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A Survey of Computer Use in the New Zealand Building and Construction Industry

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Preface

The Building Research Association of New Zealand (BRANZ) has commissioned this report as part of its ongoing research into the use of information technology in the building and construction industry. The report was prepared after data was gathered from a general survey of computer users in the New Zealand Building and Construction Industry. The report outlines how the survey was constructed and conducted. It details the findings of the survey and makes recommendations based on its conclusions.

Acknowledgments

The author acknowledges all those people in the building and construction industry who, in spite of having very busy schedules, were prepared to accept the invitation to register for the survey and took the time to complete the extensive questionnaire. Without their generosity the study would not have been possible.

Note

This report is intended for the guidance of those who are making decisions on the development or purchase of computerised systems for the building industry in New Zealand. It aims to assist BRANZ and the industry to more effectively plan its use of computers, and to concentrate its efforts in those areas which are likely to be of greatest benefit. It also aims to provide some guidance on the types of training most needed and considered by users to be most productive.

A SURVEY OF COMPUTER USE IN THE NEW ZEALAND BUILDING AND CONSTRUCTION INDUSTRY

BRANZ Study Report SR 80

J.M. Doherty

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KEYWORDS

Computers; Information Technology; Computer Use; Survey

ABSTRACT

Computers are now a vital part of all effective businesses. However, the current extent of computer use in the New Zealand building and construction industry is not known. This report attempts to measure computer usage for the main functional roles, detail what is used, how such use has changed in the past five years, and assess what direction the industry is now heading in regard to the use of computers.

One of the conclusions reached is that a large minority of businesses either do not use computers or use them only casually. It is not known how significant this is. A similarly large minority need to upgrade their computers. Growth is expected in electronic information

services, especially on the Internet. There is an apparent need for advice in the area of businesses better managing their use of computers.

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1. INTRODUCTION

An inquiry of Statistics New Zealand by the author led to the discovery that there are very few official figures published about the use of computers in New Zealand. Similarly for the use of communication technology such as the Internet. Statistics New Zealand did provide unofficial anecdotal reports suggesting that about 25% of New Zealand households owned at least one computer in 1996. In 1994 the figure was officially reported as 18.6% *(New Zealand Official Yearbook, 1996, p.251)*.

In November 1995, commercial organisations were adding domain name registrations on the Internet at a rate of 18% per month *(New Zealand Official Yearbook*, 1996, p.252). An IDC New Zealand report *(ComputerWorld New Zealand, 1997)* suggested there are nearly 1 million Personal Computers in New Zealand and that about 100,000 are connected to the Internet, with a total of about 10,000 New Zealand companies registered on the Internet in 1996.

A 1996 Morgan & Banks survey, of 1000 Australian employees and managers in a wide range of industries showed that nearly 60% of Australian employees are falling behind rapidly in the base skills needed for efficient use of the Internet and other desktop PC functions required in today's business environment. Computer literacy in leading Australian boardrooms was even worse; most senior executives lacked even the very basic computer keyboard skills. Only 7% of senior executives believed they had an excellent level of PC literacy. Although no similar survey has been done in New Zealand, it is possible that these findings are relevant here since the business culture and educational structures of Australia and New Zealand are similar.

There appear to be no official statistics or similar studies on computer use in the New Zealand building and construction industry, except for a limited survey (Thompson, 1992) undertaken as a part of the BRANZ' 1992 IT Theme Year. This survey focussed on identifying the main operating systems and application software packages in use. The results indicated a predominance (80% +) of "IBM compatible" users and in the CAD field a similar predominance of AutoCAD users. The percentage of organisations using computers for anything other than word processing and basic accounting was relatively small, particularly among building contractors.

The capability of computing technology commonly used by business and the public has changed significantly since the 1992 survey. In particular, the Internet and the World Wide Web (WWW) have made major impact and all industries are evaluating to avail themselves of the opportunities it offers. The feeling is that a good proportion of the New Zealand building and construction industry is not keeping up with the developments in the use of computers, but no-one can cite reliable figures as to how much the industry has changed, (if at all) to keep pace with such development in the past five years.

In reviewing its own plans for the development of information services, BRANZ needs to both adopt computer technology for the dissemination of information, and to encourage the industry to do so. To do this, it is essential that there is an adequate understanding of what each sector of the industry has now in the way of computer technology and what access there is likely to be in the foreseeable future. BRANZ has a central role to play in informing the industry of where it currently stands and in offering a lead to ensure both the uptake of efficient information systems and the coordination of output.

2. AIM OF THE STUDY

The aim of the survey was to determine what computer technology the New Zealand building and construction industry currently uses, and to publish the findings. This is to enable BRANZ and others in the industry to plan for the provision of products and services in electronic form, and to provide guidance to educators and service providers for checking that appropriate computer training is being delivered where it is most needed.

3. GENERAL OBJECTIVES

- Identify what access to computer systems and services the industry currently has.
- Identify the purposes for which the industry now uses computers, and the extent of such use.
- Identify the level of industry use of currently available computer facilities.
- Identify the barriers that prevent the industry from better using existing computer technology.
- Estimate the level of skill currently displayed by individuals in their use of computers.
- Assess how much computer training each individual has undertaken recently.
- Assess the commitment the industry has to maintaining currency with computer hardware.
- Assess the commitment the industry has to maintaining currency with computer applications.
- Assess the commitment the industry has to maintaining currency with electronic communications.
- Assess how much use of electronic services the industry has made in the past 12 months.
- Identify what new computerised functions the industry would like to see developed for its use.

4. BACKGROUND DISCUSSION

The use of computers by the building and construction industry falls naturally into two domains of use. These domains are:

- communication systems
- technical decision support systems

In the "communication domain", many people find computers are as important as telephones and fax machines. All of the common means of communication that require a separate independent device can now be done using the desktop or laptop computer. Some forms of business are simply not possible for those who do not have access to a capable computer system linked into the digital telecommunications network. The level of skill required to use this communication technology is not high, although setting it up and keeping it working is. Those who can cope with cell phones and VCRs should be able to learn how to navigate through information using a mouse on a computer. Only slightly more practice is needed to develop a basic keyboarding skill sufficient to be able to write short textual messages (touch typing skill is not required). What will be as important as it is now, is to develop the habit of being concise, accurate and consistent in all communications. In particular, users will need to be aware of industry conventions that have been adopted for language and data classification.

In the "technical decision support domain", computer applications have been used for many years. Applications are getting smarter and more powerful every day. The result is that many traditional methods are rapidly becoming un-competitive. While it is still possible to avoid using computer applications for many tasks, the stage has now been reached where if the electronic tools are not used, then others within the industry who do use them are hindered in their work. Rapid response team work in particular is restricted. For some tasks computer applications are the only possible means of doing the job. Every day more and more useful facilities are becoming available and it would be unwise to ignore them.

To use these tools effectively requires just as much skill as was always required with manual methods. The use of computer tools does not remove the professional skill of the operator. However, to realise the full potential of these tools, requires additional skill that comes only from experience.

The information technology is evolving very rapidly. This creates a major, particularly in justifying the cost of keeping computer hardware, software and the skill level of users up-to-date.

The initial strategy and design of the survey was undertaken discussions between BRANZ and the survey contractors. The following were some of the issues considered.

5. CONSTRUCTION OF THE SURVEY

5.1 Individual v Organisation

The most significant task was to frame a detailed personal on how individuals used computers for their most common roles. The earlier survey (Thompson, 1992) asked respondents to state the number of copies or items used in their organisation, but then also referred to items that the individual (respondent) had used. This caused some confusion as to which replies were related to the individual and which were a count for the whole organisation. Also, it was difficult to interpret the results because the size of the respondent organisations was not indicated. In any case, what someone in an organisation says it does and what individuals within the organisation actually do, may not always correlate. It would be rare (if ever) to find a firm where all individuals were at a similar level and skill in their use of computers. Organisations are often made up of many different types of user, from those who never need or use a computer, to those who use a computer full time, with many in between.

5.2 User's General Computer Knowledge

It was acknowledged that the survey would most likely be of interest to, and therefore be answered by, those who were already using computers. Also, there was no point in asking technical questions to users with little or no experience of the issues. Hence it was important to establish early if a potential respondent was an existing computer user or a potential computer user. An early consideration was to have a different set of questions depending upon the existing level of the user's computer knowledge. In this way the questions could more accurately reflect the interest and language of the user. This idea was rejected as being overly complicated at this time but it could be reconsidered if a follow-up survey is conducted. If a follow-up survey is undertaken, one problem to be solved will be how to accurately categorise users. Should it be by asking users if they regard themselves as a “non-user”, “casual-user”, "regular-user", or "expert-user" for a given standard set of common applications? A user may be expert in some things and casual in others; and with many levels in between.

5.3 Levels of Skill in Computer Applications

The computer skills of individuals in all sectors of the industry are at many different stages of development and levels of use. If the survey was to be conducted on an individual basis, then this diversity and level of usage by individuals would need to be considered. Skill levels and understanding by each individual using each application would range from the expert, to those who have a general working knowledge, to those with little or no knowledge. Some individuals may be skilled in many applications while others might be skilled in only one. Still others might never obtain a reasonable skill in even one application. It is important to gauge the level of use and skill for the applications that are commonly used across all sectors and within each major sector of the industry.

5.4 Commercial v Domestic Sectors

It is well-known that the New Zealand building and construction industry is fairly evenly divided between the domestic (housing) and commercial sectors. While it is common for many individuals to work within only one sector of the industry, it is also common for others to operate in more than one sector. Each sector has quite different needs for the use of computers even though in some areas, they have much in common. Once again, in order to keep the survey as simple as possible and to avoid multiple responses, it was decided that the differences between these sectors would not be targeted at this time. Hence the survey attempts to focus on the uses that are common to all sectors of the building and construction industry.

5.5 Functional Roles of Computer Users

Initially it was proposed to divide responses into user categories such as architect, engineer, builder, technician, draughtsperson, inspector, etc. While these categories are what most people themselves relate to, the idea was rejected when it was realised that some of these roles overlap considerably and there would be an unhelpful diluting of the results that should be grouped together. To overcome this problem the survey focussed instead, on identifying the different functional roles for which computers were used. For example, was more useful to know the total number of those who used computers at the project inception stage, than to know how many of them were engineers, architects or draughtspersons. If they had a particular functional role to fulfil then the problems to be solved would be the same and computers should provide the same tool to all. Nevertheless an attempt has been made to provide some indication of use by discipline, but there will be a large margin of error in the analysis.

5.6 Confidentiality

It was realised that some users might regard the survey as asking commercially sensitive questions to which they would not want their identity linked. The means of adding a measure of confidentiality to the survey was to ask for pre-registration of consent. A copy of this form is included in Appendix 2. This enabled personal details and functions to be provided in advance of the actual survey questionnaire which would be issued only to those who had registered. The questionnaire would be identified only by a registration number, similar to the way the national census is undertaken.

5.7 A Current Snap-shot vs a Prediction of the Future

It was decided that an aim of the survey would be to take a "snap-shot" of what computer users are currently using. The issue of what respondents thought they might be using in the future was avoided. This would enable respondents to focus on answering questions of fact rather than subjective judgements. A person’s current plans can be easily effected by new developments in technology and these cannot be predicted accurately. This did not preclude questions about a respondent's plans and expectations that are part of normal prudent business planning. Hence questions on such matters as expected levels of training within the immediate future are included.

6. CONDUCTING THE SURVEY

6.1 Parts of the General Survey

It was decided to divide the general survey into two parts. The forms for each part are included in Appendix 2. The first part of the general survey was a "registration and consent to be surveyed form". The second part was the detailed questionnaire.

There were a number of reasons for dividing the general survey into two parts:

- to enable the registration form to be easily copied and distributed to potential respondents even if they were not directly invited;
- to save the cost in distribution of the multi-page survey questionnaire to non-respondents;
- to add confidentiality to the detailed returns;
- to get an early indication that responses would be from a good spread of disciplines.

6.2 Direct Mail Lists

The mailing list used to distribute the invitation to register for the survey was compiled from a number of mailing databases provided by BRANZ. Additional mailing lists were obtained from a commercial list vendor and these were combined with the BRANZ databases. This ensured the main mailing list was reasonably comprehensive and up-to-date. Out of this process a sample population of nearly 5000 names was compiled. This formed the mailing list for the invitations to register. It was hoped that these 5000 individuals would distribute the survey registration form to other colleagues with whom they were associated. Of the invitation forms mailed, 112 were returned uncompleted.

6.3 Other Advertising

In addition to the direct mailing of invitations, an article was published in the *BUILD* magazine. Readers were invited to express their interest in being surveyed. Fewer than twenty responses were received.

6.4 Survey Bias

It was acknowledged that the registration process would produce a biased result. Those who actually used computers were the most likely to register. The survey was constructed so that non-users, casual users, and regular users could be identified, but this still left the question as to how representative these respondents were of the general population in the building and construction industry.

6.5 Random Survey to Assess Computer Use in the Whole Industry

In order to assess computer use across the general industry population, a separate Random Survey was conducted using the same questions as used in the registration form for the General Survey. Obtaining a truly representative sample of sufficient size to give reliable results proved to be quite difficult within the time available.

It was decided to send this second survey to 150 people selected at random from the BRANZ databases. The 150 users were evenly divided between five different industry sectors.

Because the survey was to obtain an indication of how representative all computer users were to the whole industry population, a weighting was applied to the percentages of each sector in accordance with the estimated populations that these sectors represented. The weightings were applied so that the combined percentage totals more accurately reflected the total of the general population. This weighting could only be a rough estimate as accurate figures for the number of individuals within each sector are difficult to deduce.

The five industry sectors and their weightings were:

Category 1	Architects, Engineers, Draughtspersons	20%
Category 2	Building Owners, Developers, Managers	3%
Category 3	Building Officials, Clerks of Works	2%
Category 4	Contractors and Sub-contractors	70%
Category 5	Manufacturers and Suppliers	5%

6.6 Recording of Results

The results were entered into a relational database for collation and analysis.

This report used all data collected up to a cut-off-date of 15/5/97.

7. THE RESULTS

7.1 The Random Survey

The Random Survey of 150 users produced a disappointingly small response from designers and builders but very good from territorial authorities. There seemed to be a disproportionate number of solicitors and real estate people in the random selection and a few returned the survey commenting that they did not feel it was meant for them. Nevertheless, the information gathered has proved useful provided care is taken in the interpretation of the figures and the degree of confidence placed in it.

The response to the Random Survey was 31% (47/150). With such a low population sample, this survey will have a high margin of error and can be used only as an indicative guide.

The Random Survey did indicate that about 70% of the total industry population are computer users. This figure could be considered to be an upper limit. It is likely that the Random Survey still contains bias towards those who are computer users, since computer users were more likely to have responded for the same reasons as in the General Survey. If the General Survey figures are to be accurately translated into the general industry population then more work needs to be done to verify the results.

The Random Survey also indicated that more than half (approx 58%) of the industry population <u>often</u> use computers in their work. This also needs to be verified and is likely to be an upper limit rather than a lower indicator.

In spite of these reservations, it is safe to deduce that <u>more than 30% of the industry population do not use computers</u>. (This is consistent with the Morgan & Banks study cited earlier which showed that 60% of employees in all industries did not regard themselves as up-to-date with computer technology). At least another 12% of the industry population have only a casual use of computers.

Further research could be done to determine if this is correct and to determine the effects this has.

7.2 The General Survey

Ninety-eight percent of the General Survey respondents stated they were existing computer users. Hence the General Survey can be regarded as "a survey of computer users" who may represent not more than 70% of the total industry population.

Of the respondents:

52% were designers (architects, draughtsmen, designers, engineers);
17% were builders or sub-trades;
11% were building officials;

The remaining 20% were quantity surveyors, suppliers, educators, etc.

Nearly half of all computer users regarded themselves has highly skilled or expert but nearly one in five regarded themselves are having low skill. 61% consider they were aware of current systems appropriate to their role(s).

7.3 Current uses for Computers

Fourteen distinct functional roles were identified in the survey. A ratio of the amount of computer use (%) for a particular function to the extent that that function is a current role (%) indicates the extent to which computers are important for that function, the larger the ratio the greater the apparent importance. The range of the ratios is:

Project Documentation	0.86
Construction Work	0.44
All other roles rate more than	0.50

7.4 Potential Uses for Computers

Taking a ratio of computer use % plus potential use % to current role % indicates that computer use potentials of about 0.90 are likely for all roles except the following:

Construction Work	0.72
Off-Site Manufacturing	0.75
Building Product Supply	0.62
Maintenance / Repair / Demolition	0.78

In asking users if they expected their level of use to change in the immediate future, 62% said they would be more involved in computer use, while 25% said they would remain about the same. Hardly anyone (0.3%) said they would be less involved.

Just over half of computer users were involved in choosing and developing their systems and are in control of the systems they use. They are also prepared to be involved in further system development.

7.5 Typical Computer Hardware

Most (86%) of computer users have a dedicated PC. 58% have a CD drive. 60% have a network connection. 17% have a modem but no network connection. 26% have both a modem and a network connection. It is interesting that such a high number of users have both a network connection and a modem since there is a duplication of function here.

In assessing the useful life of a computer, IT planning consultants often use a rule of thumb of three years before replacement becomes more economic. It seems that while 85% of the industry are using computers less than three years old, 19% have computers approaching the end of their useful life and 13% of computer users are using computers that could be regarded as obsolete. There is a growing range of essential business and technical software that simply will not work on the older low power systems and this could mean that between 13% and 32% of computer users may not able to run the latest applications (particularly the 32bit Windows applications).

7.6 Network computers (LAN) and external links (WAN)

The Thompson (1992) study accurately predicted an upsurge in the use of networks. About 16% of users reported having a network connection in 1992 compared with 60% now.

As a network LAN is often provided when there is more than a handfull of users within close proximity to each other who want to share resources, there is a good chance that a LAN will also be provided with external access services for e-mail and the Internet. The survey showed that 79% have access external communication services either via a network connection or an individual modem. This correlates well with the 77% who said they had used such access.

By definition, networked computers are more likely to be found in offices that have more than about five to ten computer users. If small offices are defined as those with fewer than ten people, then it can be concluded that nearly 60% of all computer users are in the larger offices. Conversely therefore, 40% of computer users are working in situations where their computer is in stand-alone mode. Of these, 17% are likely to be working stand-alone with a modem access to external services, while 23% will have no external links.

7.7 Changing Computer Platforms

The Thompson (1992) study reported about 82% of computers were Intel-(IBM or Clone) based. Today, the make of computer hardware used is less relevant because most popular personal computers have "open architectures" that can run commonly available software and the price of the hardware has dropped to the point where it has become a commodity item. What is more significant is the operating system the hardware uses as this more accurately determines what application software the hardware can run.

In 1992 it was reported that the operating system mix was dominated by MS DOS (63%), with MS Windows 3.x (17%), Apple/Mac (10%), UNIX (5%). Now the mix is dominated by MS Windows (68%), with MS DOS (20%), Apple/Mac (9%), UNIX (2%). The trend towards 32 bit MS Windows is clear.

The survey shows that Windows 95 has achieved 34% usage within the 21 months it has been available. The more robust Windows NT has been slow to be taken up (8%) even though NT has been available longer than Windows 95. This could well be attributed in part to the confusion caused by the early competition that NT faced from OS/2 and the long-established UNIX options. Now OS/2 does not show at all, and the threat from UNIX (2%) is no longer significant. Of some significance is the heavy requirement of RAM that NT has. The price of RAM and the price of hard disk storage is no longer the major barrier it was only three years ago.

7.8 Computer Policy and Procedures

The respondents reported that only 24% of them were aware of a stated policy by their company on computer obsolescence and replacement and only 26% have access to an office manual on computer policy and procedures. It seems about 75% do not have a formal statement regarding these things.

In the opinion of the author, it is disturbing if more than half of computer users do not have an established procedure to take should their computer system fail. For many computer users, they would not be able to do their job if they did not have a functioning computer. A well-planned operator should prepare for the day when a vital part of their system fails for whatever reason.

The same comments could be directed at the 30% who have a no regular back-up system.

7.9 Word Processing

In 1992 there were about 40 different word processors being used in the industry and the dominant one was Word Perfect, with MS Word close behind.

Now there are still about 12 families of word processor being used by 81% of computer users, but MS Word (66%) is clearly ahead of everything else and Word Perfect has dropped to 10% in second place.

7.10 Spreadsheets

In 1992 there were three leading spreadsheet programs; Lotus 123, MS Excel, and Quattro Pro, in this order of preference but all still contending to be the leader.

Now an even more dramatic shift has taken place, with MS Excel clearly preferred by 66% of users, and Lotus 123 (5%) even behind the very basic MS Works (10%). Quattro Pro has also dropped to 5%. There are still at least another nine programs also being used by some of the 68% of computer users who use spreadsheet programs.

7.11 Database Programs

Remarkably, the use of databases seems to have dropped since 1992. Approximately 50% of users reported use of a database in 1992 but now the figure is 34%. This is interesting and requires further research to ascertain what is happening.

Systems based on the dBASE flat file format were common but these seem to have dropped out of favour with the newer Windows based relational databases gaining popularity. The only database to have survived with a significant presence is Paradox (19%). The rising star in database programs is MS Access (56%). Also showing is Filemaker (5%).

7.12 Use of CAD for 2D Draughting

In 1992 about 57% of organisations used CAD and AutoCAD was used by 56% of these, with AutoSketch also listed at 9%. The next three most popular CAD systems in 1992 were Generic CADD (6%), Claris CAD (6%) and VersaCAD (5%). These last three have now dropped to 2% or less while AutoCAD has improved to 67% of users and AutoSketch has dropped to 3%. While AutoCAD is still the standard for 2D CAD systems by a long way, DataCAD is one system that has improved from 2% to 5% and Microstation has improved from 2% to about 3% (not as much impact as was predicted in 1992). A new player is ArchiCAD which shows in the 2D area at 8%.

The total proportion of CAD users at 46% seems to suggest that CAD has dropped in usage from the 57% in 1992. This comparison is somewhat misleading as the method of measuring is different. In 1992 the 57% referred to organisations whereas the current 46% refers to individuals. These individuals may represent a sole trader or they may be line staff in a larger office.

7.13 Use of CAD for 3D Modelling

In 1992, 3D modelling was in its infancy as far as building industry systems were concerned. It has now matured very rapidly and is setting the new standard in sophistication for design, visualisation, working drawings, and other automatic processes such as estimating, quantity scheduling and specification.

Currently there are two systems vying for leadership in 3D modelling: AutoCAD (45%) and ArchiCAD (30%). Also making a move is Chief Architect (5%), with DataCAD (4%), Microstation (2.5%) and CADDSMAN (2.5%) also evident.

7.14 Use of CAD for Visualisation and Animation

In 1992, visualisation was mainly undertaken using a 2D graphics packages. There were at least 12 popular programs being used.

With the growth of 3D modelling has come sophisticated visualisation and animation options, some fully integrated into the CAD software. It is no longer appropriate to include these features with 2D graphics as they represent a new category of use.

While usage is still rather low at 15% for visualisation and 8% for animation it is expected that this area will rapidly grow.

The leading systems in New Zealand are currently ArchiCAD (38%) and AutoCAD (32%). Also making a showing is Chief Architect (6%), and at least nine other systems in use.

7.15 Engineering Analysis Software

Of all computer users, 11% use engineering analysis software. The leading system is Microstran (32%) with P-frame (8%), Turboframe (8%) and MathCAD (8%) also prominent. There are at least 12 other systems in use. The large number of systems in use probably reflects that each package handles different aspects of engineering analysis and no one system does everything. Engineers as a group may well have a very wide set of needs and there could well be some who write their own software to meet their various needs as they arise.

7.16 Specification Systems

It is remarkable that only 2% of users reported they used electronic sources for specification writing. Specification writing is one of the really basic advantages of computer use and systems such as MasterSpec have been available for many years.

A possible explanation for the low figure could a misinterpretation of the survey question. Many users may have thought they had already answered this question under the question about use of word processing in general.

7.17 Use of Computers for Quantity Surveying

Quantity surveying systems were reported by 15% of computer users. No single system dominates. There were 13 specialist systems named and many systems were based on spreadsheets. Custom designed systems were also prominent.

7.18 Project Management

Project management software has a large number of users (32%). The most common system was MS Project (39%) but many use spreadsheets for this function (15%-25%). Other systems with a significant usage were Timeline (7%) and Superproject (5%).

7.19 The Most Useful Applications

There was a three-way tie between MS Word, MS Excel and AutoCAD (25% each).

There is also a hard core for ArchiCAD (7%) and Word Perfect (5%).

7.20 Electronic Information Services

Among computer users, 79% have access to external data services and nearly all (77%) have used it within the past 12 months. However, only 30% have found a useful data service. It seems there is still some way to go before electronic information services deliver what has been promised and they become essential communication tools for everyone in the industry. This opens considerable scope for new services to enter the market since the industry appears to be well placed to use them; is seeking to find useful services; but has not always found them so far.

7.21 Training

The more experience a computer user has, the more skilful they may become at using their computer. However, most computer systems have the capacity to do much more work than they are typically ever asked to do by their operators. Also, computer systems are developing at a rapid pace. With this in mind, a prudent business should have a strategy that involves keeping software up-to-date. If users are to maintain their skill level on this changing platform, then training also needs to be on-going. In today's technology environment it would be reasonable for a business to budget for every computer user to have some training each year. Failure to do this would mean that a user begins to fall behind in their ability, while competitors could take the opportunity to race ahead.

Training is taken fairly seriously by the industry as 67% of computer users reported they did have some off-the-job training within the past 12 months and 66% expect to have off-the-job training within the next 12 months. 33% expect to have up to 10 hours training, 17% expect to have 10-20 hours, 9% expect to have 20-30 hours, and 7% more than 30 hours.

The preferred method of training is one-on-one in-house training with or without a consultant trainer or learning on the job with the assistance of a colleague.

7.22 Barriers to Computer Use

In the survey, 12 suggestions were offered as to why computer use would be hindered. Computer users agreed that most of these were valid reasons although few thought that computer (un)reliability was a issue.

The most significant barrier seems to be that computer users were satisfied with their current methods (82%) and most made this judgement based on what was claimed to be adequate awareness of current systems (61%). No attempt was made to verify how effective or accurate this awareness was.

Lack of finance was reported by 68% of computer users to be a barrier. This was predictable. It is interesting that 32% don't think that finance is a barrier.

While the survey asked respondents to cite any other barriers to effective use of computers, few were offered. There were some comments that tended to suggest application software needs to be further improved even though many users are happy to live within existing limitations.

It was expected that users might report barriers such as disruption to existing methods and the slow or even negative return on investment, but none of these were reported.

8. CONCLUSIONS

- A large majority (86%) of computer users have a dedicated PC and 60% of users are networked.

- By current standards a significant proportion of existing computer users (13%-30%) are using or may be using computer hardware and software that is either out-of-date or tending to be.

- The typical replacement computer system is likely to have MS Windows 97 as its operating system and MS Office 97 as its application suite. It is also likely to be optimised for multimedia and the Internet.

- CD ROM drives are now commonly offered as a standard device on new stand-alone computers. They are essential for the loading of software and they also provide a useful medium for data distribution services. People using networked computers may already have a CD ROM drive or one can usually be added at little cost.

- With 58% of users already having CD readers and either modem access (43%) or network connection (60%), the potential for CD-ROM based services linked to Internet services has a good platform to work on.

- Since CDs and hard disk storage have come down in cost, and the size of computer applications have gone up dramatically, a problem for file backup has been created. The rapid growth of graphics and multi media has exceeded the capacity of floppy disk technology. Future surveys should address the issue of media to be used for back-up. Writable CD technology and devices such as Zip drives may make an impact in the short term. Other alternative technologies are yet to appear but could be quickly adopted when they do.

- Computer systems are currently dominated by Microsoft Windows (68%) and applications within the Microsoft Office suite (Word 66%, Excel 66%, Access 56%).

- CAD of some form has become very important to a large number of computer users (46%) and AutoCAD still dominates or has significant presence in all areas (2D 67%, 3D 24%, visualisation and rendering 32%, animation 55%). The only CAD package to threaten this dominance is ArchiCAD which has made an impact in the more sophisticated CAD area of 3D (30%) and in visualisation and animation (38%). However, the sophisticated CAD users represent 24% of users in the 3D area, 15% in rendering and only 8% in animation. There are many duplications within these three areas.

- There is a very wide variety of application software being used by small numbers of users. The survey confirmed that there are a very large number of different computer programmes in use for the same or similar tasks. This was evident in 1992 and is again in 1997. For common communication tasks, the use of any word processor or spreadsheet will do, provided the final communication is transmitted on paper. However, if the communication is in the form of electronic data, and the recipient may be required to undertake further electronic processing on this data, then compatibility of formats becomes important.

- While a large percentage of computer users (79%) have access to external information services and most (77%) have used it within the past 12 months, only 30% have found a useful data service. Even though the Internet is playing a major part in unification of data there is still a long way to go before commercial and technical data interchange is seamless and reliable.

- The most popular and most useful electronic information service was SPECTEL (used occasionally or often by 33.5%, and found most useful by 41.7% of these users)

- Growth in computer use is expected to continue. The biggest potential growth is in electronic information services and communication, especially via the Internet. This <u>will not</u> require large investment in hardware, software or training and a good proportion of the industry is already well placed to use any services that are developed. The 23% of existing computer users who have not used electronic data services could easily add this capability at little cost in hardware. The significant cost for these users would likely be in rental of an additional telephone line.

- The industry seems to take training moderately seriously. Sixty-seven percent of computer users reported they did have off-the-job training within the past 12 months and 66% expect to have off-the-job training within the next 12 months. The preferred method of training is one-on-one in-house with or without a consultant trainer, or, learning on the job with the assistance of a colleague.

- While the New Zealand building and construction industry has a large proportion of its existing members who use computers, there is also a large minority who either don't use computers at all, or use them only casually. The effect of this should be investigated.

- Training needs to be given to non-users and casual users to bring them up to speed to take advantage of the computing technology around them. The needs for upper management training will be different to middle management and technician training.

- There does not seem to be any one major barrier to the use of computers. The most significant barrier reported was that computer users were satisfied with their current methods (82%) and most made this judgement based on adequate awareness of current systems (61%). While application software may need to be further improved, many users are happy to live with existing limitations. This is an indicator of an attitude problem that should be investigated further.

- As more and more reliance is placed on electronic means for cost-effective communication of information, non-computer users are likely to become less efficient in the industry. While BRANZ may not be expected to provide a solution to this problem, it should be encouraging and advising on what is the appropriate education for different sectors.

- Possibly the biggest challenge will be to devise a strategy for changing the attitudes of those who do not accept computer applications or do not accept the fact that computers evolve and that they should keep up.

9. RECOMMENDATIONS

9.1 Training

BRANZ should encourage the educational agencies to produce a national training curriculum and resource suited to the training of non-users and casual users within the building and construction industry. This is needed to bring them up to speed so they may take advantage of the computing technology around them.

BRANZ should coordinate and encourage the production of high quality computer awareness programmes directed at upper management. The needs of upper management for training are different to the needs of middle management and technician training. A special strategy needs to be devised so that upper management are convinced their highly valuable time will be well spent.

9.2 Computer Usage Study

Further studies need to be done to find out: what types of industry people don't use computers; why they don't; if this non-use of computers is a matter of concern; does it hinder other users and their work.

Conversely, a more detailed study could be made of the computer users and the way they actually use computers. This would be to find out how effective their use is and what effect does their use have on industry communication.

9.3 Seminars and Short Courses

The survey indicated a significant number of computer users do not seem to have good practice in back-up and contingency planning. If this is so then there is an urgent need for seminars and training courses in the area of professional responsibility in the use of computers for business, design and project management.

This education could include advice on strategies for policy setting including obsolescence planning, software upgrading, regular back-up procedures, and contingency planning for emergencies.

9.4 The Internet and Data Interchange

A survey of existing computer users should be undertaken to ascertain user's current and expected dependency on data interchange of all types. While some computer users are interchanging electronic files there is a lack of standards. What effect does this have on the industry?

There is scope for development of Internet use. A suggestion is to provide guidance on how the industry can make best use of this technology. Once again BRANZ could act as the coordinator for electronic data interchange guidelines for the building and construction industry.

Although the survey did not ask about data interchange, knowledge of such exchanges could be important in any future survey. Whilst commercial data interchange is the focus of much current development in other industries, there appears to be little official advice to assist technical data interchange for data such as CAD files. This acts as a drag on the development and implementation of sophisticated management systems for technical data which are the key to powerful and productive systems.

9.5 Standards and Protocols

If the building and construction industry is to participate in the expected rapid growth in electronic information services and communication, then the application of standards and protocols for data interchange, currently being worked on internationally, will be very important.

9.6 Modelling of Industry Process

It would be helpful to those who are developing systems for the building and construction industry and for those who are seeking to find out how to extend their use of computer technology, if there were a model or mock-up that demonstrated how different existing software could be integrated effectively. This could then address the various issues of data interchange and provide recommended means of dealing with mis-matches for the benefit of everyone concerned.

BRANZ should either develop such a model itself and/or work with one of the universities or polytechnics to do so.

10. REFERENCES

ComputerWorld New Zealand. May 19, 1997

Statistics New Zealand, *New Zealand Official Yearbook, 1996, Wellington*

Sunday Star-Times. February 2, 1997

Thompson, K. 1992. *The Role of Information Technology Within The Building Industry. Building Research Association of New Zealand. Judgeford.*

APPENDIX 1 : SUMMARY OF THE RESULTS

THE RANDOM SURVEY

Return based on 43 respondents

Type	Contacted	Responded	Computer User	
Designers	30	7	3	43%
Owners / financial consultants	30	5	3	60%
Territorial authority	30	13	7	54%
Builder or sub-trade	30	12	4	33%
Material supplier	30	6	2	33%
TOTAL	150	43	19	44%

How representative are computer users of the general building and construction industry population?

	Often	Casually	Never
How many industry people use a computer?	58%	12%	30%

THE GENERAL SURVEY

How many individuals were surveyed?

Direct mail invitations to register	5000	100%
Registration forms returned not completed	112	2.2%
Registration forms received	390	7.8%
Questionnaire forms received	340	7%
Number of computer users	336	

Positions or Titles of computer users?
(interpretation based on Position / Title from Registration Form)

Architects	20%
Draughtspersons	13%
Builders	13%
Engineers	12%
Inspectors	11%
Designers	7%
Quantity surveyors	3%
Trade persons (other than builders)	4%
Suppliers	4%
Educators	2%
others	12%

The functional roles of computer users

(from Registration Form)	Current Role	Main Role
Project Inception, Feasibility Study, Brief Prep	56%	9%
Concept Design	64%	15%
Design Resolution	64%	20%
Project Documentation	72%	31%
Building Consents and RMA	57%	12%
Construction Estimating / Tendering	49%	11%
Construction Planning	32%	2%
Project Management / Site Control	50%	8%
Construction Work	18%	4%
Off-Site Manufacturing	12%	3%
Building Product Supply	8%	2%
Inspection	31%	3%
Facilities Management	21%	2%
Maintenance / Repair / Demolition	23%	1%

The functions where computers are used

(from Registration Form)	Computer is Used	Potential Use
Project Inception, Feasibility Study, Brief Prep	38%	12%
Concept Design	42%	14%
Design Resolution	46%	11%
Project Documentation	62%	6%
Building Consents and RMA	37%	9%
Construction Estimating / Tendering	34%	12%
Construction Planning	19%	12%
Project Management / Site Control	30%	13%
Construction Work	8%	5%
Off-Site Manufacturing	6%	3%
Building Product Supply	4%	1%
Inspection	19%	7%
Facilities Management	15%	5%
Maintenance / Repair / Demolition	13%	5%

Type of hardware used

A dedicated PC (Q2)	86%
A modem on their PC (Q5)	43%
A CD drive on their PC (Q5)	58%

A network connection (Q5)	60%

Age of computer hardware

	under 1yr	1-2yr	2-3yr	over 3yr	don't know
How old are the PCs in use now (Q4)	31%	35%	19%	13%	2%

Do users receive new or used hardware?

	new	used
Was the PC new or a hand-down (Q6)	83%	17%

Who decides on upgrading computers?

	the user	others
do users determine the PC they get (Q7)	60%	40%
do users decide when to upgrade their PC (Q8)	61%	39%

Rating of computer skill by users (Q10)

<5=low, 5or6=medium, 7or8=high, >8=expert	low	medium	high	expert
	21%	26%	42%	10%

Operating systems used (Q9)

		Users
MS Windows:	Win3.x	26%
	Win 95	34%
	Win NT	8%
non-MS Windows:	Apple/Mac	9%
	DOS	20%
	UNIX	2%
	Other	1.3%
	Don't know	0.3%

Skill in use of operating systems (Q11)

		no skill	low skill	med skill	high skill
MS Windows:	Win3.x	27%	19%	34%	21%
	Win 95	26%	27%	35%	11%
	Win NT	77%	9%	11%	2%
non-MS Windows:	Apple/Mac	67%	17%	7%	9%
	DOS	26%	34%	28%	12%
	UNIX	90%	8%	2%	0%
	Other	94%	3.8%	0.3%	1.3%

Word processing programs used (Q12) 81%

MS Word (all versions)	66%
(MS Word 6)	(31%)
(MS Word 7)	(15%)
Word Perfect (all versions)	10%
MS Works (all versions)	8%
Claris Works	3%
8 other named programs	5%
no name	8%

Spreadsheet programs used (Q12) 68%

MS Excel (all versions)	66%
(MS Excel 5)	(18%)
(MS Excel 7)	(16%)
MS Works (all versions)	10%
Lotus (all versions)	5%
Quattro Pro (all versions)	5%
Claris Works (all versions)	4%
6 other named programs	3%
no name	7%

Database programs used (Q12)	34%	
MS Access (all versions)		56%
Paradox (all versions)		19%
Filemaker (all versions)		7%
11 other named systems		18%
CAD programs used (generally) (Q12)		
Total number of individual users	46%	
CAD programs used for 2D draughting (Q12)	45%	
AutoCAD (all versions)		67%
(AutoCAD R12)		(17%)
(AutoCAD R13)		(23%)
(AutoCAD LT)		(25%)
ArchiCAD (all versions)		8%
DataCAD (all versions)		5%
Microstation (all versions, include Powerdraft)		3%
AutoSketch		3%
ClarisCAD		2%
TurboCAD		2%
12 other named CAD systems		10%
CAD programs used for 3D modelling (Q12)	24%	
AutoCAD (all versions)		45%
(AutoCAD R12)		(13%)
(AutoCAD R13)		(26%)
ArchiCAD (all versions)		30%
ChiefArchitect (all versions)		5%
Microstation (all versions)		2.5%
DataCAD (all versions)		4%
CADDSMAN		2.5%
8 other named CAD systems		10%
CAD programs used for visualisation and rendering (Q12)	15%	
AutoCAD (all versions and supporting programs)		32%
(AutoCAD R12)		(8%)
(AutoCAD R13)		(20%)
ArchiCAD (all versions)		38%
ChiefArchitect (all versions)		6%
9 other named systems		24%

CAD programs used as a platform for animations(Q12)	8%	
ArchiCAD (all versions)		55%
(AutoCAD R13)		18%
6 other named systems		27%

Engineering analysis software used (Q12)	11%	
Microstran		32%
P-frame		8%
Turboframe		8%
MathCAD		8%
12 other named systems		43%

Electronic sources for specification writing (Q12)	2%	
Masterspec		75%
Others		25%

Quantity surveying systems (Q12)	15%	
MS Excel		33%
Everest		10%
Lotus		8%
Nimbus		8%
Quatro Pro		4%
Chief Architect		4%
Supercalc		4%
Custom designed systems		8%
10 other named systems		20%

Project management systems (Q12)	32%	
MS Project		39%
MS Excel		11%
Timeline		7%
Superproject		5%
MS Access/Office		4%
Mac Project		3%
9 other named systems		7%
No name or custom designed		11%

The most useful computer applications (Q13)

MS Word	25%
MS Excel	25%
AutoCAD	25%
ArchiCAD	7%
Word Perfect	5%
MS Works	4%
MS Project	2%
MS Access	1.2%
20 other named systems	11%

(exceeds 100% as more than one selection made)

Choosing and updating systems

Users who select the application they Use (Q14)	56%
Users who control the decision to update applications (Q15)	51%
Users willing to be involved in development (Q17)	51%

Do existing users expect to change their level of use of computers?

	less	same	more
(Q18)	0.4%	28.4%	71.2%

Electronic information services used in past 12 months?

Have access via one or more methods (Q19)	70%
Have access via a modem (Q19)	33%
Have access via a network (Q19)	35%
Have access via other external access (Q19)	16%
Have used some external data service (Q20)	77%
Have used email (Q20)	51%
Have used bulletin boards (Q20)	10%
Have used file transfer (Q20)	26%
Have used the Internet / WWW (Q20)	43%
Have free access to use external data services (Q21)	57%
Have found a useful data service (Q23)	30%

The main sources of electronic building information and how often used? (Q22)

Source used	once only	occasional	often	most useful
SPECTEL	3.0%	24.6%	8.9%	41.7%
The internet / WWW (in general)	1.5%	5.9%	3.0%	28.6%
Ralenti	12.3%	5.9%	5.9%	14.3%
Brookers	0.5%	3.0%	0.0%	3.6%
SNZ CD	0.5%	2.5%	0.5%	2.4%
BRANZ	2.0%	3.9%	1.0%	1.2%
Winstones CD	3.0%	0.5%	0.5%	0.0%
14 other named services	1.0%	6.9%	2.0%	10.7%

Training by existing computer users (Q24)

	0 hrs	1-19 hrs	20-49 hrs	50-99 hrs	>99 hrs
Off-the-job training in past year	61%	28%	5%	1.5%	3.5%
Off-the-job training in past 5 years	40%	26%	18%	4.5%	11%
Off-the-job training within next 12 mths	62%	27%	5%	2%	3%

Preferred types of training (Q26)

	hopeless	poor	acceptable	good	excellent
Self teaching from computer manuals	6%	14%	38%	32%	11%
Self teaching (on-line help / computer tutorials)	7%	13%	56%	21%	3%
Self teaching from training guide or video	13%	20%	40%	26%	2%
Learning on-the-job with colleague assistance	5%	4%	31%	32%	27%
One-on-one with in-house trainer	12%	4%	25%	21%	38%
One-on-one with consultant trainer	9%	5%	28%	29%	30%
Attending an external course of up to 1 day	6%	6%	37%	31%	19%
Attending an external course of 2-4 days	8%	11%	37%	28%	16%

How practical and convenient is on-the-job training? (Q25)	Yes	No
On-the-job training is practical	53%	47%
On-the-job training is convenient	36%	64%

How aware are computer users of current systems & practices?	Yes	No
Consider themselves to be aware of current systems (Q27)	61%	39%
Have a stated policy on computer obsolescence and replacement (Q28)	24%	76%
Have access to an office manual on computer policy and procedures (Q29)	26%	74%
Have a regular data back-up system (Q30)	70%	30%

Have a procedure to take if computer fails (Q31)	49%	51%

Barriers to computer use and adoption of change? (Q32)	Yes	No
Lack of finance	68%	32%
Rapid change of technology	37%	63%
Unaware of better systems	47%	53%
Satisfied with current methods	82%	18%
Colleagues and associates do not use computers	21%	79%
Users have to use systems determined by others	30%	70%
Poor data received from others	20%	80%
Out-of-date computer hardware	23%	77%
Computer is unreliable	8%	92%
Lack of access to training	28%	72%
Lack of access to day-to-day technical system support	26%	74%
Lack of access to day-to-day technical hardware support	26%	74%

APPENDIX 2 : THE SURVEY FORMS

March 3, 1997

COMPUTER USE IN THE NZ BUILDING & CONSTRUCTION INDUSTRY

The Building Research Association of New Zealand (BRANZ) have commissioned Salesoft CAD Solutions to undertake a random survey of individuals in the New Zealand Building and Construction Industry.

email Address
team@salesoft.co.nz

The purpose of this random survey is to estimate what percentage of individuals are using computers for any purpose within the roles they undertake.

You have been selected for this important survey (even though you may not be a computer user).

It would greatly help us if you would agree to answer the questions on the reverse side of this letter and fax or post the result to me.

This random survey is being conducted in parallel with a more general survey of computer users which you may have also received independently of this letter. Please do not get them confused as they are for different purposes.

You are welcome to participate in the general survey as well as this survey. If you have not received the general survey and would like to register for it, please indicate on the reverse side and I will send you the registration form.

Please be assured that your identity and the identity of your firm will not be disclosed in any publication. Your information will be used only for statistical purposes and will be handled in strict accordance with the Privacy Act 1993.

Thank you for your cooperation.

Joe Doherty
Project Leader

Fax to: (09) 373 2990

COMPUTER USE IN THE NZ BUILDING AND CONSTRUCTION INDUSTRY
Random Survey (March 1997)

Instructions:
This Form is only to be completed by person to whom it was addressed.
When completed, Fax or Post this form to:

Computer Survey, Salesoft CAD Solutions, PO Box 90 394, Auckland

I agree to participate in this industry survey. I do so on the understanding that any personal details I supply will be handled in accordance with the Privacy Act 1993. Any technical information I provide will be identified only by a number. Neither my name, nor my company's name, will be disclosed in any reports. My personal details are supplied for classification purposes and for communication about this survey and any related follow up survey.

My Name:	______________	Phone:	______________
My Position / Title:	______________	Fax:	______________

Company:	______________________	Email:	________________________
Postal address:	______________________		
Suburb / Locality:	______________________		
City or Region:	______________________	Signature:	________________________

In the past 12 months I have used (or could potentially have used) some form of computer technology in one or more of the following Building and Construction Industry Functions.

email Address
team@salesoft.co.nz

Please tick all those boxes that apply

My Roles?			My Computer Use?		
Yes		**Building & Construction Industry Functions**	Often	Casually	Never
	1	Project Inception, Feasibility Study, Brief Prep			
	2	Concept Design (Arch, Struc Eng, Bldg Serv, QS, etc)			
	3	Design Resolution (Arch, Struc Eng, Bldg Serv, QS, etc)			
	4	Documentation (Arch, Struc Eng, Bldg Serv, QS, etc)			
	5	Building & RMA Consents, other planning control			
	6	Construction Estimating, Quoting, Bidding, Tenders			
	7	Construction Planning			
	8	Project Management & Site Control			
	9	Construction, Building Operations, Work of Trades			
	10	Off Site Manufacture of Building Products or Elements			
	11	Distribution, Supply and Transport of Building Products			
	12	Quality Control and Certification of Work in Place, WOF			
	13	Facilities Management, As Built Survey, Asset Reporting			
	14	Maintenance, Repair, Demolition, Modification for Reuse			
	15	Other Functions (state):			

In the past 12 months I spent most of my time on Role Number: …..…

Please send me the general computer use survey questionnaire: ……Yes No

ATTENTION:

Technical Computer Users
Computer Systems Manager
Office Manager

April 23, 2008

COMPUTER USE IN THE NZ BUILDING & CONSTRUCTION INDUSTRY

The Building Research Association of New Zealand (BRANZ) have commissioned Salesoft CAD Solutions to survey computer use in the New Zealand Building and Construction Industry. This survey aims to gauge the extent and effectiveness of computer use by individuals in the different industry roles they undertake.

You are requested to distribute this important survey to qualified persons within your office.

We are inviting any one in an active role to register their willingness to be surveyed. They do not need to be a full time computer user. For those who agree, please complete the "Registration of Consent to be Surveyed" on the reverse side of this letter. Fax or post it today to Salesoft CAD Solutions (not BRANZ).

We will then send the registrant the technical questionnaire that matches their role. Questionnaires are due for distribution beginning on 14 March 1997. The final report on the survey results will be ready for publication about July 1997 and it is intended to be available for sale from BRANZ.

Today there are a number of electronic services available to the industry. Which ones are the most used? No doubt more will quickly evolve. Will we make full use of them? What are we doing now to take advantage of these revolutionary developments in electronic information?

A perusal of project communications indicates a wide variety of computer use in the New Zealand Building and Construction Industry. Many NZ firms exchange information electronically. But to what extent do they cooperate in the structuring of the data in these files so as to make the most effective use of the technology they are using? Just how critical is data compatibility? While a firm may consider their own use of computers to be effective, no one knows for sure what the cumulative effect of an ad-hoc approach is on the industry. We do not have any unbiased overviews of what each sector is really using, nor what the trends-in-use are. We all find it difficult to maintain awareness of what is available and to justify the on-going expense of upgrades. Some firms have a policy of maintaining their computer systems with the latest computing technology while others have under-powered or out-of-date systems. It would be worthwhile to know if the industry's investment in computer technology really is effective. To what extent does any lack of investment hinder productivity? Unfortunately, we cannot begin to measure potential economies because we do not have accurate information on existing usage at the individual level.
Hence the decision by BRANZ to commission this survey.
We hope you agree to support the survey, and thank you for your cooperation.

Joe Doherty
Project Leader
Fax to: (09) 373 2990

COMPUTER USE IN THE NZ BUILDING AND CONSTRUCTION INDUSTRY
Registration of Consent to be Surveyed

Instructions:
Please use one form per user. When completed, please Fax or Post this form to:
Computer Survey, Salesoft CAD Solutions, PO Box 90 394, Auckland

I agree to participate in this industry survey. I do so on the understanding that any personal details I supply will be handled in accordance with the Privacy Act 1993. Any technical information I provide will be identified only by a number. Neither my name, nor my company's name, will be disclosed in any reports. My personal details are supplied for classification purposes and for communication about this survey and any related follow up survey. I understand that the main purpose of registration at this time is in order that an appropriate set of survey questions can be sent to me.

My Name:	____________________	Phone:	____________________
My Position / Title:	____________________	Fax:	____________________
Company:	____________________	Email:	____________________
Postal address:	____________________		
Suburb / Locality:	____________________		
City or Region:	____________________	Signature:	____________________

……………………

I would prefer survey communications to me to be by: .... Post ☐ Fax ☐

In the past 12 months I have used (or could potentially use) some form of computer technology in one or more of the following Building and Construction Industry Functions.

Please tick all boxes that apply

My Roles?			**Computer Used?**	
Yes		**Building & Construction Industry Functions**	Yes	Potential
	1	Project Inception, Feasibility Study, Brief Prep		
	2	Concept Design (Arch, Struc Eng, Bldg Serv, QS, etc)		
	3	Design Resolution (Arch, Struc Eng, Bldg Serv, QS, etc)		
	4	Documentation (Arch, Struc Eng, Bldg Serv, QS, etc)		
	5	Building & RMA Consents, other planning control		
	6	Construction Estimating, Quoting, Bidding, Tenders		
	7	Construction Planning		
	8	Project Management & Site Control		
	9	Construction, Building Operations, Work of Trades		
	10	Off Site Manufacture of Building Products or Elements		
	11	Distribution, Supply and Transport of Building Products		
	12	Quality Control and Certification of Work in Place, WOF		
	13	Facilities Management, As Built Survey, Asset Reporting		
	14	Maintenance, Repair, Demolition, Modification for Reuse		
	15	Other Functions (state):		

In the past 12 months I spent most of my time on Role Number: .... ☐

COMPUTER USE IN THE NZ BUILDING AND CONSTRUCTION INDUSTRY
Questionnaire for BRANZ 1997 Survey

At My Regular Place of Work

Q1 A personal computer is (or could be) an important tool for me:

Yes ☐ **No** ☐

Q2 I have a computer dedicated to my personal use:

Yes ☐ **No** ☐

If Yes, go to Question 4, If No, proceed with Question 3

Q3 I have occasionally used a computer within the past year:

Yes ☐ **No** ☐

If Yes, go to Question 10. If No, go to Question 24

My Computer

11. Q4 The age of my computer is:

< 1 yr ☐ 1 - 2yrs ☐ 2 - 3 yrs ☐ 3 - 4 yrs ☐ > 4yrs ☐ Don’t know ☐

Q5 My computer includes the following devices:

A Modem ☐ A Network connection ☐ A CD ROM ☐

Q6 When I received my computer, it was:

New ☐ **Used** ☐

Q7 The type of computer I use was chosen by me:

Yes ☐ **No** ☐

Q8 I will decide when to purchase an upgrade of my computer and software:

Yes ☐ **No** ☐

Q9 The operating system in the computer that I currently use is:

Apple/Mac ☐	DOS ☐	UNIX ☐	Other ☐
Win 3.x ☐	Win 95 ☐	Win NT ☐	Don’t know ☐

My computing experience

Using a rating scale from 0 = nil, to 10 = expert

Q10 I rate my general computing skill as: 0 - 10

Q11 I rate my knowledge of the following Computer Operating Systems as: 0 - 10

Apple/Mac	
DOS	
UNIX	
Windows 3.x	
Windows 95	
Windows NT	
Any one other operating system	

Q12 The computer application(s) that I use <u>most often,</u> and how important I rate them are:

(State the application name and version, if known, otherwise leave blank)
(Importance rating is from 0 = not important, to 10 = I cannot do my work without it)

Sample Answer for:
Word Processing: <u>MS Word 6</u> <u>7</u>

application:	program name + version	rating
Word Processing		
Spreadsheet		
Flat File Database		
Relational Database		
2D CAD drawing		
3D CAD modelling		
Design Visualisation		
Design Animation		
Engineering Analysis		
Specification Writing		
QS Estimating		
Document Tracking & Management		

Quantity Survey Take Off		
Project Management		
Issuing of Instructions		
Issuing of Claims		
Certification		
Facilities Management		
Personal Time Management		
Email		

How critical are computer applications to my role(s)

Q13 The computer application I find <u>most useful</u> is:

(name of application)

Q14 The person who decides which version of this program I use is:

Me ☐ Someone else ☐

Q15 The person who will decide when to upgrade this program will be:

Me ☐ Someone else ☐

Q16 The task I would <u>most like</u> a computer to give me assistance with is: … (describe)

Q17 I am interested in being involved in identifying and commenting on new computer system developments for the building and construction industry?

Yes ☐ **No** ☐

Q18 In the future, I expect to be more / less involved in using computers?

Less ☐ Same as Now ☐ More ☐

External Electronic Information & Services

Q19 My general access to <u>external data communication services / facilities</u> at work is:

I have no access ☐ I have my own modem & phone ☐
My own office network connection ☐ I have access to another facility ☐

Q20 <u>External communication services / facilities</u> I have used within the past 12 months are:

Email ☐ Bulletin Board ☐ File Transfer ☐ Internet / WWW ☐

Q21 My freedom to use <u>external data services</u> is controlled by:

Me ☐ Someone else ☐

Q22 <u>The main sources of electronic information</u> I have used within the past 12 months, for the following building and construction applications are: …

	(list up to two sources)	how often used?		
application:	**name of source:**	**once**	**occasion ally**	**often**
Codes & Standards				
Availability of Building Products				
Product Supplier Information				
Service Supplier Information				
General Technical Information				
Current Construction Costs				
Projects Available for Tender				
Building Industry News				

Q23 The electronic information service I have found <u>most useful</u> to my role, is:

Name of service: ______________________ Or none ☐

Training in use of computers

Q24 Off-the-job training on computer systems

(if exact amount is not known an estimate will do)

total hours I have had over the past year is:	
total hours I have had over the past five years (including last year) is:	
total hours I expect to have over the next year is:	

Q25 On-the-job training in computer systems for me is: …

practical ☐ not practical ☐ convenient ☐ not convenient ☐

Q26 I rate the following forms of training in order of effectiveness in assisting me to <u>become</u> productive in using a computer system:

0 = hopeless, 10 = excellent

Teaching myself on the job by reading the manual	
Using the computer's on-line help and tutorials	
Buying a training book or video and working alone	
Having a colleague assist me on real work	
Having an in-house trainer, one on one	
Employing an outside trainer, one on one	
An external course of more than 8 but less than 30 hours	
One or more external short courses of less than 8 hours	
Other (state)	

Computer Awareness and Policies

Q27 I consider myself to be aware of the most common computer systems that are currently available for my role(s)?

Yes ☐ **No** ☐

Q28 I (or my firm) have a stated policy on computer system obsolescence and replacement?

Yes ☐ **No** ☐

Q29 An office manual is available to me and it includes policies and procedures for computer use and applications?

Yes ☐ **No** ☐

Q30 My office has a regular system of backing up data?

Yes ☐ **No** ☐

Q31 My office has a procedure to take should my computer fail?

Yes ☐ **No** ☐

Barriers to Effective Use

Q32 Barriers which hinder my use of computer technology are?

	Yes	No
Lack of finance		
Systems keep changing too fast for me		
I have not seen anything better than what I currently use		
What I am now using meets my current needs		
I am hindered because colleagues and associates do not use computers		
Most or all of the computer systems I use are determined by others		
I am hindered by the quality of the data I receive from others		
The computer I use is too slow		
The systems available to me are unreliable		
I cannot obtain suitable or convenient training		
I cannot obtain adequate support when I have a question		
I cannot obtain adequate support when things go wrong with my system		

Other reasons are: ____

Q33 I have the following general comments to offer on use of computers? …