered, due to the NZSIC-based selection, and the exclusion of certain industries from the statistics. With improvements to industry coverage in 1997, data at the 5-digit ANZSIC level is now fully covered. The chart below shows those occupations that

make up the IT industry under the ANZSIC classification for the years 1990 to 1998.

**Employment in IT Industries 1990-98
by ANZSIC Classification**



As the chart above indicates, following a slump in employment in 1993 to 29,282, employment in all the IT occupations grew strongly through to 1997 but has levelled off with the 1998 figure being very close to that of 1997 at 37,620.

Since the 1992/1993 period there has been consistent growth in the following categories (note that some categories continued to grow through the slump):

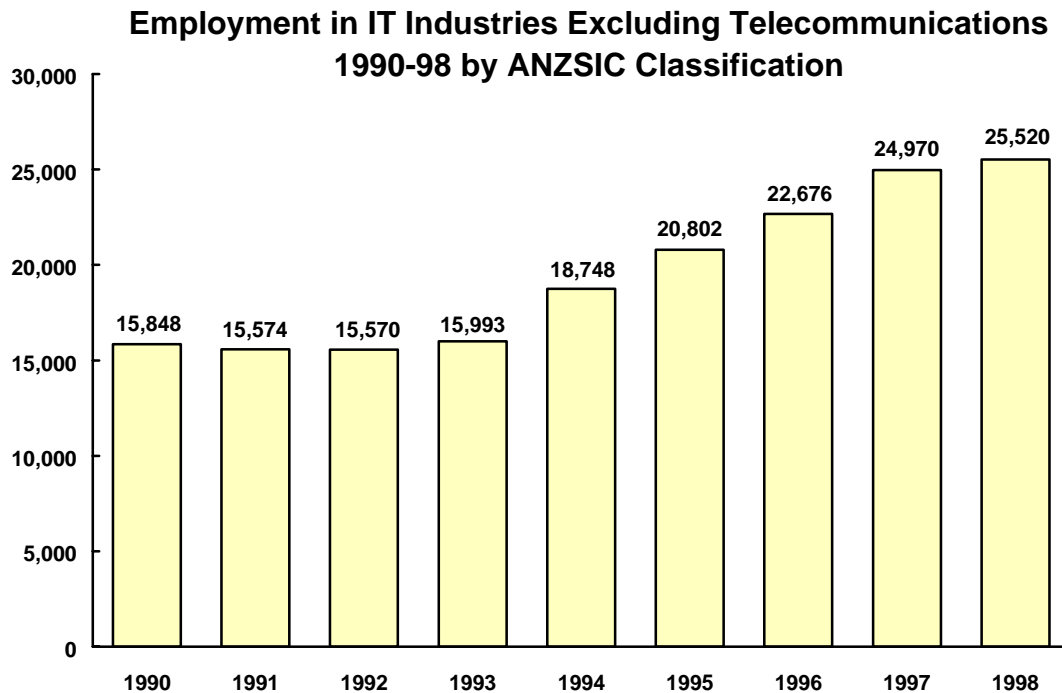
	Minimum year	Number	1997	1998
<i>Computer/Business Machine Manufacturing</i>	1993	313	560	610
<i>Telecommunications, Broadcast Equipment Manufacturing</i>	1992	821	1,360	1,360
<i>Electronic Equipment Manufacturing</i>	1992	917	1,710	1,780
<i>Computer Wholesaling</i>	1990	2,733	5,400	5,380
<i>Computer Maintenance</i>	1993	294	530	610
<i>Computer Consultancy</i>	1990	3,459	8,780	10,140

Some other categories have shown relatively consistent declines since the start of the period:

	Maximum year	Number	1997	1998
<i>Telecommunications Services</i>	1990	17,267	12,640	11,800
<i>Data Processing</i>	1990	2,553	1,580	1,650

Overall, there has been an increase in employment in this area of 4,205 since 1990 (12.7%) and 8038 since the low point of 1993 (27.5%).

The next chart shows the same data as the one above, but excludes those employed in *Telecommunications Services*. It follows much the same trend as the previous chart but shows flat or very limited growth through the 1991-93 period before significant increases take place from 1994 to 1998. This gives an overall percentage increase in employment in IT industries excluding *Telecommunications Services* of 61% from 1990 to 1998.



4.2 IT Occupations

The information in this section is taken from the 1991 and 1996 Censuses.

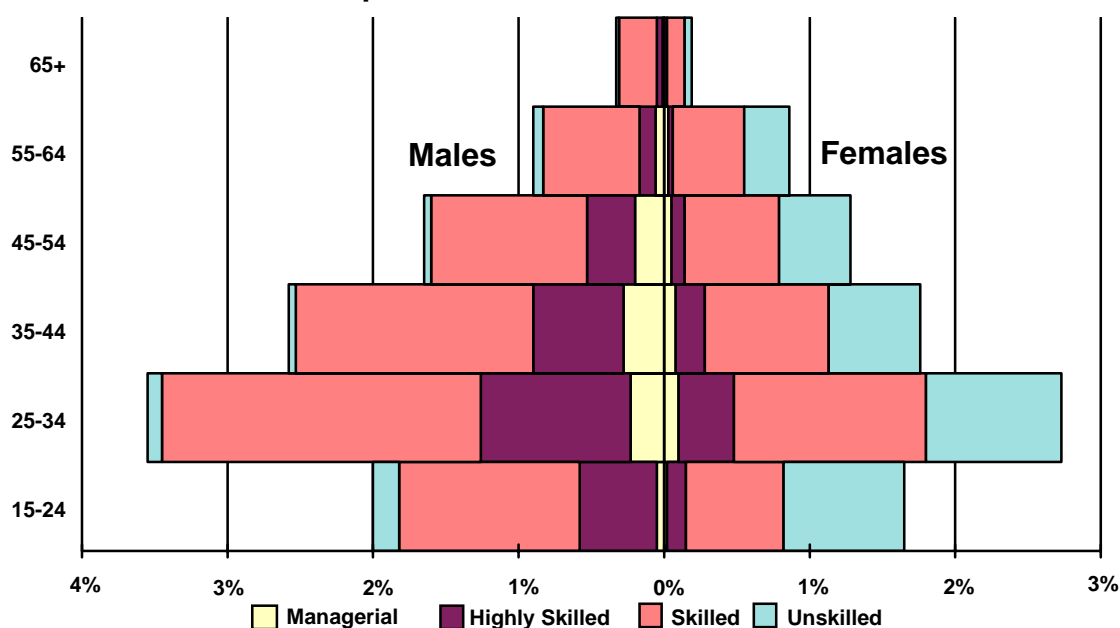
Occupations are categorised according to the occupation classification codes used by Statistics New Zealand. For the purpose of this paper, the following codes are deemed to be IT occupations. The only change to these classifications in 1996 was a change to the occupation previously classified as Computer 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 the two following charts.

Employment of the Working Population by Age and Sex in IT Occupations At Various Levels - 1996



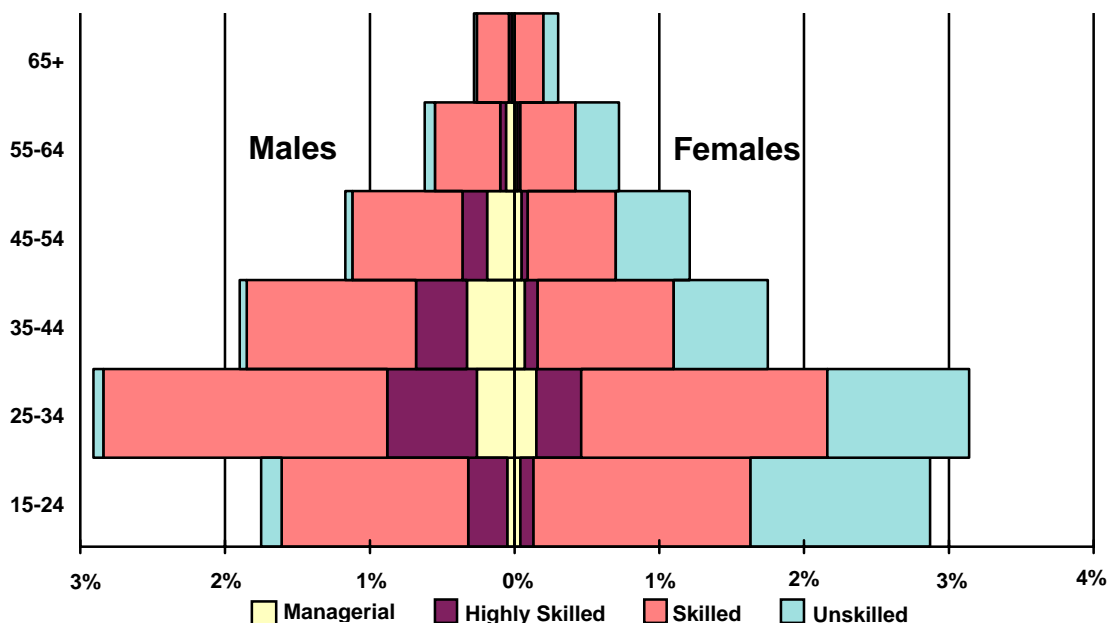
Each bar in this chart represents the numbers employed in IT occupations as a percentage of the numbers working in all occupations for a given age/sex group. These percentages are known as participation rates.

The chart 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. Women in contrast, still dominate the Data Entry occupation with significantly higher participation in this occupation than men.

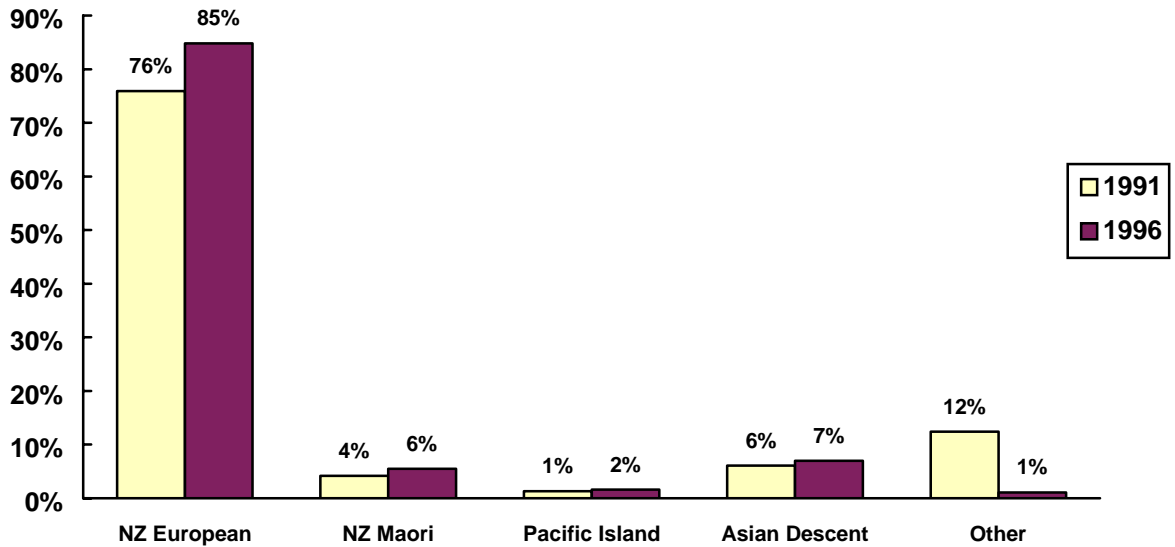
A comparison with the same data from the 1991 Census below, shows a relatively similar pattern to the 1996 chart. However, it also reveals a slight 'maturing' of the industry between 1991 and 1996. In 1991 85.2% of men in IT occupations were 44 or younger, while 86.4% of women in IT occupations were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

Employment of the Working Population by Age and Sex in IT Occupations At Various Levels - 1991



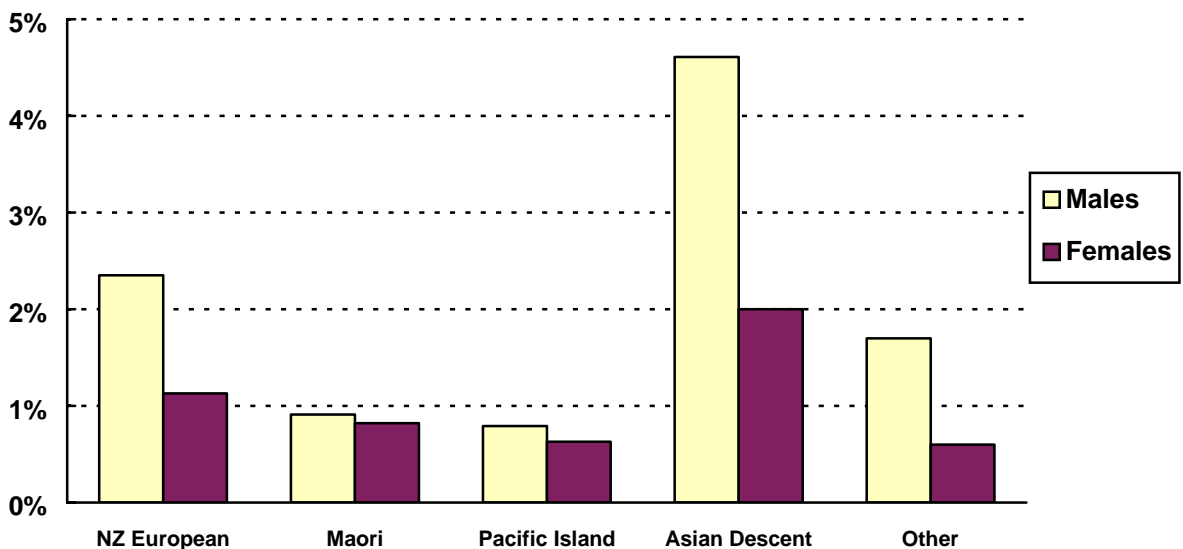
The following chart shows the breakdown by ethnic origin of those in IT occupations for 1991 and 1996, excluding data entry operators. The only changes of note between the two surveys is a large decrease in the proportion of people classifying themselves as Other and an increase in the NZ European category.

Breakdown of those Employed in IT Occupations by Ethnic Origin Excluding Data Entry in 1991 & 1996



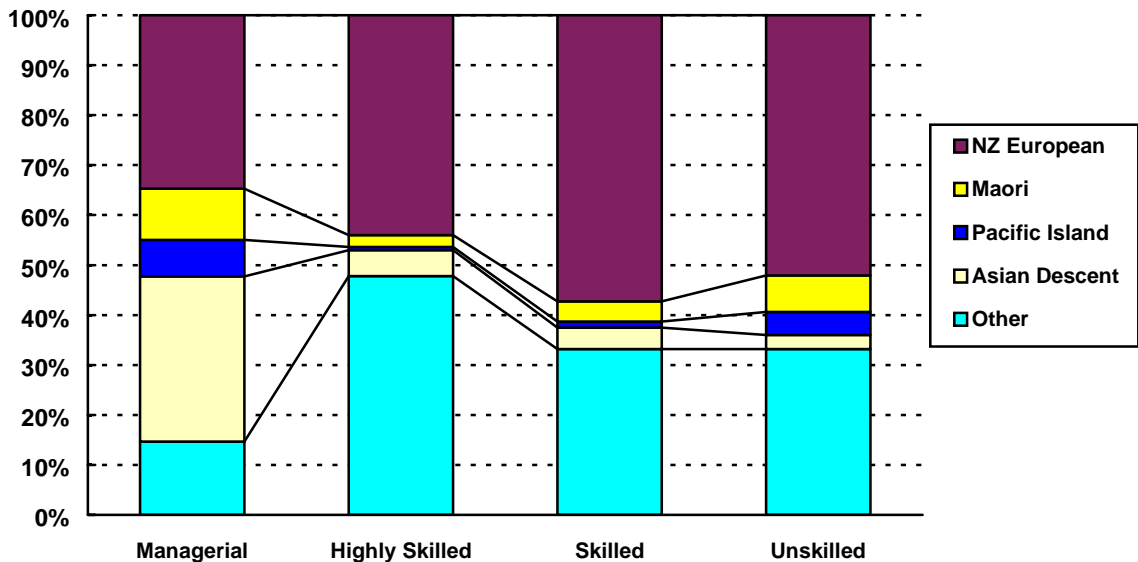
The next chart shows the numbers working in skilled IT occupations as a percentage of the working population in each ethnic group. While the participation of men and women identifying themselves as NZ European is higher than those of Maori and Pacific Islanders, the outstanding feature of the chart is 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.

Percentage of Working Population in IT Occupations by Ethnic Origin Excluding Data Entry in 1996



The chart below 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.

IT Occupations at Various Levels as a Percentage of Total Numbers in IT Occupations for each Ethnic Group - 1996

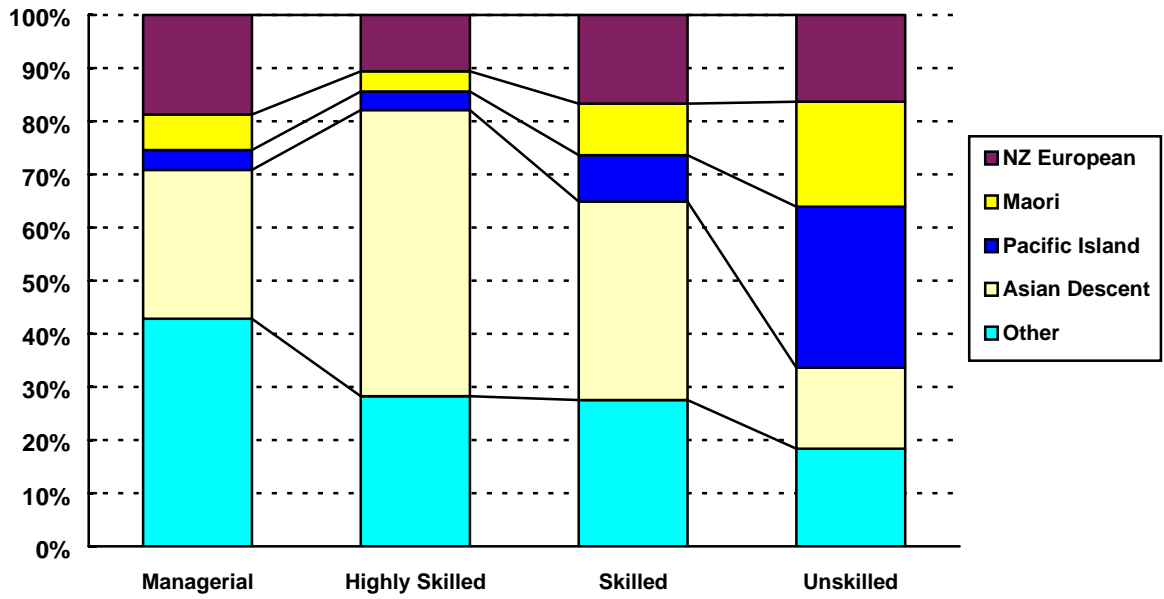


People categorising themselves as NZ European have high participation rates across all four levels of IT occupations. The Other group also shows relatively high participation rates, except at the managerial level. This is reflected by the significantly higher participation rate of people of Asian descent 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 above with the same data from 1991 below, 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%.

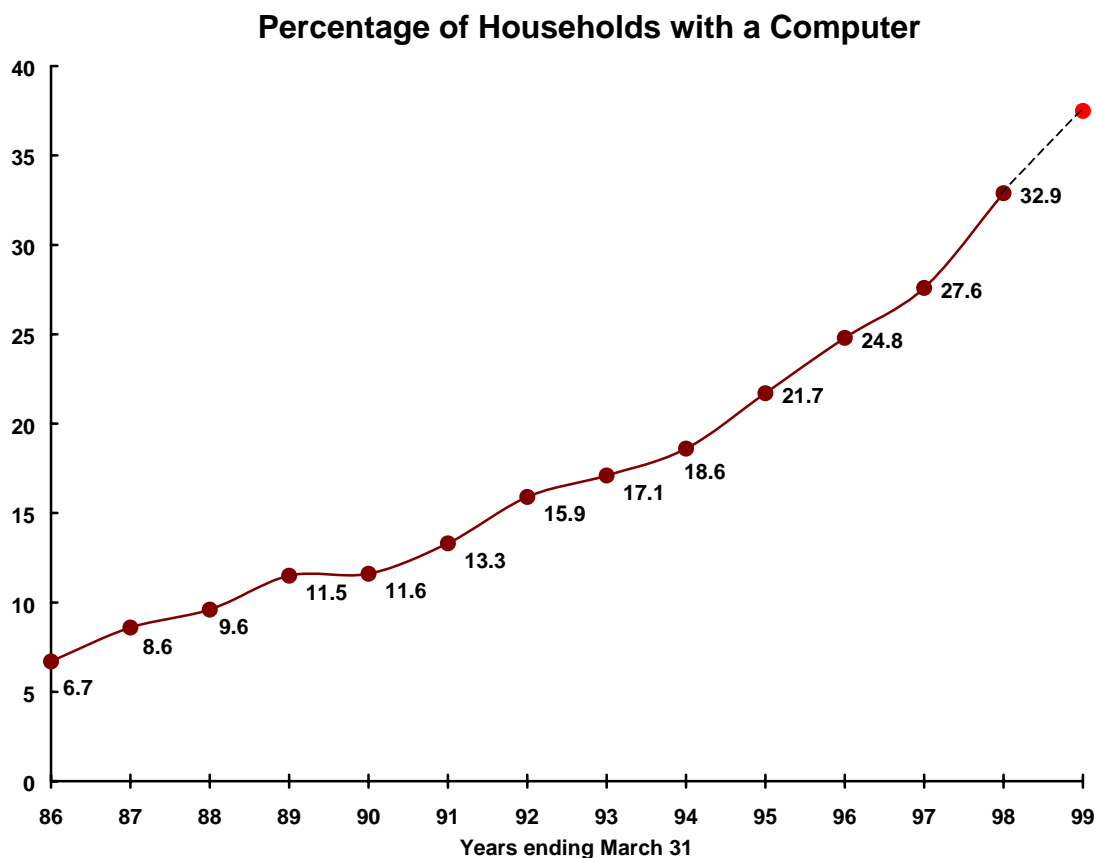
IT Occupations at Various Levels as a Percentage of Total Numbers in IT Occupations for each Ethnic Group - 1991



5. Computers in Homes

The figures used in this section are taken from the annual Household Economics Survey conducted by Statistics New Zealand. This survey assesses each household in a sample of 3000 over a 12 month period ending in March. It is therefore reasonable to attach the figures to a March year end.

The following chart shows the percentage of homes with a computer (mains operated with keyboard):

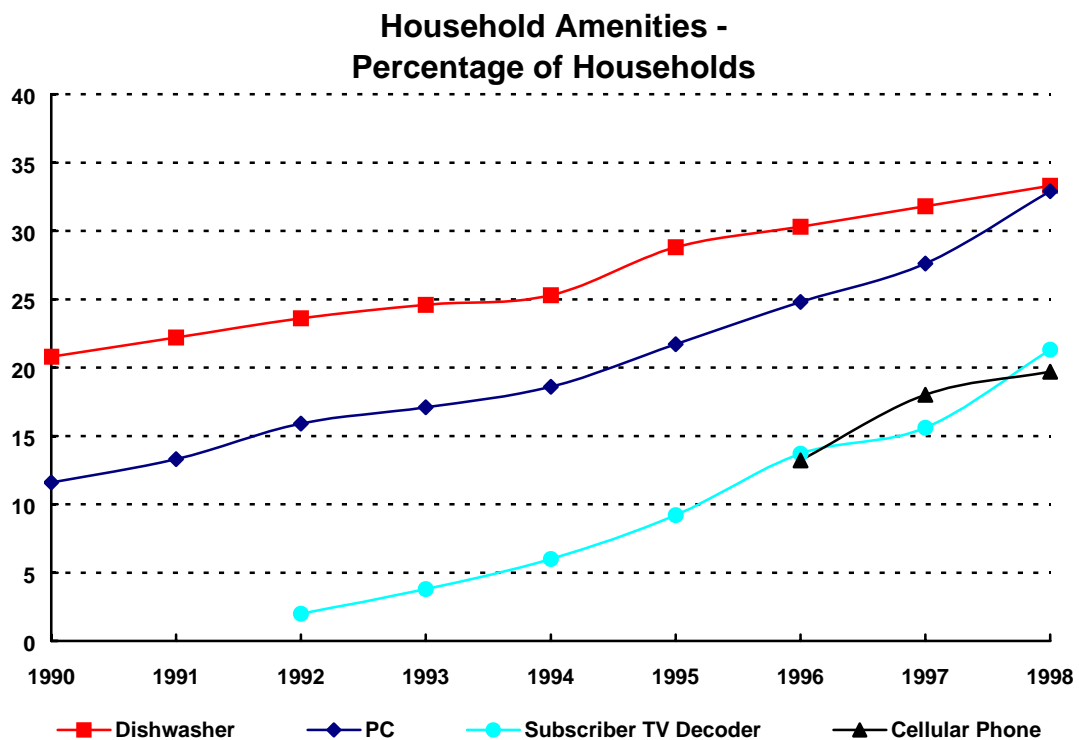


The chart shows that in March 1998, 32.9% of New Zealand homes had a mains-operated computer. The percentage of households with a computer has continued to rise at about 14% per year since the question was first asked in the survey in 1985-86. The dotted line extends the curve to March 1999 assuming the 14% growth rate for the past 12 months, giving a projected figure of about 38%. Note that the survey does not distinguish between households with only one computer and those with more than one.

In addition to home computers, the survey also asks about the availability of a number of other electronic amenities. The following table shows the percentage of households responding to the survey that reported the presence of a range of these amenities in 1997 and 1998.

Amenity in dwelling	Percentage of Households	
	1997	1998
Clothes Washing Machine	97.7	97.7
Colour Television	96.6	97.2
Telephone	95.9	96.0
Video Recorder	81.3	79.3
Microwave Oven	77.2	80.0
Dishwasher	31.8	33.3
Home Computer	27.6	32.9
Cellular Phone	18.0	21.3
Subscriber TV Decoder	15.6	19.7

The graph below gives the percent of households owning the lower four of these amenities from 1990 to 1998. The number of households with a computer is now roughly equal to the number owning a dishwasher. After flattening a little last year, the percentage of households with a subscriber TV decoder continues to grow rapidly.



6. 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 is a measure of the number of organisations connected.

The data for this section is derived from the results of a survey undertaken every six months by Network Wizards. The full survey results are available on that company's web server at <www.nw.com>.

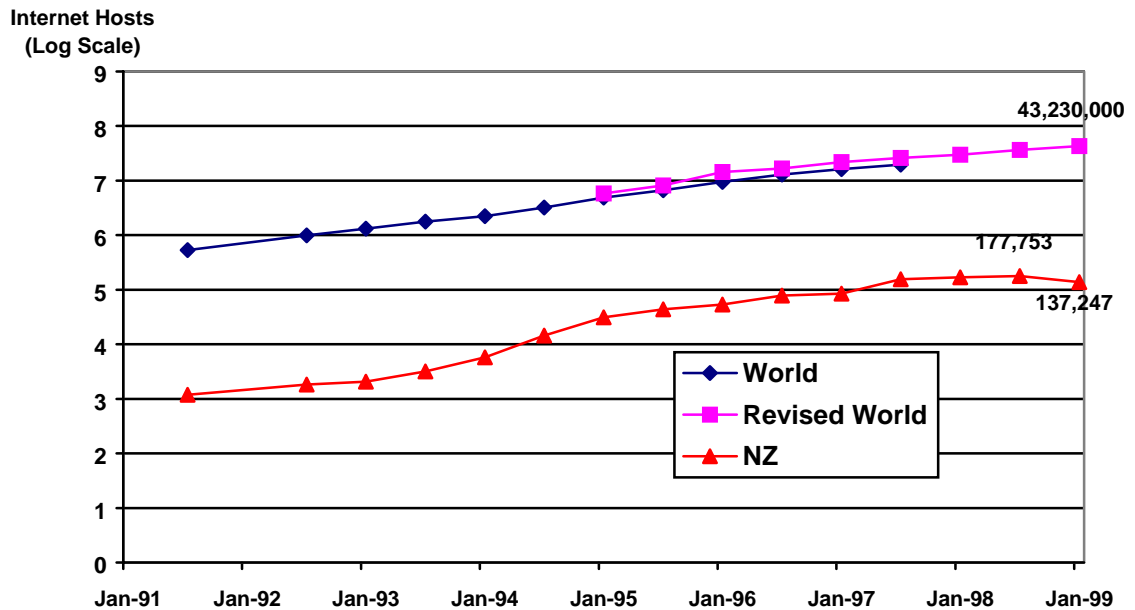
The number of "hosts" (computers) on the Internet is often regarded as a measure of the number of people with access to the Internet. To be counted as a host, a computer must have its own Internet address and be permanently and directly connected to the Internet. Home or small business computers which connect by dialling up to a service provider are therefore not counted. Consequently, it is reasonable to assume that there are more users than hosts, possibly by a factor of two or more. To stress this point: the information in this paper 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. Figures 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 three 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. The old survey method counted the number of domain names that had IP addresses assigned to them. The new survey method used in January 1998 counts the number of IP addresses that have been assigned a name. This distinction is subtle but it does mean the new survey is counting something different from the old survey. 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 visit the Network Wizards web site at <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.

The following graph shows the growth in the number of hosts connected to the Internet in New Zealand, as well as the number connected worldwide, from July 1991 through to January 1999. A line has been added showing the revised total host counts for the earlier surveys. This line indicates the new survey method finds more hosts than the old method for the earlier surveys.

Growth in Internet Hosts - New Zealand and the World July 1991 to January 1999



The straight rising lines on this logarithmic graph tell the same story as the exponential curve usually seen on graphs of growth of the Internet. By using the logarithmic scale both curves can be plotted on the same graph, despite the substantial difference in the actual numbers.

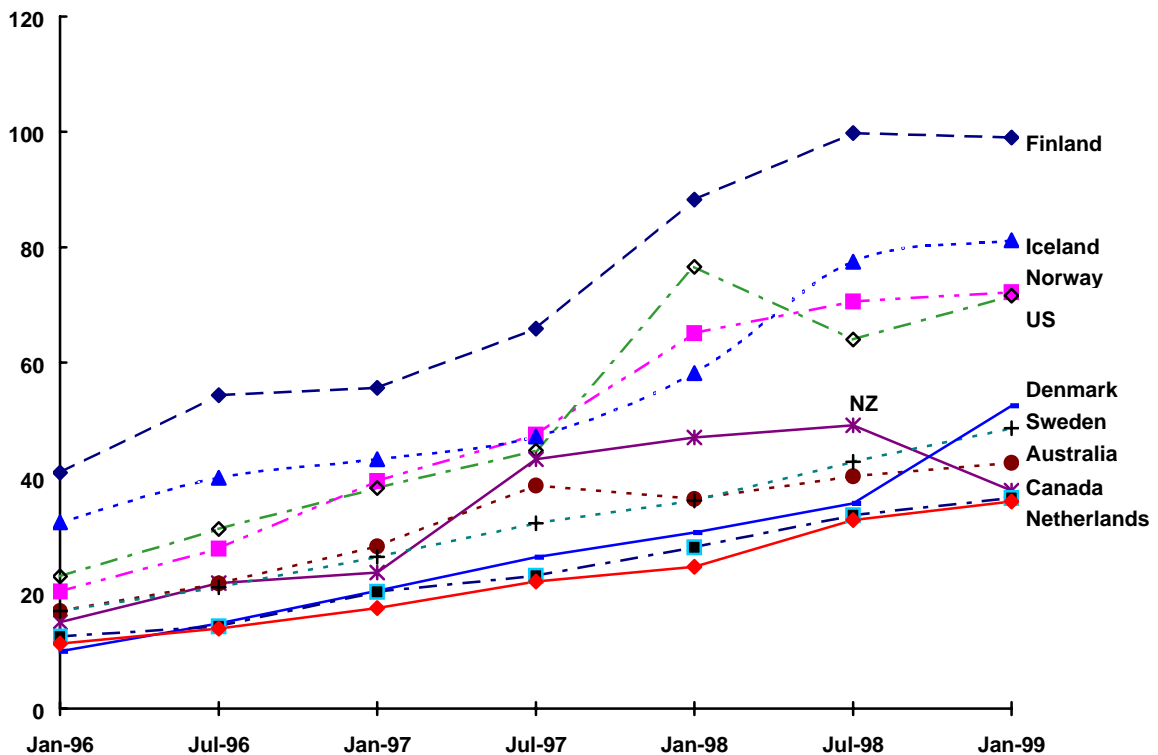
The graph shows a significant jump in the number of Internet hosts worldwide since January 1995, continuing through to January 1999. This growth continues to follow an exponential curve. The number of hosts in New Zealand also increased rapidly until 1996 but appears to have reached a plateau at just under 178,000 in 1996 and 1997, with a dramatic drop over the past year.

As other information detailed below shows, the use of the Internet in New Zealand is continuing to increase rapidly and this apparent decrease in host numbers indicates that this is no longer a particularly useful measure of Internet activity in New Zealand. The reason for this apparent decline 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 represents a maturation of the use of the Internet in New Zealand.

The following two charts show relative statistics for ten countries with the highest Internet host counts by population. The first is based, as with the above chart, on Network Wizards statistics up to and including January 1999, and the second on OECD figures for July 1998. Despite the different basis for the statistics, the same ten countries are involved.

The chart below shows changes in the number of hosts per 1000 people since January 1996. Like Finland, Iceland and Norway, until very recently New Zealand showed very strong growth in numbers of hosts per 1000 people but now appears to have reached a plateau, in fact, in New Zealand's case there has been a very significant drop over the past six months. This also was seen last year with both the US and Australia and Finland also has experienced a small fall. As explained earlier, the significance of this phenomenon is not clear but it does indicate that some caution is required in interpreting these figures.

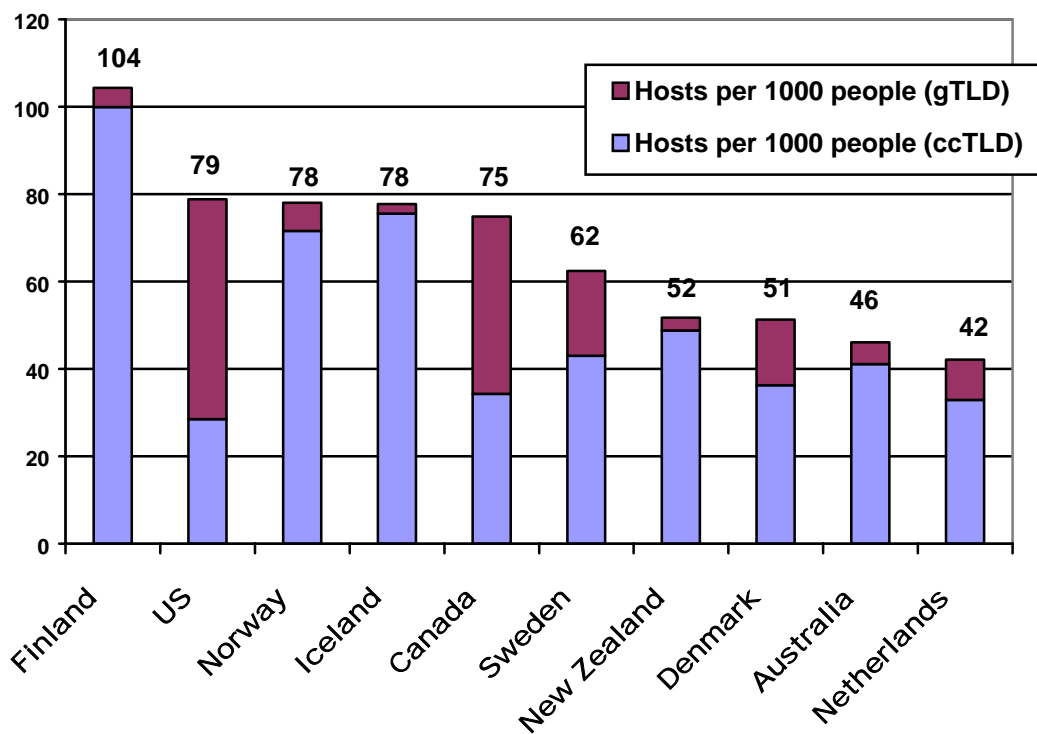
**Number of Internet Hosts Per 1000 People
January 1996 to January 1999**



The following chart is based on OECD data as of July 1998 and shows the same ten countries. It differs in one significant respect from information presented in previous reports in that it includes information about the apparent number of hosts in each country registered in the “generic” Top Level Domains (gTLDs).

Information presented in previous reports has been based on the assumption that, except for the US, the number of hosts registered in the gTLDs could be neglected for comparative purposes, relying solely on registrations in the country code Top Level Domains (ccTLDs). Examples of the latter are .nz for New Zealand (see Section 7.1), .au for Australia and .ca for Canada. The chart shows both the ccTLD and gTLD host counts for each country.

**Connections to the Internet
Top Ten OECD Countries by Hosts per 1000 People**



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 from the last report, New Zealand has moved from fifth into seventh place and Australia from sixth into ninth. 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. Note that the position of the US is unchanged because previously it was assumed that the majority of the gTLDs were US-based registrations anyway.

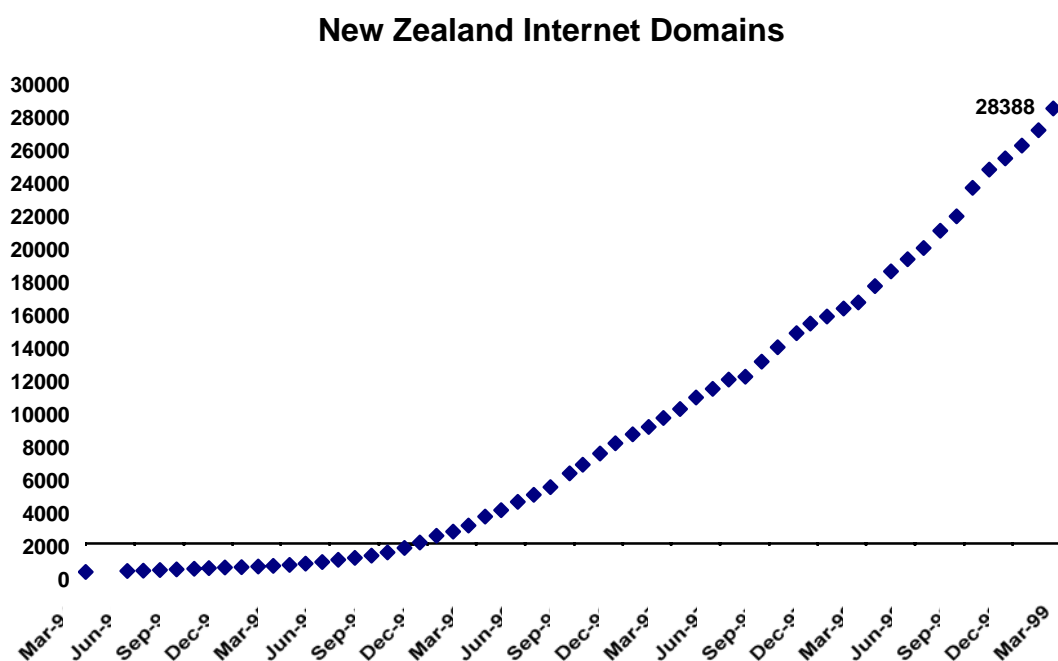
7. Organisations on the Internet

The data in this section is derived from figures compiled by Mark Davies of Victoria University of Wellington.

When an organisation connects to the Internet, it typically registers a “domain name”. In this section we attempt to estimate the numbers of New Zealand organisations connected by counting the registered domain names.

Each third level New Zealand domain, eg name.co.nz, that has been registered is assumed to belong to a separate organisation. Sub-domains are not counted, thus moc.govt.nz is counted but comms.moc.govt.nz is not. In general each third level domain is given to a different organisation, be it a company, school, government department etc, so domains are a reasonable measure of the number of organisations connected.

The following graph shows the total number of network connected organisations as a time series since July 1994.



It is clear there has been strong growth in the registering of domains in New Zealand, particularly over the last three years. However, growth is linear rather than exponential, corresponding to the addition of between 800 and 1200 names per month. By March 1999, there were 28,388 registered domain names in the .nz domain. This gives an approximation to the number of organisations connected, assuming one domain name per organisation. Note that New Zealand organisations registering in the generic TLDs such as .com and .org (estimated at about 6%) are not counted but overseas based organisations registering in .nz (likely to be a small number) will be.

7.1 Types of Organisation

Organisations are allocated domain names according to organisation type. The penultimate part of a name, such as the “co” in <name.co.nz> is used to categorise domains. This part of the name is often called a second level domain. In New Zealand the following second level domains are used:

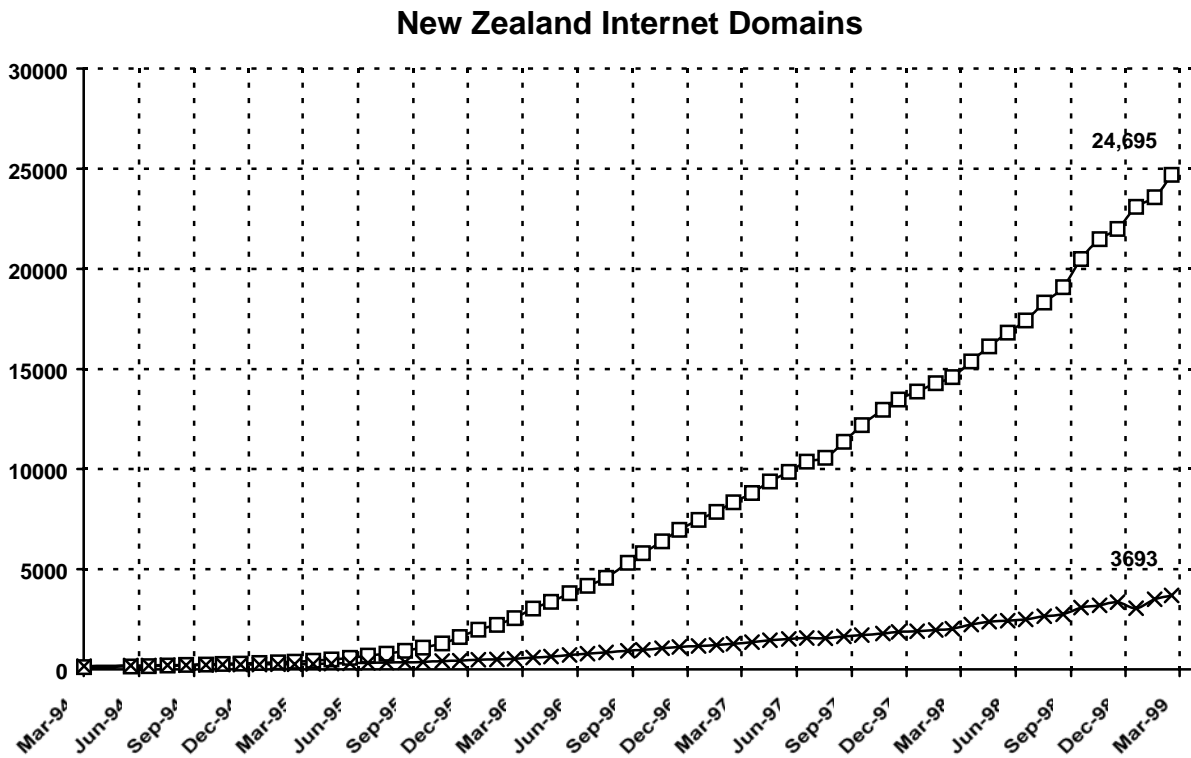
Second Level Domain Normally Used By:

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

This table represents current and customary usage, and does not cover a number of historical anomalies. In particular, 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.

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

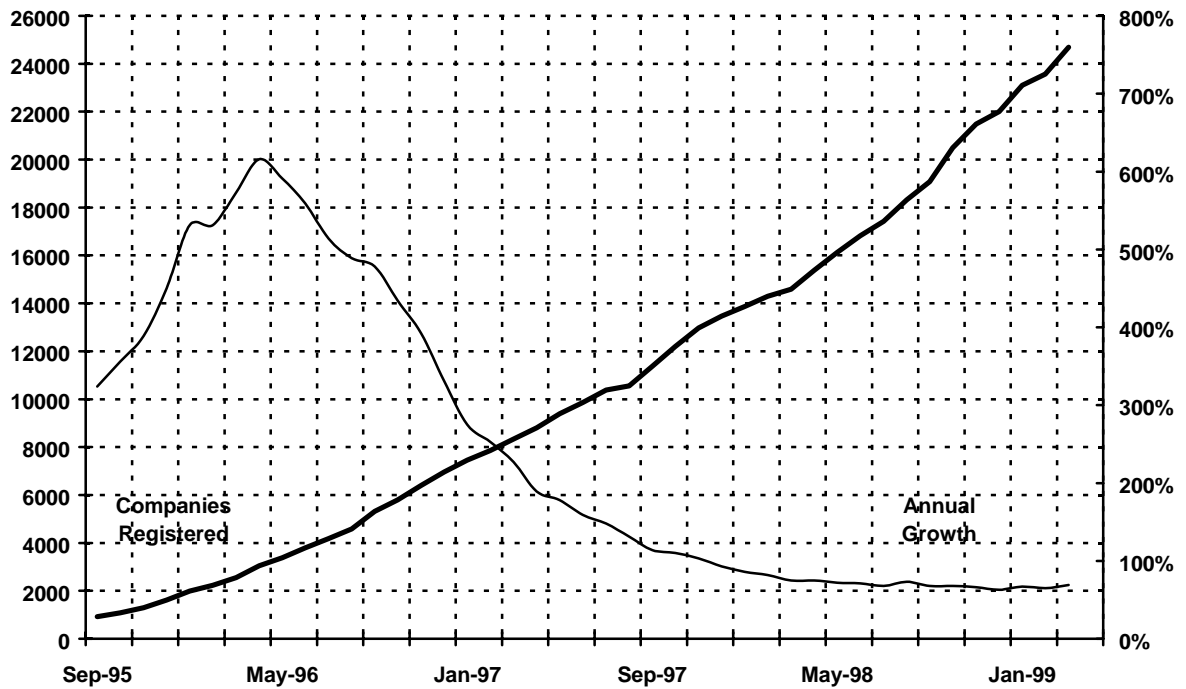


The graph shows that much of the increase in registered domain names is due to the registration of commercial domains, which have increased from 2,551 to 24,695 in the last three years. In the year to March 1999, the annual growth rate in the registration of commercial domains was 69%, compared with 75% in 1998 and 227% in 1997. The decreasing growth rate is an indication that there is now an established base of organisations with a registered domain name and Internet connection in New Zealand and reflects the linear increase in registrations referred to above.

Over the last year growth in the registration of non-commercial domains also increased to 3,693 (82%), although the numbers of non-commercial domains are well overshadowed by the number of commercial domains registered.

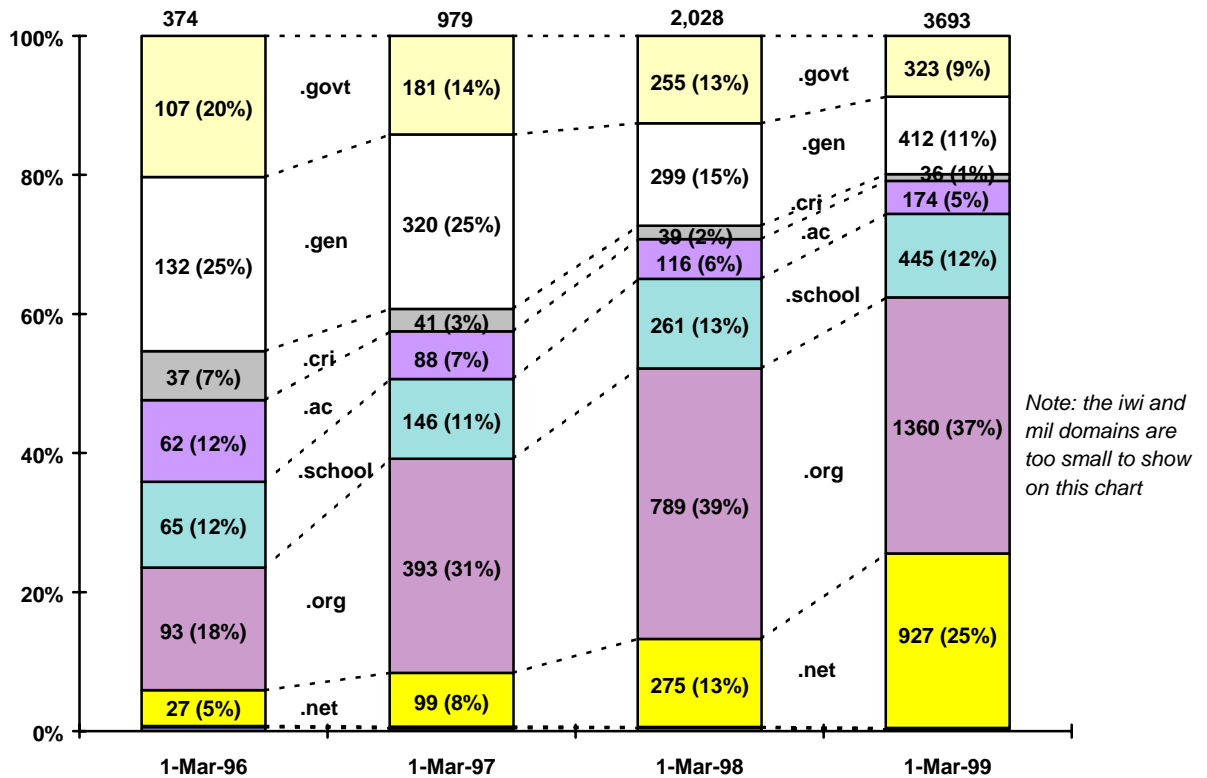
The next graph plots the commercial domain information from the previous graph, however, a line mapping the annual growth rate of the registration of commercial domain names is added. This graph also shows the substantial growth in New Zealand companies registering a domain name on the Internet over the last two to three years. The line plotting the annual growth rate shows that it peaked in April 1996 at 616%, and has fallen steadily since to its current rate of 69%.

Companies Registered on the Internet in New Zealand



The chart below shows how the non commercial domain registrations are split for the March years 1996 to 1999. The .net.nz domain was the fastest growing non-commercial domain in 1998 and now represents 25% of non-commercial domains. The .org.nz and .school.nz domains have about maintained their level (at 37% and 12% respectively), while older established groups such as .ac.nz, .govt.nz, .gen.nz and .cri.nz now make up a smaller proportion of the registrations even though the actual number of registrations has increased.

New Zealand Non-commercial Internet Domains

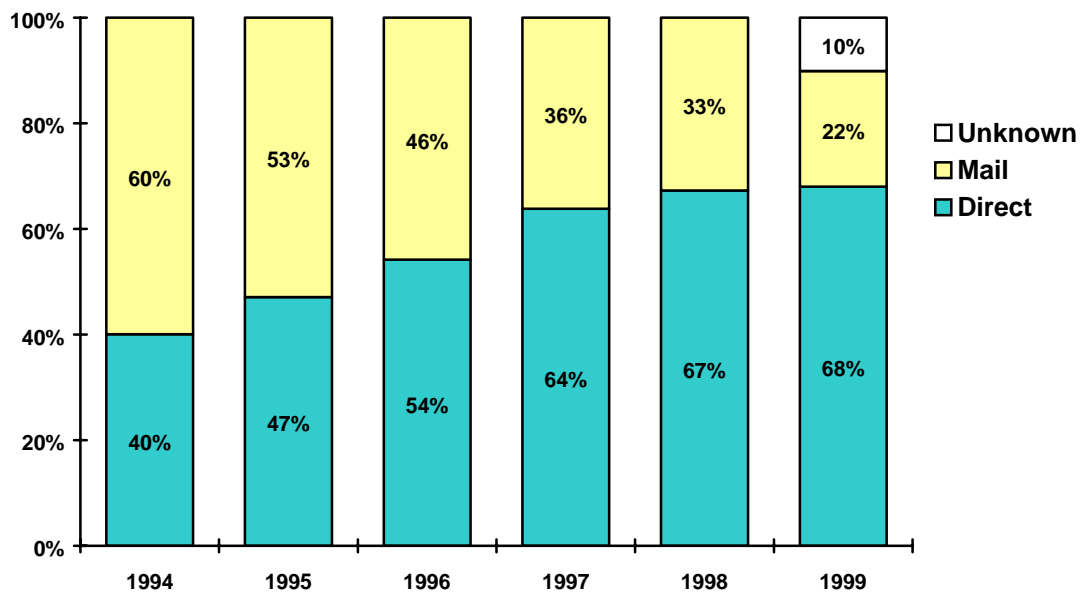


7.2 Direct Connection Versus Mail-Only Connection

There are two ways in which an organisation can connect to the Internet: a direct connection allowing full access, or a mail only connection. The latter type of connection would typically be used to enable the users of a corporate mail system to send and receive Internet mail messages, without providing them full Internet access.

The following graph shows the ratio of directly connected organisations to mail connected organisations in New Zealand for the March years 1994 to 1999. The proportion of organisations connecting directly to the Internet is growing far more rapidly than the proportion choosing mail only connections, although the latter category is still growing. The 1999 figures include a new 'unknown' category resulting from the refusal by a growing number of organisations to allow their domain name data to be examined by the process used for gathering this information. This probably reflects a growing concern over privacy and security issues and thus is a symptom of the increasing importance and commercial nature of the Internet.

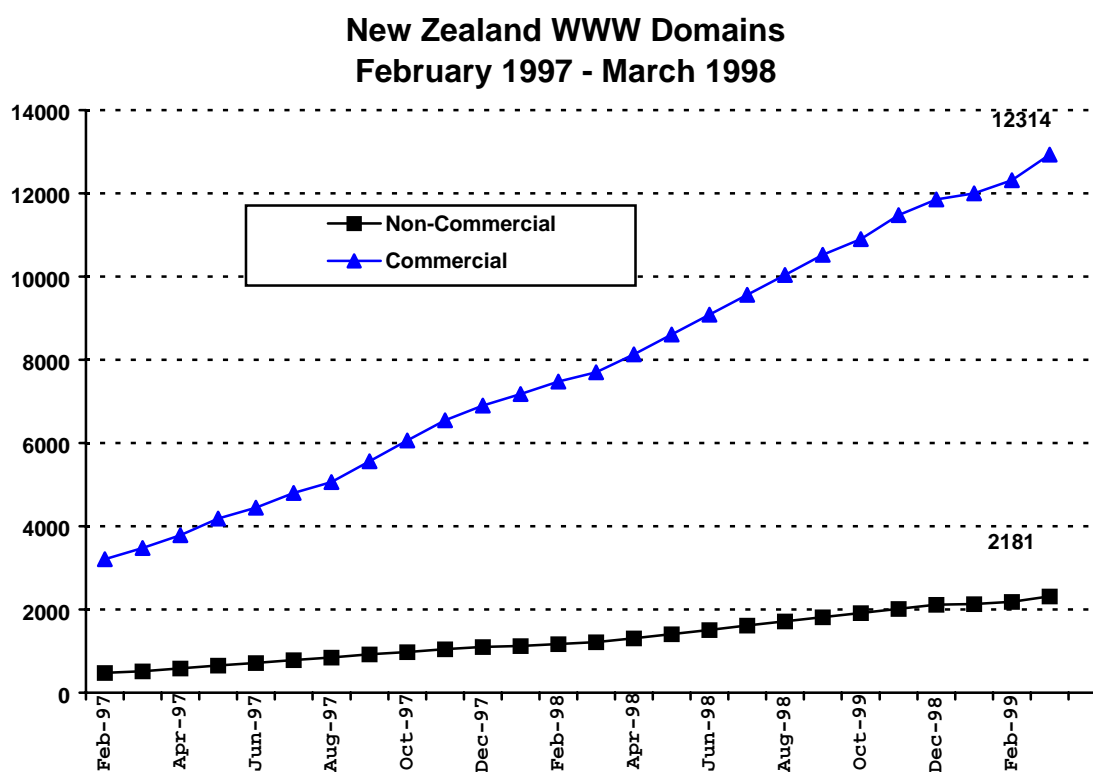
Split Between Directly Connected and Mail-Only Connected Organisations



7.3 New Zealand World Wide Web Sites

The number of organisations with an Internet registered domain provides no indication of how many New Zealand organisations have now established Web sites on the Internet. To estimate this, one must count each World Wide Web domain name that has been registered, ie all the domain names of the format: www.name.domain.nz. However, this only gives an estimate of the number of Web sites, as it double counts organisations using different formats eg tvone.co.nz, and does not take into account non-active Web sites.

The chart below shows the total number of sites split into commercial (co.nz) Web sites and non-commercial Web sites estimated in this way from February 1997 to March 1999. There were 15,241 Web sites in New Zealand as of March 1999 of which 12,929 or 85% have been set up by commercial organisations. Overall there was an increase of 71% in Web sites over the year from March 1998.



8. IT Use in New Zealand Schools

The previous report included information provided by the Ministry of Education from a survey of all New Zealand schools conducted in 1996. This survey has not been repeated.

This report also draws on two other sources of information: a survey carried out by the Information Technology Advisory Group (ITAG) in August 1998, and earlier research carried out by the Telecom Education Foundation (TEF) between 1993 and 1996. The ITAG survey was carried out as continuation of the TEF surveys but also included questions about the use of computers in schools and other issues. The full report of this survey (*IT in Schools*, November 1998) is available on the Web at <http://www.moc.govt.nz/itag/publications.html>.

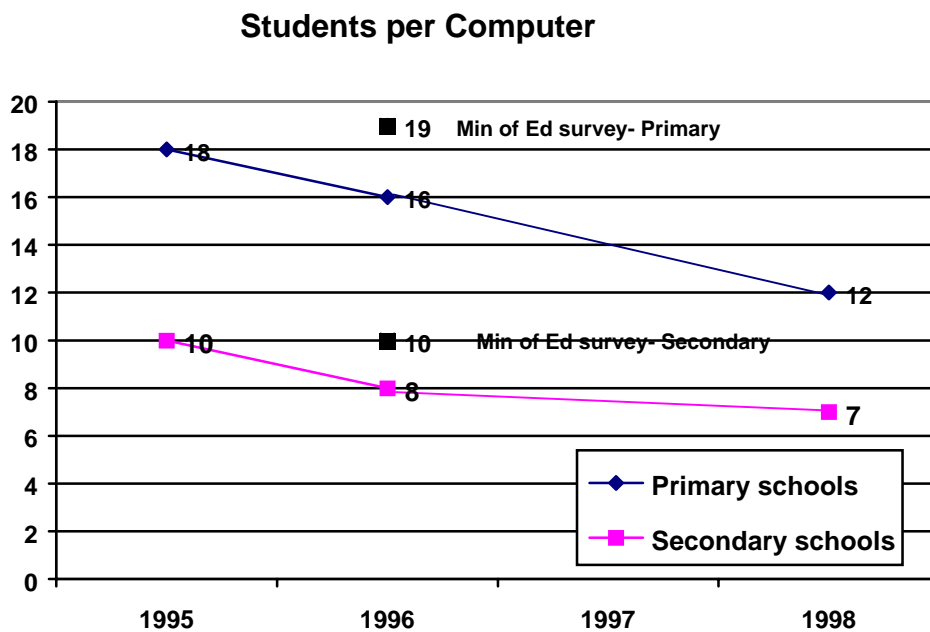
The Ministry of Education research is derived from returns from 98% of New Zealand schools. It is possible that this survey underestimated the total number of computers because further information received from schools indicated that a number treated the survey as relating to only those computers used for administration and did not include computers used in classrooms. Additionally, some schools did not include computers considered to be 'useless' or obsolete.

The ITAG survey research is from a sample of 276 primary and 164 secondary schools and the earlier 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.

8.1 Computers in Schools

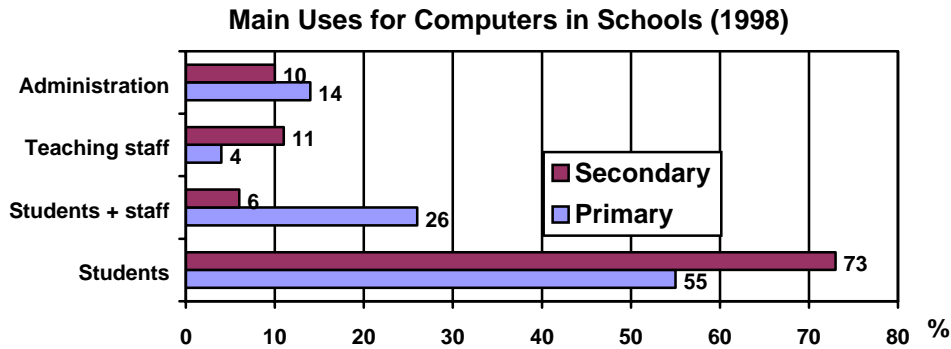
The Ministry of Education survey indicated that there were just under 52,000 computers in schools in 1996. Extrapolation of the results of the ITAG survey indicates that there were around 75,000 computers in schools in 1998, an increase of 44% in two years.

The chart below 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.

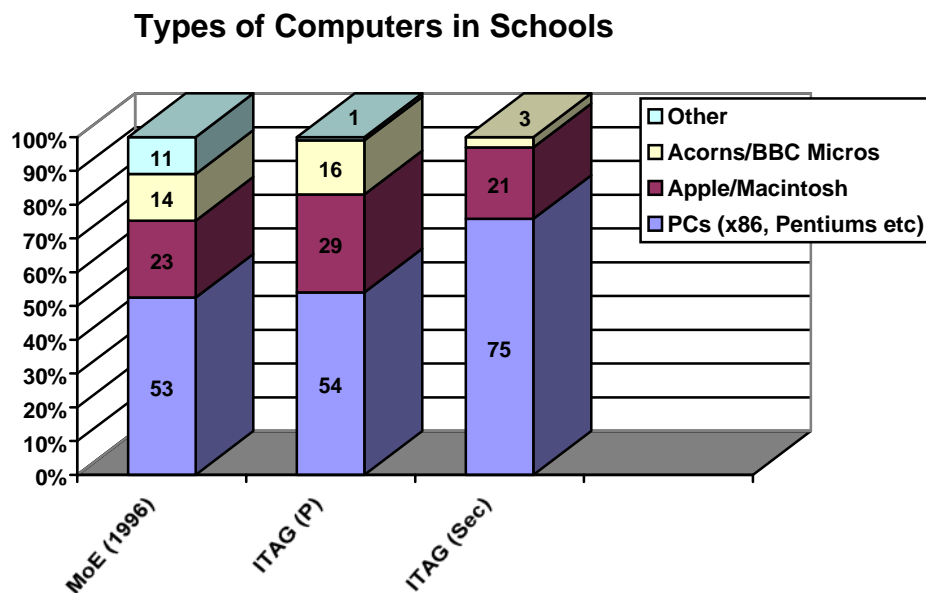


The ITAG survey asked for information about how computers were being used in schools. When administration computers are excluded, in 1998 there was one computer for every 14 students in primary schools and one per eight students in secondary schools.

The chart below shows the main uses for computers in New Zealand schools in 1998.



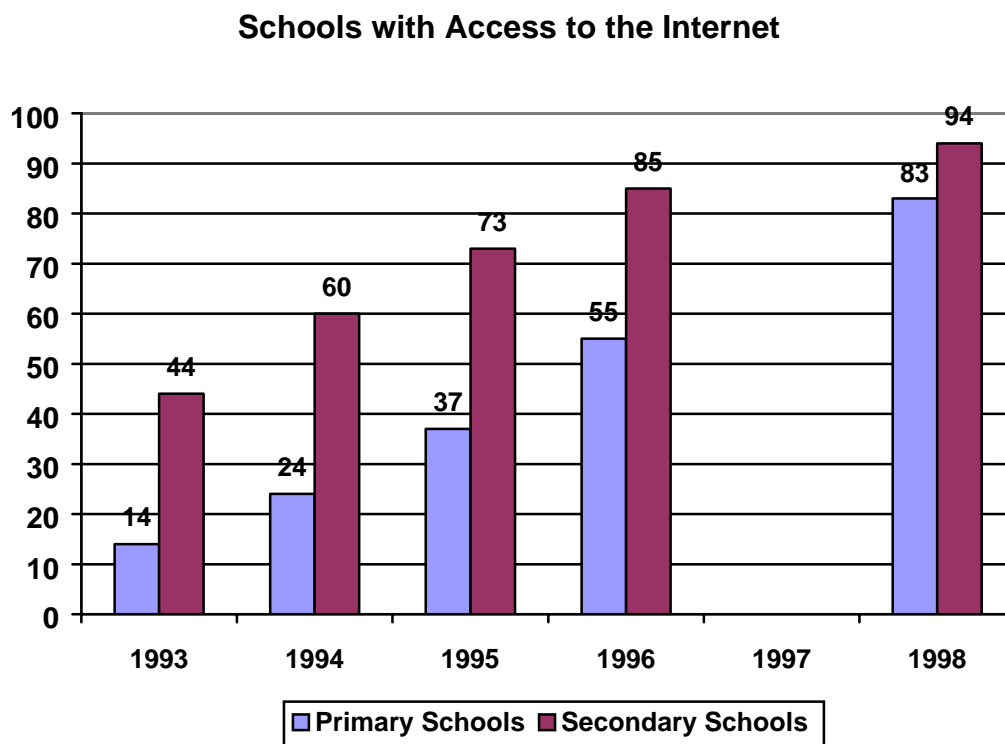
Both the ITAG and Ministry surveys asked for information about the types of computers in use in schools. The results are shown in the following chart.



The proportion of PCs, Apple Macs and Acorn/BBC Micros in all schools in 1996 is about the same as for primary schools in 1998. However, when secondary schools are included with the 1998 data, it is clear there has been a move to the greater use of PCs compare with other types of computer over the period. Older machines included in the 'Other' category almost disappeared by 1998.

8.2 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 the chart below. 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.



Levels of access for classroom computers is substantially lower: in 1998 only 55% of primary schools and 60% of secondary schools provided access to the Internet from at least one classroom.

The number of schools, especially primary schools, with their own domain name is low. There are about 2750 schools in New Zealand and only 445 registrations in the .school.nz domain as of March 1999 (see Section 7).

9. Enquiries

Enquiries regarding this paper should be directed to:

Frank March

Ministry of Commerce

PO Box 1473

WELLINGTON

Phone: (04) 474 2908

Fax: (04) 471 2658

E-mail: Frank.March@moc.govt.nz

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ISBN 0-478-23417-1