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AN ANALYSIS OF THE COMPUTER IN THE ARCHITECTURAL PROFESSION  
April 21, 1982

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University Undergraduate Fellows Program  
Senior Honor Thesis

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I would like to express my thanks to my advisor Syd Spain and to the Department of Architecture; both of whom were invaluable in this endeavor

April 21, 1982

Gerald H. Weghorst

APPROVED: 4/21/82

A large, stylized handwritten signature in black ink, consisting of several overlapping loops and lines, positioned below the date.



An Analysis of the Computer in the Architectural Profession  
Gerald H. Weghorst

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An Analysis of the Computer in the Architectural Profession  
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Outline

I. INTRODUCTION

- A. With the aid of current and past research, this analysis intends to determine the state of the art of the computer in the architectural profession and predict the influence it will have on the profession in the future.
- B. This research uses two types of data: current opinions collected from surveys and past facts from various sources.
- C. Finally, this analysis should project opinions on how the influence of the computer is currently affecting the profession and how this might project into the future.

II. COLLECTION AND ANALYSIS OF DATA

- A. The first step involves familiarization with certain terms to be used.
- B. To fully understand the current situation, It is necessary to first study the past influences involved.
  - 1. One topic to review is the past accomplishments of the computer industry.
  - 2. The organizational structure and methods of the architectural profession must be understood.
- C. A study of the present usage of the computer in the profession should provide the best insight for predicting future trends.
  - 1. The main source of current information will come from a survey of the architectural profession conducted in December 1981.
  - 2. Other sources of information give this survey a more in-depth, accurate analysis.
- D. Studying this data, it is possible to predict future trends in the profession.
  - 1. This data points to certain events that could change the way we view the computer in architecture.

2. These predictions can now be compared to what the profession actually expects from the computer in the future.
- E. After reviewing the data, an analysis of which direction to pursue can be made.
1. Modifications within the profession will have to be made in order to accommodate this new machine.
  2. With or without these modifications, we can expect certain results to occur.

### III. CONCLUSION

- A. This analysis has presented current facts and projected future trends.
- B. What then, is the next step?
- C. In closing, these concluding thoughts might be of interest.

In 1899, deliverymen relied greatly on their only means of transportation, the horse. At this time, rumors were heard predicting a wave of technology; technology that in twenty years would ultimately replace the horse and the method of business with which the deliverymen felt so accustomed. This technology of course, was the automobile. In 1982, architects rely chiefly on traditional methods of office production. Tools such as the pencil, paper and drawing board have been professionally accepted and are planned to be in use for a long time; or are they? As hints of the automobile were once circulated through the delivery business, rumors of a far more powerful machine, the computer, are being heard in the architectural profession. Similar to the warning that went out 90 years ago, architects are now being told that in order to sustain profitability and a competitive edge on their profession, they must automate certain services within the next 10 years. What does this mean for the architect? Architects must become aware of the current situation and understand it to it's fullest to prepare for this transition of technical power.

To understand current developments and grasp the direction of future computer behavior, architects must first understand the history and the past influences of the computer industry as it pertains to architecture. In 1954, Charles Eames, a leading designer of the time, foresaw the

future onslaught of what he termed "optimization theories", and proclaimed their future in these words, "...the development of these and related theories will be the greatest tool ever to fall into the hands of architects or planners." If Eames was foretelling the computer explosion and its effect on the architect, then he also gave warning to the profession by stating, "Whether or not they (the buildings) are planned by architects may pretty well depend on the way architects today prepare to use such tools."<sup>1</sup> Twenty-eight years ago, a prediction such as this seemed unusual and distant, a product of dreamers and scientists. Today, it is realistic and frightening to architects trying to keep up with technology while preparing "to use such tools".

The use of these tools, computers in architecture, can be traced back four years before the statement by Charles Eames to 1950 when Buckminster Fuller used computers for structural analysis.<sup>2</sup> However, the first real development came in the late 50's and early 60's with the Department of Defense's development of PERT (Project Evaluation and Review Technique) and CPM (Critical Path Method). These programs provided much needed funding for development in computer applications and sparked interest within the architectural industry.<sup>3</sup>

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By the 1960's, computers had found their way into architectural offices, but because of extravagant costs,

only the larger firms were able to afford them.<sup>4</sup> Interest throughout the industry increased despite high costs and scarcity and the computer's seed was sown into the mainstream of architectural technology. During a 1964 computer conference in Boston, five times as many interested architects as expected (from 100 to 500) showed up for the architectural computer lecture proving that even at this early stage, architects were not only interested but intrigued by the capabilities of this new machine.<sup>5</sup> Throughout the 1970's, technology increased and hardware (the computer machinery) prices decreased until the early 1980's when hardware prices were falling as much as 30% a year.<sup>6</sup> Currently, prices are affordable for even the most modest offices, technology is able to support the average architect's needs and the supply is abundant. For the profession, all of the necessary ingredients are available for a smooth transition into automation except possibly the most important - the well-informed architect.

It now has become necessary to educate the architect in the skill of computer acquisition. In a market such as the computer industry's, where information three months old is considered ancient or obsolete, it is very difficult to present available services being offered. It is not as difficult, however, to present and help define the state of the art of computers today from the architect's point of view.

An approach of polling architects and obtaining their experiences and expectations of the computer would be just as beneficial to an interested architect as obtaining boxes of computer brochures. A comprehensive "state of the art" compilation of data on the computer in architecture seems to be nonexistent at this time, but it is very important for the proper education of the architects planning to purchase computers in the near future. Because of this lack of information, it was necessary to help fill this void and provide the needed information by collecting data of this type from a survey directed towards an unbiased cross section of architectural firms.

The survey conducted was restricted to the state of Texas but should be representative of surrounding states as well. A total of 406 questionnaires (see appendix) were sent to architectural firms across the state. Of the 406 sent, 187 or an extremely high 46% were returned exposing the fact that a professional nerve was struck and confirming the thought that the profession definitely wants more information on this subject. The surveys were compiled and analyzed, producing some very interesting facts; facts that should provide another piece to the puzzle of computer acquisition and help to inform the architectural firm where it stands in respect to the rest of the profession. To better understand the questionnaire returns and provide information useful to the architect, some of the more important facts gathered from the overall

analysis will be presented.

Possibly the most important fact realized was a product of the results shown in Figure 1.

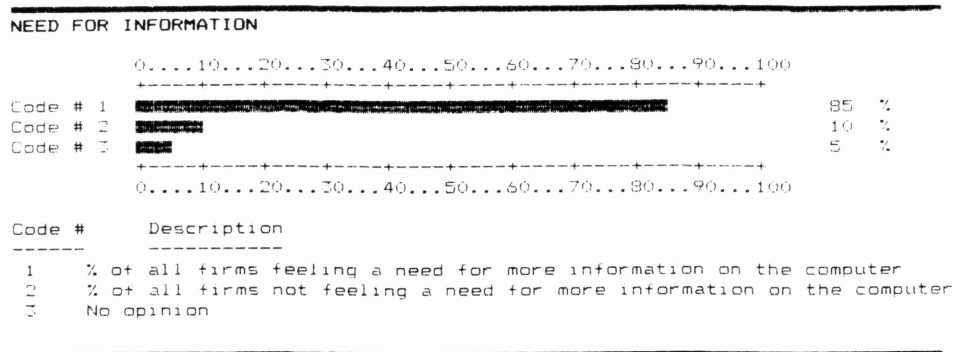


Figure 1. The need for more information

An overwhelming 85% of the architectural firms questioned felt a need for more information on the computer and how it pertains to the architectural profession. This overwhelming cry for information only strengthens and magnifies the importance of this survey and begins to alleviate some of the uncertainty that experience has shown to be a part of the first steps of computer involvement, a problem that will survive as long as the need for information exists.<sup>7</sup>

One of the main objectives of the survey was to determine the best indicator of whether or not a firm owned and/or used computer equipment and Figure 2 shows the results of this inquiry.



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**BREAKDOWN BY EMPLOYEES**

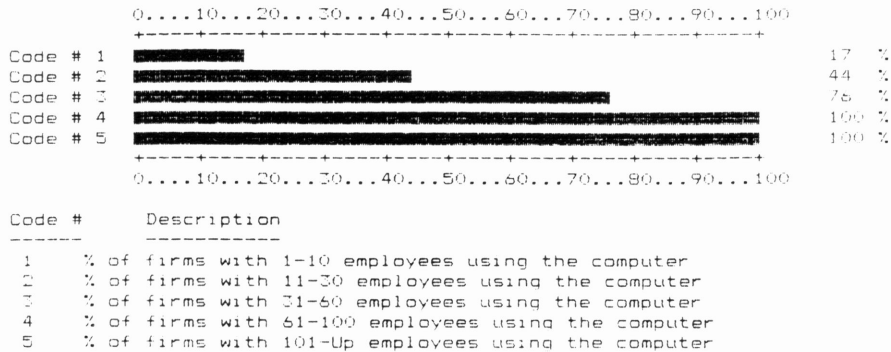


Figure 2. Computer usage / Breakdown by employees

It seems of all the percentages generated, that the number of employees within a firm was the best indicator of whether or not a firm owned a computer. This can probably be accounted for by the volume of work, bookkeeping and management files needed to run large offices, all of which are ideally suited for use on the computer.<sup>8</sup> Also a good indicator but not pictured, was the asset size of the firm.

The more assets a firm declared the more likely they were to own a computer. This fact however, does not mean that smaller firms cannot profit from computer usage because with small systems starting under \$5,000, any firm can obtain very comendable results with minimum investment.<sup>9</sup> The topic of investments is the next to be studied and this analysis proves of special interest to the computer industry as can be seen in Figure 3.

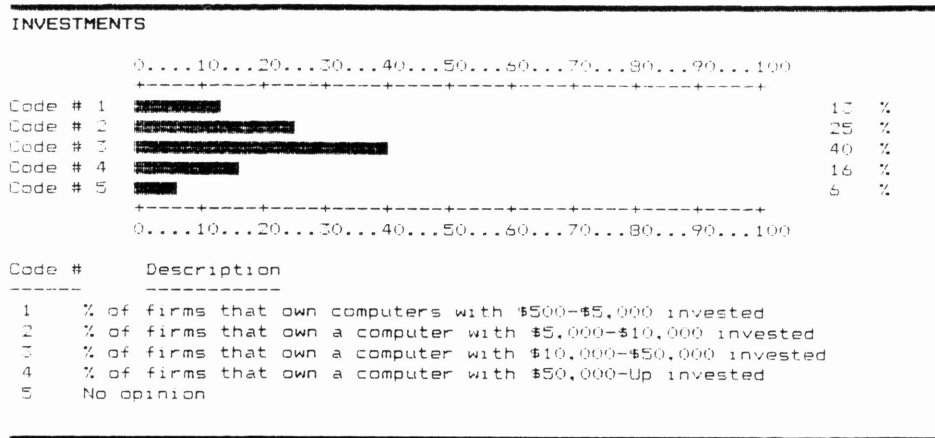
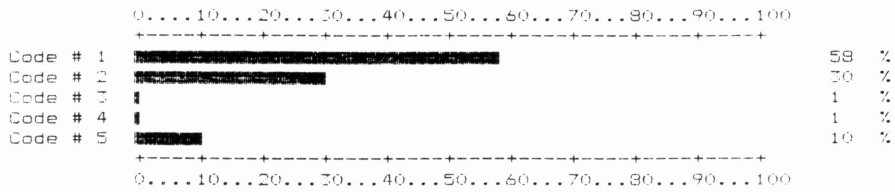


Figure 3. Past investment statistics

Although some systems start as low as \$500 and others range into the hundreds of thousands of dollars, the architectural profession seems to prefer those systems in the middle. Most firms that owned systems have invested between \$5,000 and \$50,000, possibly because the systems in this price range tend to offer what the architectural firm is looking for. The opposite ends of the monetary spectrum include the very high priced computer graphic systems used mainly by large offices and the lower priced hand held calculators and microcomputers. These past investments have produced a trend for the future computer purchasing architect to follow but the trend that has developed is still in its infancy as illustrated in Figure 4.

PERIOD OF OWNERSHIP



Code #	Description
1	% of firms that own computers that have been purchased within the last 1-2 yrs.
2	% of firms that own computers that have been purchased within the last 2-5 yrs.
3	% of firms that own a computer that has been purchased within the last 5-10 yrs.
4	% of firms that own a computer that has been purchased over 10 yrs. ago
5	No opinion

Figure 4. Present periods of ownership

This analysis shows that an overwhelming 88% of the computers used in architecture have been purchased within the last five years, proving that the architectural profession is indeed in the genesis of this automation transistion period, a period likely to last until the profession feels comfortable with their newly acquired technical methodology. This period will promote keen competition between firms by marketing this new service of automated design and competing for clients wishing its advantages. The time until architects do feel comfortable with these new machines and have settled down to use them to their maximum potential, may not be as far off as some believe. As Figure 5 shows, 80% of the firms owning a computer system are satisfied with the results of using it.

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SATISFACTION OF RESULTS

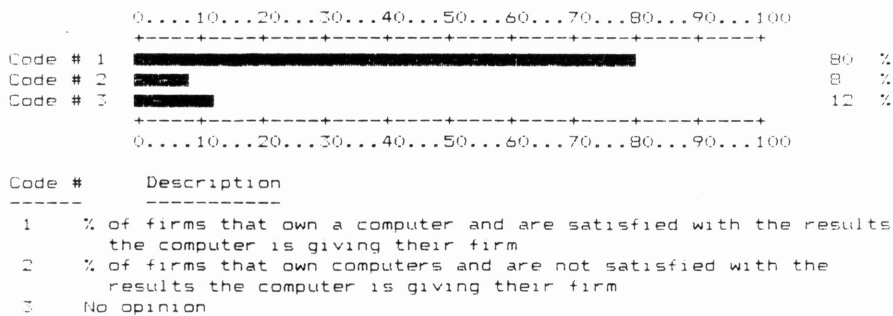


Figure 5. Past satisfaction of owning a computer

If it is kept in mind that these machines were purchased within the last five years, it can be deducted that satisfaction is achieved fairly soon after acquiring the computer. Possibly because of this high rate of satisfaction, 70% of all firms now owning a computer plan to expand their system.

The previous analyses of the survey have dealt with questions relating to current computer owners and past computer performance. These were presented in order to give the current computer owning firm a basis of comparison with their competitors and also to give the non-computer owning firms some information on which to base a possible future computer acquisition. The following analyses will deal with the latter firm mentioned, or the non-computer owning firms. These analyses explore the feelings of this type of firm while providing purchasing information.

However, more important will be the scrutiny of these analyses and the projection of future trends of the partnership between the architect and his computer.

Perhaps the most frightening statistic to be encountered is shown in Figure 6.

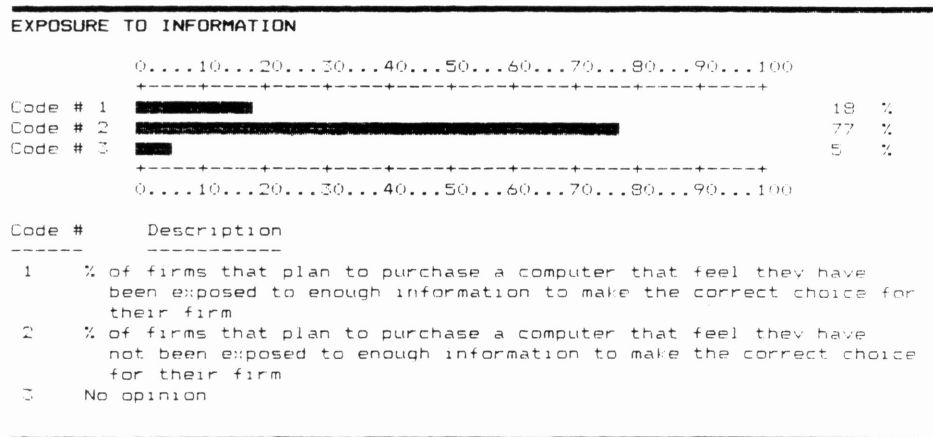


Figure 6. Exposure to information regarding the computer

With the major proportion of the architectural profession preparing to buy computer systems, it is most unsettling to realize that 77% of the firms planning to purchase admit to not having enough information to make the correct choice for their firm. Add to this the fact that only 41% of the firms planning to purchase have had a computer demonstrated for them and the general lack of information needed to chose the correct system becomes apparent. This pre-purchasing information is most important in avoiding a multi-thousand dollar mistake; a mistake that can be corrected with a little more research and a lot more professional exposure.

The most obvious question in need of an answer is, how many firms plan to purchase a computer in the future? This is explored in Figure 7.

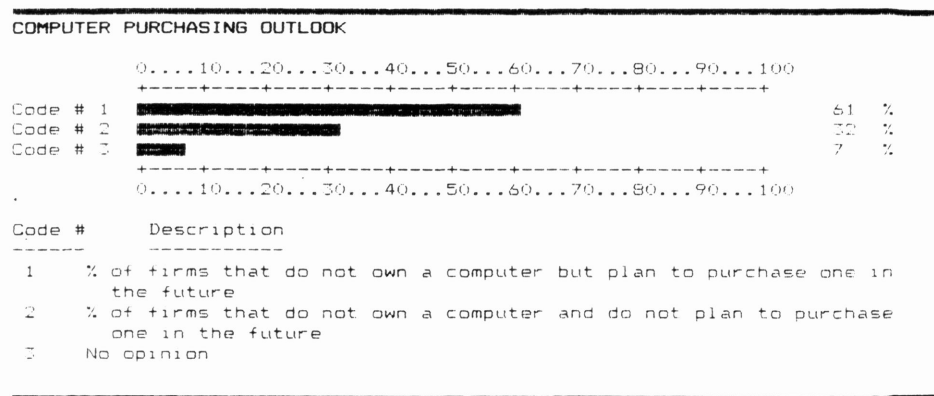


Figure 7. Future computer purchasing outlook

The percentage of architects that plan to buy is a figure that cannot be ignored. The actual percentage that will eventually be realized will probably be higher due to the fact that the architects expressing interest in the computer today are going to be an obvious influence on the other firms that stated they were not interested in what the computer had to offer. With 61% of non-computer owning firms planning to purchase in the future, it becomes necessary to outline the requirements and trends of the profession so that the computer industry might prepare for this wave of buyers. The most important statistic that might help determine future trends is the result drawn from Figure 8.

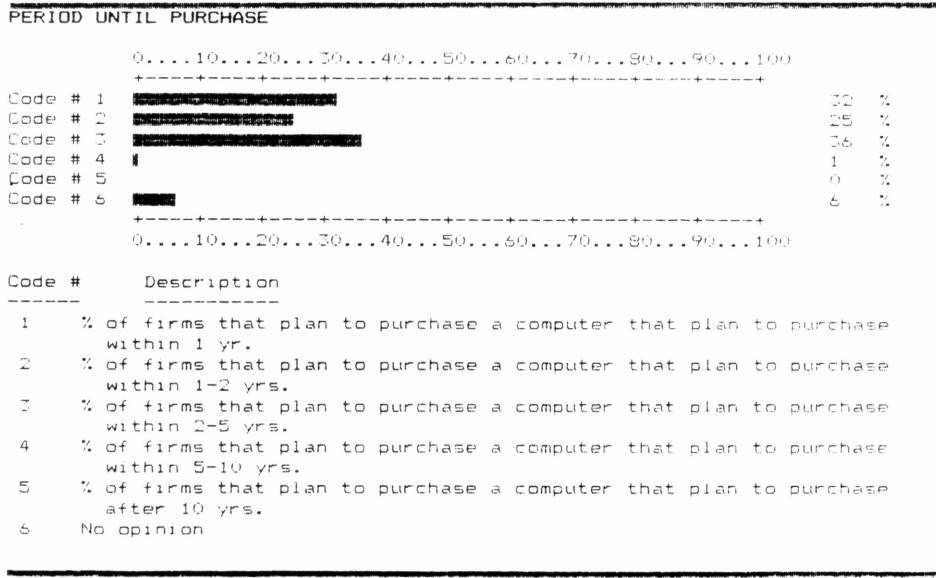


Figure 8. Expected period until purchase

With 93% of the firms planning to purchase planning to do so within five years, it is very important that services be available to support this type of volume and that these firms become aware of computer purchasing procedures. The mere application of a large amount of money towards a computer system does not automatically assure the architect of computer efficiency. It has been outlined that firms should go through a period of self evaluation before the choosing of computer types available.<sup>10</sup> This process better assures the firm of purchasing the correct type of computer for their particular operation. As Frank Stasiowski, architect/computer analyst states, "All the hardware will work, the question is how much money will it take to make it work."<sup>11</sup> This question of future expenditures can be graphically explained in Figure 9.

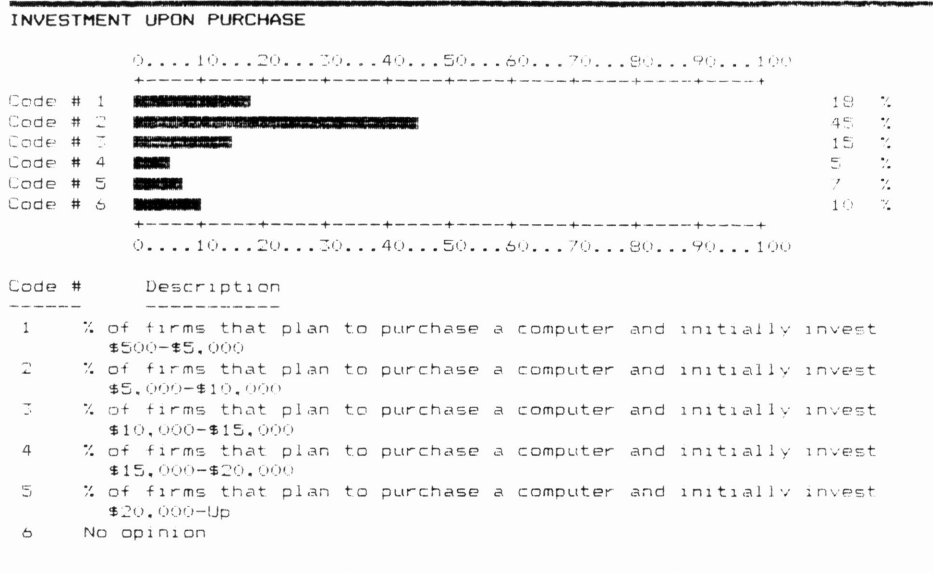


Figure 9. Expected investment upon purchase

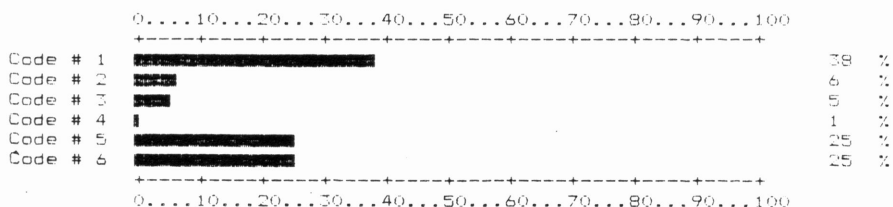
Most firms seem to want to invest in the \$5,000-\$10,000 range. If this amount is compared to the previous analysis of current computer investments, it can be seen that future investments will tend to be less than those in the past. This discrepancy can be attributed to falling hardware prices or to the unwillingness of firms to spend as large amounts of money on computers in the future as they have in the past. Whatever the reason, computer hardware and software will have to be developed in this price range to support the future influx of the architectural practice.

Finally, it is interesting to review two comparisons; the first involving computer performance and the second studying the future of the computer in architecture. As shown in Figure 10, past performance shows that among



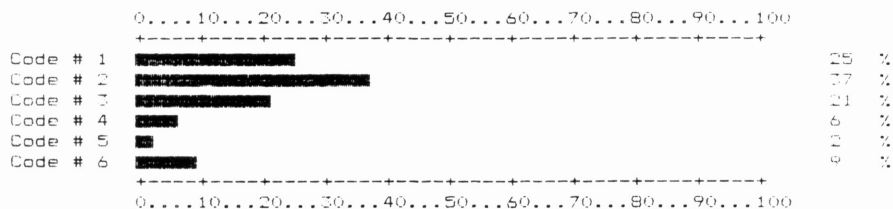
computer owners, increased efficiency was noticed almost immediately after purchasing the computer or no increased efficiency was noticed at all. If this is compared to Figure 11, a vast difference can be seen.

**PAST PERFORMANCE**



Code #	Description
1	% of firms that own a computer that noticed increased efficiency within 1-6 mos.
2	% of firms that own a computer that noticed increased efficiency within 6 mos.-1 yr.
3	% of firms that own a computer that noticed increased efficiency within 1-2 yrs.
4	% of firms that own a computer that noticed increased efficiency after 2 yrs.
5	% of firms that own a computer that have not noticed increased efficiency
6	No opinion

**FUTURE EXPECTATIONS**



Code #	Description
1	% of firms that plan to purchase a computer that expect increased efficiency within 1-6 mos.
2	% of firms that plan to purchase a computer that expect increased efficiency within 6 mos.-1 yr.
3	% of firms that plan to purchase a computer that expect increased efficiency within 1-2 yrs.
4	% of firms that plan to purchase a computer that expect increased efficiency after 2 yrs.
5	% of firms that plan to purchase a computer that do not expect any increased efficiency
6	No opinion

Figure 10. (top) Past efficiency performance  
 Figure 11. (bottom) Expected efficiency performance

Future computer owners tend to expect a cyclical nature on the increase in efficiency with most firms expecting an increase within one year. The difference between what future owners expect to happen and what has happened in the past is important because not only is the increase in efficiency going to occur much different than expected, but it must be shown that some firms will not realize an increase in efficiency at all. This lack of increase, the opposite expected from a computer system, might be attributed to a lack of information on the buyers part or a hasty judgement based on a salesman's convincing nature. Whatever the reason, it is a very important pitfall for future computer purchasers to try to avoid. The second comparison is shown in Figure 12.

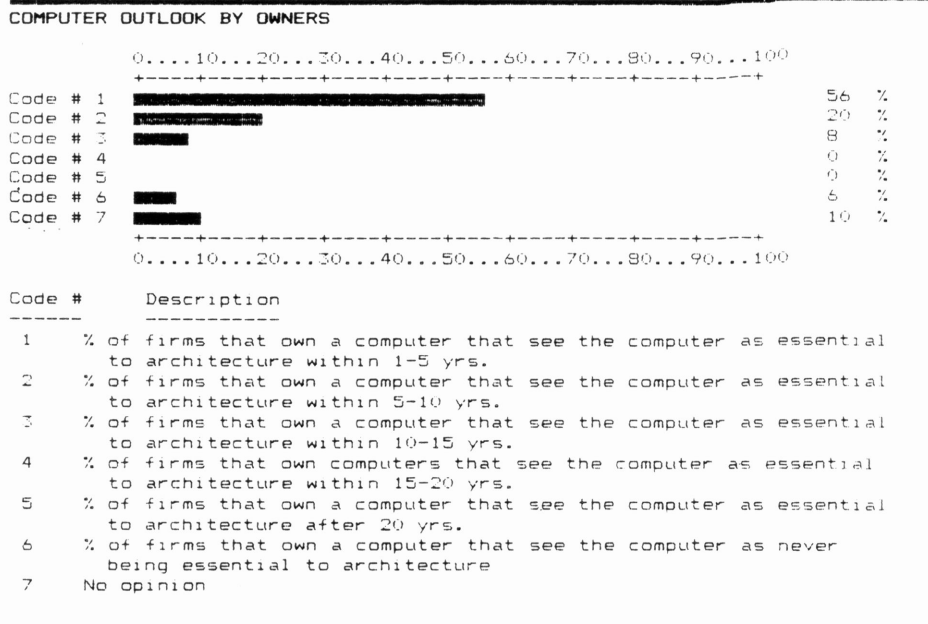


Figure 12. Future outlook by computer owners

This analysis addressed the future of the computer in the architectural profession and both is almost identical to the same question posed to non-computer owners, illustrating that architects have been told of the future importance of the computer and apparently have received the message. Most architectural firms see the computer as essential to architecture within the next five years, proving that information such as this research and others like it (R.I.B.A. survey 1981) is needed immediately in order for the profession to be prepared.<sup>12</sup> The feeling best expressing the current state can be culminated in the words of Richard Rush, "The question is not whether to use computers, it is how. It is not when, it is now."

It seems important to realize the magnitude of the transition that is beginning to take place in the architectural profession. Methods of thinking and presenting these thoughts that date back to our archaic ancestors will eventually be greatly replaced by automation and machines of artificial intelligence.<sup>13</sup> Architects are being told by many sources that they will receive preferential treatment if they own and use a computer.<sup>14</sup> All of these factors encourage computer usage, yet there is an air of hesitation; perhaps caused by the fear of the loss of creativity, the loss of jobs, or the use of machines some term incompatible with its users.<sup>15</sup> However, the most likely cause of hesitation is simply a lack of knowledge and understanding of what seems to an outsider as

a maze of electronic circuitry and frightening symbol of the unknown. The problem now becomes the education of architects and the familiarization of them with the computer. If this technological image barrier can be broken, then the architectural profession can begin to reap the many fruits this machine of tomorrow has to offer.

Footnotes

<sup>1</sup>Eric Tercholz, "Biography of Computer Use in Architecture," AIA Journal, May 1980, p.64.

<sup>2</sup>Tercholz, p.64.

<sup>3</sup>Tercholz, p.64.

<sup>4</sup>John Pile, "Machines for Designing," Interiors, July 1980, p.77.

<sup>5</sup>Benard Spring, "Architecture and the Computer; Proceedings of the First Boston Architectural Center Conference," Journal of Architectural Education, May 1966, p.47.

<sup>6</sup>"Electronic Design Aides are Fast, Precise and Cheap," Progressive Architecture, July 1980, p.103.

<sup>7</sup>Pile, p.90.

<sup>8</sup>Pile, p.77.

<sup>9</sup>TRS-80 Microcomputer Catalog, Radio Shack, Tandy Corporation, 1982, p.6.

<sup>10</sup>Electronic Design Aides, p.102.

<sup>11</sup>Electronic Design Aides, p.102.

<sup>12</sup>T. Stevens, "Computers in Practice," RIBA Journal, May 1981, p.41.

<sup>13</sup>Tercholz, p.65.

<sup>14</sup>"Computer Capability Inquiry Sought in A/E Procurement," AIA Journal, December 1980, p.14.

<sup>15</sup>C.L. Mauro, "Human Factors Study Crucial for Future Office Computers," Industrial Design, April 1981, p.26.

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4. Pile, John. "Machines For Designing", Interiors, Jul. 1980. pp.76-77.
5. Spring, Benard. "Architecture and the Computer; Proceedings of the First Boston Architectural Center Conference", Journal of Architectural Education, May 1966. XX:47-48.
6. Stevens, T. "Computers In Practice", RIBA Journal, May 1981. pp.40-41.
7. Radio Shack, "1982 TRS-80 Microcomputer Catalog", Tandy Corporation, 1982. pp.4-7.
8. Terholz, Eric. "Biography of Computer Use in Architecture", AIA Journal, May 1980. pp.64-65.

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Appendices

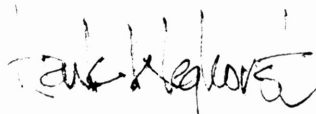
Hank Weghorst  
College of Architecture  
and Environmental Design  
Texas A&M University  
October 25, 1981

Dear Architect,

I hope that I can urge you to take a few minutes of your time to review this letter/questionnaire so that you may take part in this timely research. The purpose of this research is to determine the current state of the art of computers in architecture and is directed toward computer owners and non-owners alike. The computer looms large in the future of architecture and I would like your response in order to try to predict the direction the architectural profession will take in respect to the computer. The results should be helpful to the architectural profession as well as the computer industry in the effort of trying to better respond to the needs of these two industries.

This research is fully sanctioned by both Texas A&M University and the College of Architecture and Environmental Design and is a product of the University Undergraduate Fellows thesis program. Your participation by filling out and returning the enclosed questionnaire by November 15, 1981, would be greatly appreciated. To show our appreciation, I will send you a copy of the results if you so signify on the questionnaire.

Thank you,



Hank Weghorst



AN ANALYSIS OF THE COMPUTER IN THE ARCHITECTURAL PROFESSION  
November 1, 1981

Hank Weghorst  
College of Architecture and Environmental Design  
Texas A&M University  
College Station, Texas 77843

Name of firm: \_\_\_\_\_  
Address: \_\_\_\_\_  
City \_\_\_\_\_ Zip code \_\_\_\_\_  
Telephone: \_\_\_\_\_  
Person Responding: \_\_\_\_\_

**A GENERAL DATA**

†The following questions can be answered by checking the appropriate boxes beside the answer or answers of your choice

‡You may check more than one box per question if applicable  
‡You may omit a question if inapplicable

1‡ Number of employees? ( ) 1-10  
( ) 11-30  
( ) 31-60  
( ) 61-100  
( ) 101-Up

5‡ Average project cost (dollars)? ( ) 0-200,000  
( ) 200,000-500,000  
( ) 500,000-1,000,000  
( ) 1,000,000-5,000,000  
( ) 5,000,000-10,000,000  
( ) 10,000,000-Up

2‡ Number of years in business? ( ) 1-5  
( ) 5-10  
( ) 10-20  
( ) 20-Up

6‡ Other areas of interest? ( ) Construction Mgmt.  
( ) Engineering  
( ) Construction  
( ) Development

3‡ Total asset size of firm (millions of dollars)? ( ) 0-0.25  
( ) 0.25-1  
( ) 1-10  
( ) 10-50  
( ) 50-Up

7‡ Do you feel there is a need for more information to be available on the computer in the architectural field? ( ) Yes  
( ) No

4‡ Type of projects? ( ) Commercial  
( ) Office  
( ) Industrial  
( ) Medical  
( ) Institutional  
( ) Residential  
( ) Interiors

8‡ Does your firm use and/or own computer equipment in its business? ( ) Yes  
( ) No

If (Yes) proceed to section "B" on back  
If (No) proceed to section "C" on back

**B FOR COMPUTER OWNERS/USERS**

- 1# Computer type used?     Micro  
                                    Mini  
                                    Mainframe
- 2# Make:  
 Model:  
 Peripherals:
- 3# How much have you     500-5,000  
 invested in your         5,000-10,000  
 system (dollars)?       10,000-50,000  
                                    50,000-Up
- 4# How long have you     1-2 yrs.  
 owned your system?     2-5 yrs.  
                                    5-10 yrs.  
                                    10 yrs.-Up
- 5# What do you use         Business Mgmt.  
 your system for?         Accounting  
                                    Word Processing  
                                    Computer Drafting  
                                    Electronic Mail  
                                    Other (specify)
- 6# Do you write any         Yes  
 of your own               No  
 software?
- 7# How long did it take     1-6 mos.  
 you to notice increased    6 mos.-1 yr.  
 efficiency/profits         1-2 yrs.  
 after acquiring your       2 yrs.-Up  
 computer?                    Have not increased
- 8# Are you satisfied         Yes  
 with the results           No  
 the computer is  
 giving your firm?
- 9# Do you plan to           Yes  
 expand your system?       No
- 10# When do you perceive    1-5 yrs.  
 the computer as             5-10 yrs.  
 essential to                 10-15 yrs.  
 architecture?               15-20 yrs.  
                                    20 yrs-Up  
                                    Never

**C FOR NON-COMPUTER OWNERS/USERS**

- 1# When do you perceive     1-5 yrs.  
 the computer as             5-10 yrs.  
 essential to                 10-15 yrs.  
 architecture?               15-20 yrs.  
                                    20 yrs.-Up  
                                    Never
- 2# Do you plan to           Yes  
 purchase a computer       No  
 in the future?
- If (No) following questions  
 need not be answered
- 3# Do you feel you have     Yes  
 been exposed to enough    No  
 information about the  
 computer to choose the  
 correct type for your firm?
- 4# Has your firm ever       Yes  
 had a computer             No  
 demonstrated to  
 show its use to your  
 business?
- 5# For what purposes         Business Mgmt.  
 would you use the          Accounting  
 computer?                    Word Processing  
                                    Computer Drafting  
                                    Electronic Mail  
                                    Other (specify)
- 6# How long would you       1-6 mos.  
 expect it to take          6 mos.-1 yr.  
 to realize increased        1-2 yrs.  
 efficiency/profits          2 yrs.-Up  
 after purchasing a          Will not increase  
 computer system?
- 7# If planning to           0-1 yr.  
 purchase, how long         1-2 yrs.  
 until you buy?              2-5 yrs.  
                                    5-10 yrs.  
                                    10 yrs.-Up
- 8# If planning to           500-5,000  
 purchase, how much         5,000-10,000  
 do you plan to              10,000-15,000  
 invest (dollars)?          15,000-20,000  
                                    20,000-Up

Would you like a copy of the results of this questionnaire?  Yes  No  
 THANK YOU (Feel free to enclose any additional remarks/comments you feel important)

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February 1, 1982

Hank Weghorst  
College of Architecture and Environmental Design  
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TECHNICAL ANALYSIS ONE

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## TECHNICAL ANALYSIS ONE

\* The purpose behind this analysis is to record and analyze the returns of the survey sent out December 1, 1981. This information is derived directly from the questionnaires themselves and includes no extraneous influence except for occasional comments on various comparisons.

### \* General Data

Total number of questionnaires sent: 406  
Total number of responses received: 187  
Total number not delivered: 37  
Percentage of return: 46.05  
Confidence level achieved: 90%+

### \* Technical Analysis Format

This analysis contains a copy of the questionnaire sent and thirty-two comparisons. Each comparison analysis is divided into four parts:

1. Percentage graph- this graphically explains the comparison being done. The scale used is a percentage scale divided into 100 one percent intervals. Each subject studied is given a code number which is described in the code description section.

2. Code description- this section describes the subjects being compared and is linked to the percentage graph by means of the code numbers.

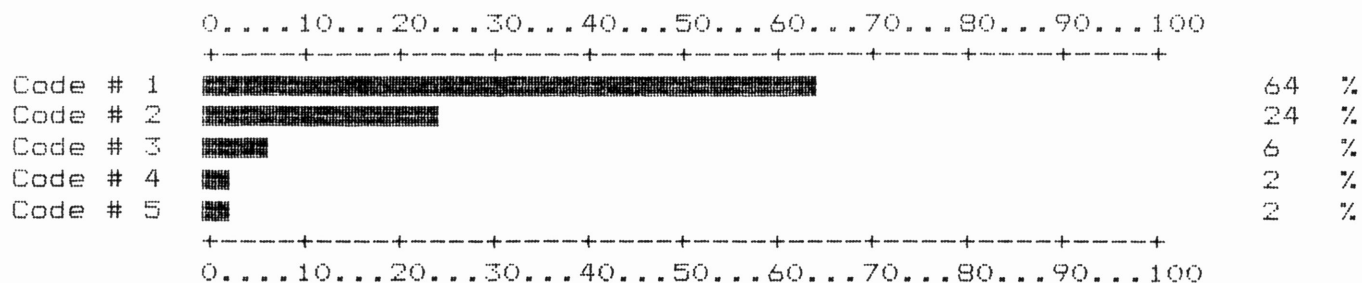
3. Code number breakdown- this section is a numerical breakdown of the percentages. The code number refers to the subject under consideration. The base number refers to the actual number of respondents the percentage is based upon. This number may be the entire respondent group (187) or a section of respondents that form a sub-group. The comparison number refers to the actual number of respondents that satisfied the criteria set forth during the analysis. This number divided by the base number yields the percentage for that subject code. The base code and comparison codes refer to a particular response on the questionnaire that is being studied.

4. The comment statement, when present, may clarify or infer upon the comparison analysis in whole or in part. This statement has no influence on the analysis numbers themselves.

\*\*\*\* Data Analysis \*\*\*\*

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\* Percentage graph



\* Code description

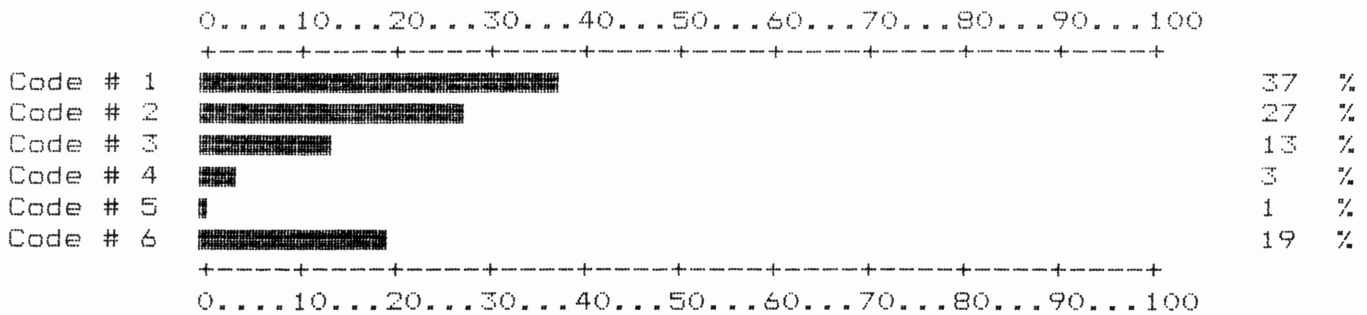
Code #	Description
1	% of all firms with 1-10 employees
2	% of all firms with 11-30 employees
3	% of all firms with 31-60 employees
4	% of all firms with 61-100 employees
5	% of all firms with 101 employees and up

\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	187	120	0		1	0	0
2	187	45	0		2	0	0
3	187	13	0		3	0	0
4	187	4	0		4	0	0
5	187	5	0		5	0	0

\*\*\* Data Analysis \*\*\*

\* Percentage graph



\* Code description

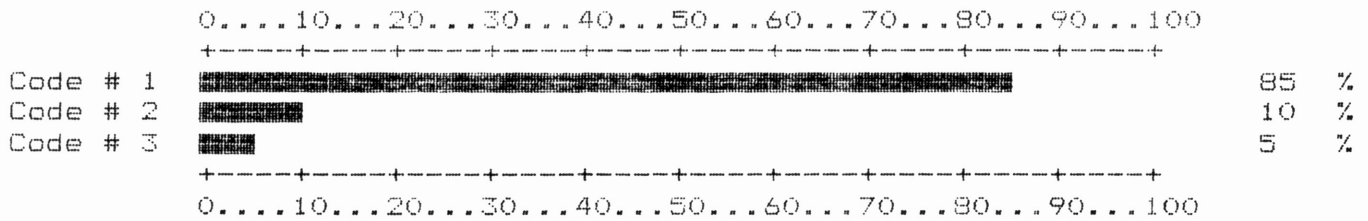
Code #	Description
1	% of all firms with assets of 0-.25 million
2	% of all firms with assets of .25-1 million
3	% of all firms with assets of 1-10 million
4	% of all firms with assets of 10-50 million
5	% of all firms with assets of 50 million and up
6	No opinion

\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	187	71	0		10	0	0
2	187	52	0		11	0	0
3	187	26	0		12	0	0
4	187	7	0		13	0	0
5	187	2	0		14	0	0

\*\*\*\* Data Analysis \*\*\*\*

\* Percentage graph



\* Code description

Code #	Description
1	% of all firms feeling a need for more information on the computer
2	% of all firms not feeling a need for more information on the computer
3	No opinion

\* Code number breakdown

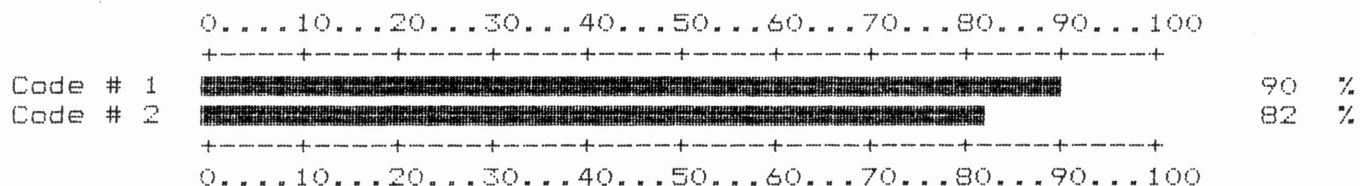
Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	187	159	0		32	0	0
2	187	19	0		33	0	0

Comment: This shows the desire of the profession for information on the computer

\*\*\*\* Data Analysis \*\*\*\*

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\* Percentage graph



\* Code description

Code #	Description
1	% of firms using computers feeling a need for more information about the computer
2	% of firms not using the computer feeling a need for more information about the computer

\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	60	54	34		34	32	0
2	128	106	35		35	32	0

Comment: This shows the desire for information is common between computer owners and non-owners alike.

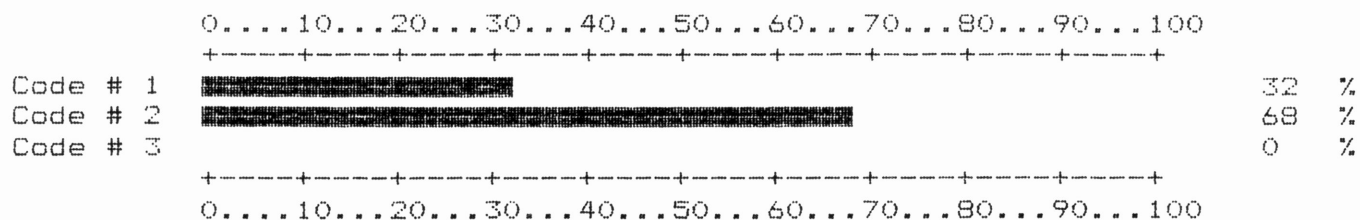
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\*\*\*\* Data Analysis \*\*\*\*

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\* Percentage graph



\* Code description

Code #	Description
1	% of all firms using the computer
2	% of all firms not using the computer
3	No opinion

\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	187	60	0		34	0	0
2	187	128	0		35	0	0

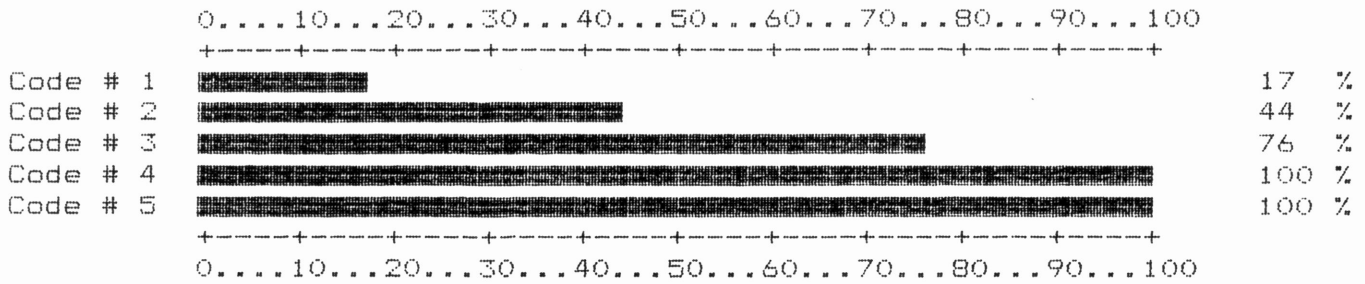
Comment: This is considered the most important analysis of the survey and is the basis of many comparisons to follow.

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\*\*\*\* Data Analysis \*\*\*\*

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\* Percentage graph



\* Code description

Code #	Description
1	% of firms with 1-10 employees using the computer
2	% of firms with 11-30 employees using the computer
3	% of firms with 31-60 employees using the computer
4	% of firms with 61-100 employees using the computer
5	% of firms with 101-Up employees using the computer

\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	120	21	1		1	34	0
2	45	20	2		2	34	0
3	13	10	3		3	34	0
4	4	4	4		4	34	0
5	5	5	5		5	34	0

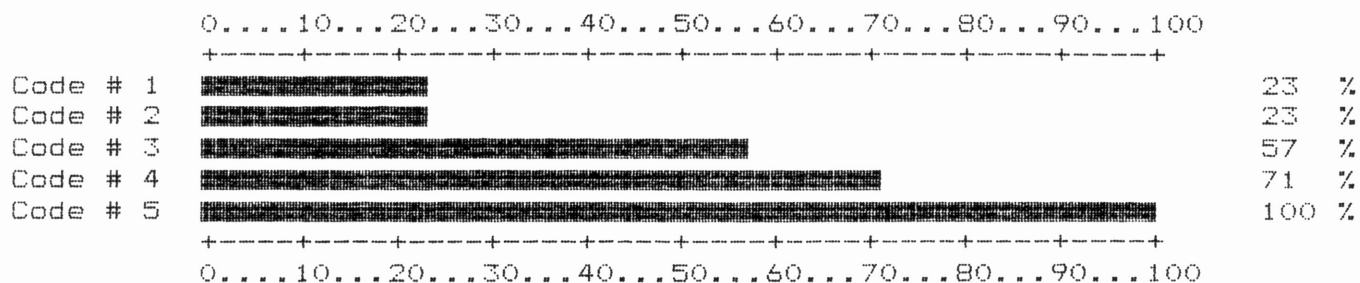
Comment: This is the best indicator of which firms own a computer. The graph developed is constant, suggesting a definite pattern of usage.

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\*\*\*\* Data Analysis \*\*\*\*

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\* Percentage graph



\* Code description

Code #	Description
1	% of firms with assets of 0-0.25 million using the computer
2	% of firms with assets of 0.25-1 million using the computer
3	% of firms with assets of 1-10 million using the computer
4	% of firms with assets of 10-50 million using the computer
5	% of firms with assets of 50-Up million using the computer

\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	71	17	10		10	34	0
2	52	12	11		11	34	0
3	26	15	12		12	34	0
4	7	5	13		13	34	0
5	2	2	14		14	34	0

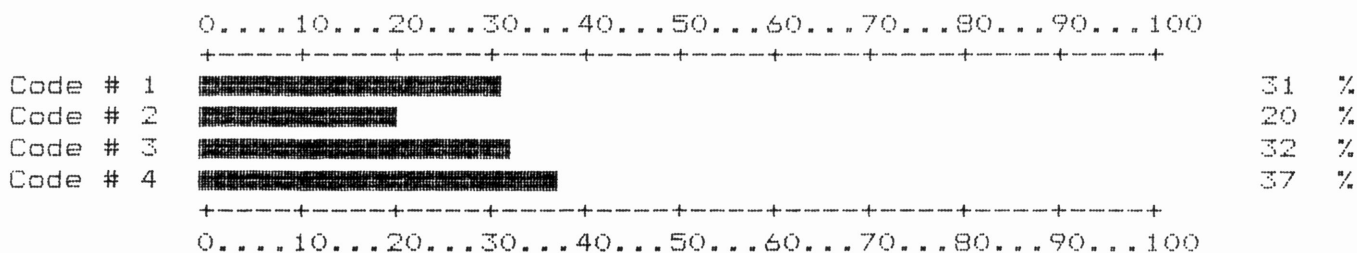
Comment: This is a very good indicator of which firms own a computer. When used in conjunction with the number of employees, this gives a good idea of the types of firms using computers.

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\*\*\*\* Data Analysis \*\*\*\*

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\* Percentage graph



\* Code description

Code #	Description
1	% of firms in business 1-5 years using the computer
2	% of firms in business 5-10 years using the computer
3	% of firms in business 10-20 years using the computer
4	% of firms in business 20 years and up using the computer

\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	19	6	6		6	34	0
2	34	7	7		7	34	0
3	53	17	8		8	34	0
4	80	30	9		9	34	0

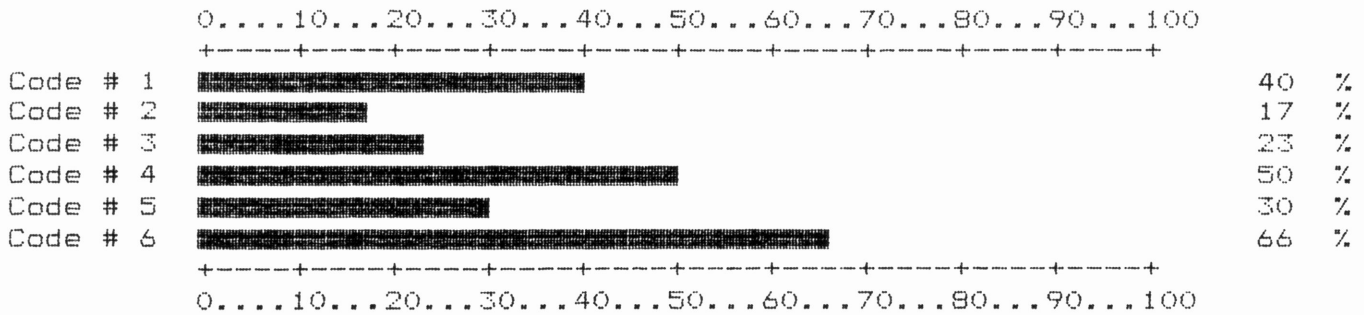
Comment: There seems to be no connection between number of years in business and computer usage.

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\*\*\*\* Data Analysis \*\*\*\*

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\* Percentage graph



\* Code description

Code #	Description
1	% of firms with average project cost of 0-200,000 dollars using the computer
2	% of firms with average project cost of 200,000-500,000 dollars using the computer
3	% of firms with average project costs of 500,000-1,000,000 dollars using the computer
4	% of firms with average project costs of 1-5 million dollars using the computer
5	% of firms with average project costs of 5-10 million dollars using the computer
6	% of firms with average project costs of 10 million dollars and up using the computer

\* Code number breakdown

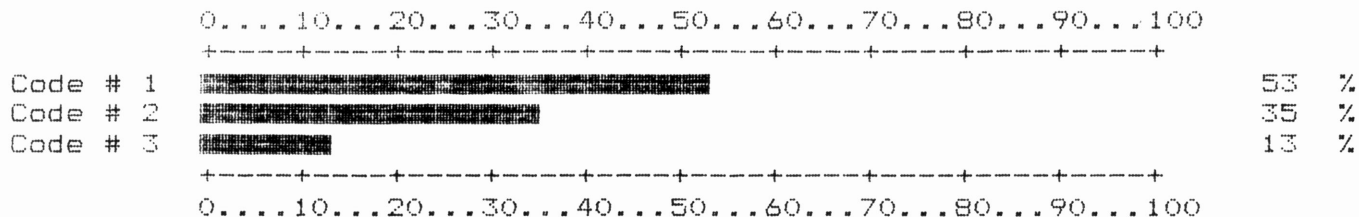
Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	10	4	22		22	34	0
2	47	8	23		23	34	0
3	64	15	24		24	34	0
4	54	27	25		25	34	0
5	13	4	26		26	34	0
6	6	4	27		27	34	0

Comment: There seems to be no connection between average project cost and computer usage.

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\*\*\*\* Data Analysis \*\*\*\*

\* Percentage graph



\* Code description

Code #	Description
1	% of firms using the computer : micro
2	% of firms using the computer : mini
3	% of firms using the computer : mainframe

\* Code number breakdown

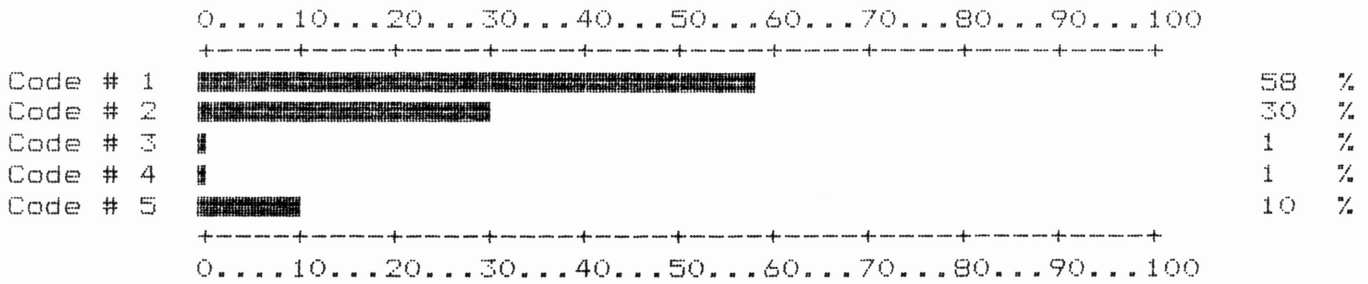
Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	60	32	34		34	36	0
2	60	21	34		34	37	0
3	60	8	34		34	38	0

Comment: Although no hard distinction exists between computer sizes, this gives an idea of what types of systems are being used.

\*\*\* Data Analysis \*\*\*

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\* Percentage graph



\* Code description

Code #	Description
1	% of firms that own computers that have been purchased within the last 1-2 yrs.
2	% of firms that own computers that have been purchased within the last 2-5 yrs.
3	% of firms that own a computer that has been purchased within the last 5-10 yrs.
4	% of firms that own a computer that has been purchased over 10 yrs. ago
5	No opinion

\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	60	35	34		34	43	0
2	60	18	34		34	44	0
3	60	1	34		34	45	0
4	60	1	34		34	46	0

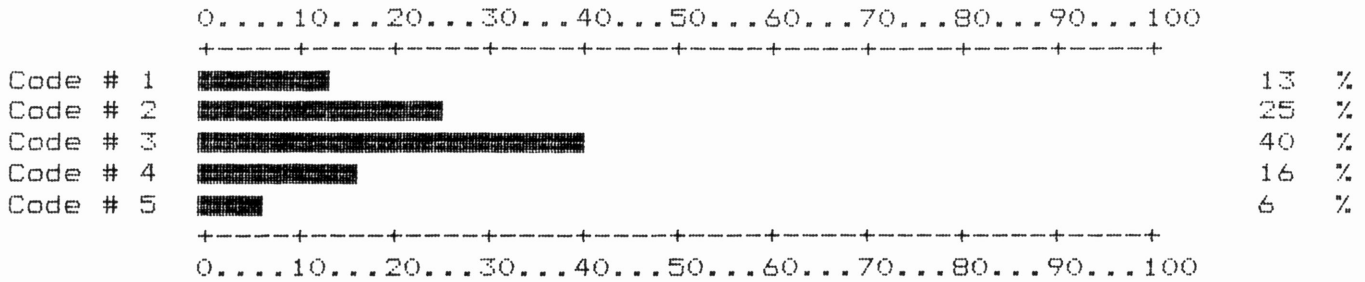
Comment: This comparison shows that the impact of computers in architecture has come within the last 5 yrs., and that the profession is still in the infancy stages of development with respect to the computer.

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\*\*\* Data Analysis \*\*\*

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\* Percentage graph



\* Code description

Code #	Description
1	% of firms that own computers with \$500-\$5,000 invested
2	% of firms that own a computer with \$5,000-\$10,000 invested
3	% of firms that own a computer with \$10,000-\$50,000 invested
4	% of firms that own a computer with \$50,000-Up invested
5	No opinion

\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	60	8	34		34	39	0
2	60	15	34		34	40	0
3	60	24	34		34	41	0
4	60	10	34		34	42	0

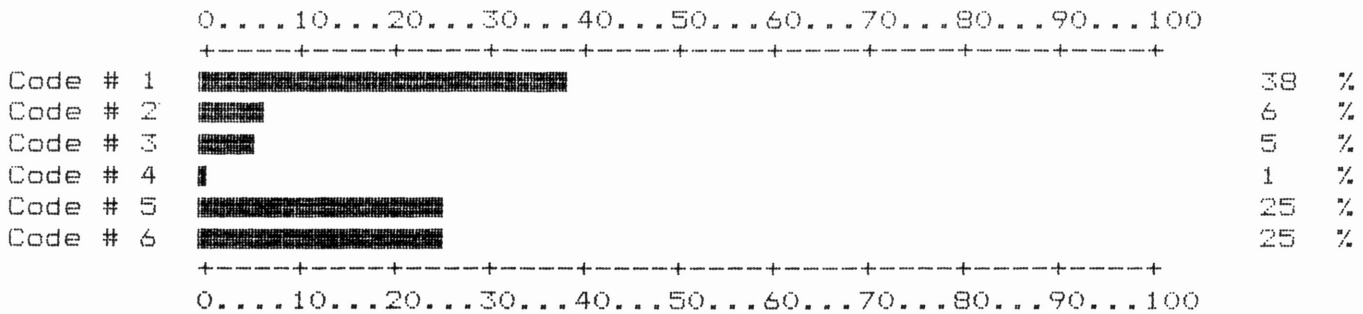
Comment: This shows the breakdown of investments in computers.

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\*\*\*\* Data Analysis \*\*\*\*

\* Percentage graph



\* Code description

Code #	Description
1	% of firms that own a computer that noticed increased efficiency within 1-6 mos.
2	% of firms that own a computer that noticed increased efficiency within 6 mos.-1 yr.
3	% of firms that own a computer that noticed increased efficiency within 1-2 yrs.
4	% of firms that own a computer that noticed increased efficiency after 2 yrs.
5	% of firms that own a computer that have not noticed increased efficiency
6	No opinion

\* Code number breakdown

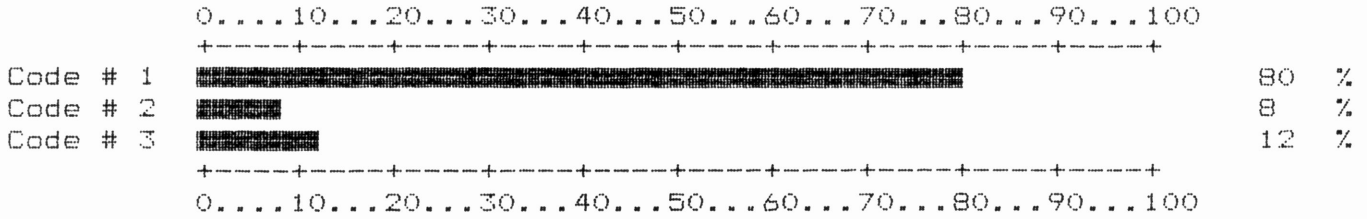
Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	60	23	34		34	55	0
2	60	4	34		34	56	0
3	60	3	34		34	57	0
4	60	1	34		34	58	0
5	60	15	34		34	59	0

Comment: From these numbers, it can be seen that firms either have success with the computer early or do not have success at all.

\*\*\*\* Data Analysis \*\*\*\*

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\* Percentage graph



\* Code description

Code #	Description
1	% of firms that own a computer and are satisfied with the results the computer is giving their firm
2	% of firms that own computers and are not satisfied with the results the computer is giving their firm
3	No opinion

---

\* Code number breakdown

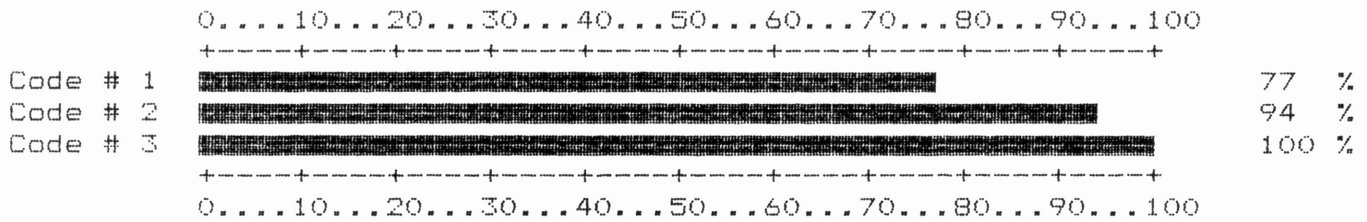
Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	60	48	34		34	60	0
2	60	5	34		34	61	0

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\*\*\*\* Data Analysis \*\*\*\*

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\* Percentage graph



\* Code description

Code #	Description
1	% of firms that have owned a computer 1-2 yrs. and are satisfied with the results the computer is giving their firm
2	% of firms that have owned a computer 2-5 yrs. and are satisfied with the results the computer is giving their firm
3	% of firms that have owned a computer for 5-10 yrs. and are satisfied with the results the computer is giving their firm

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\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	35	27	43		43	60	0
2	18	17	44		44	60	0
3	1	1	45		45	60	0

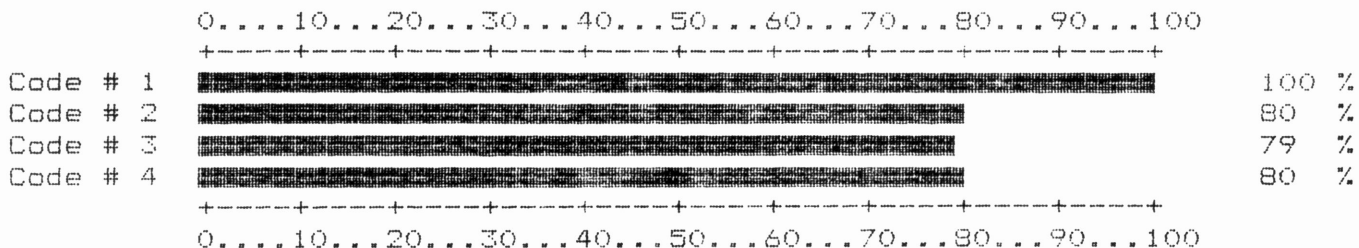
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Comment: This shows that experience with a computer system improves satisfaction with results obtained.

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\*\*\*\* Data Analysis \*\*\*\*

\* Percentage graph



\* Code description

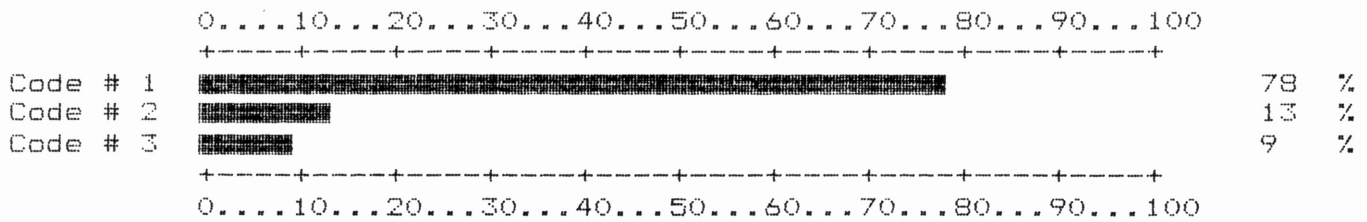
Code #	Description
1	% of firms that have invested \$500-\$5,000 and are satisfied with the results the computer is giving their firm
2	% of firms that have invested \$5,000-\$10,000 and are satisfied with the results the computer is giving their firm
3	% of firms that have invested \$10,000-\$50,000 and are satisfied with the results the computer is giving their firm
4	% of firms that have invested \$50,000-Up and are satisfied with the results the computer is giving their firm

\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	8	8	39		39	60	0
2	15	12	40		40	60	0
3	24	19	41		41	60	0
4	10	8	42		42	60	0

\*\*\*\* Data Analysis \*\*\*\*

\* Percentage graph



\* Code description

Code #	Description
1	% of firms that own a computer and plan to expand their system
2	% of firms that own a computer but do not plan to expand their system
3	No opinion

\* Code number breakdown

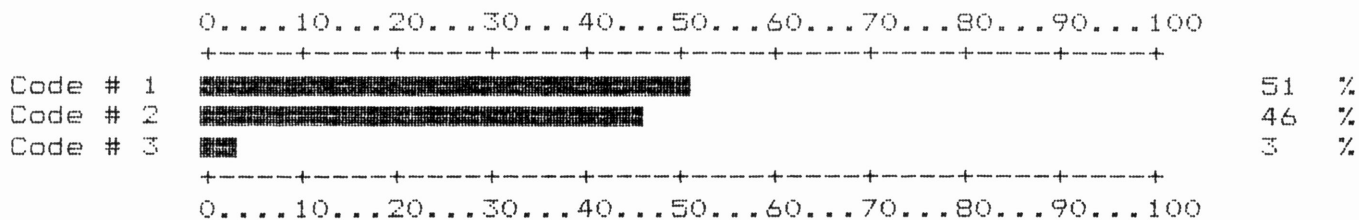
Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	60	47	34		34	62	0
2	60	8	34		34	63	0

Comment: It can be seen that most firms do plan to expand their systems.

\*\*\*\* Data Analysis \*\*\*\*

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\* Percentage graph



\* Code description

Code #	Description
1	% of firms that own a computer and write their own software
2	% of firms that own a computer and do not write their own software
3	No opinion

\* Code number breakdown

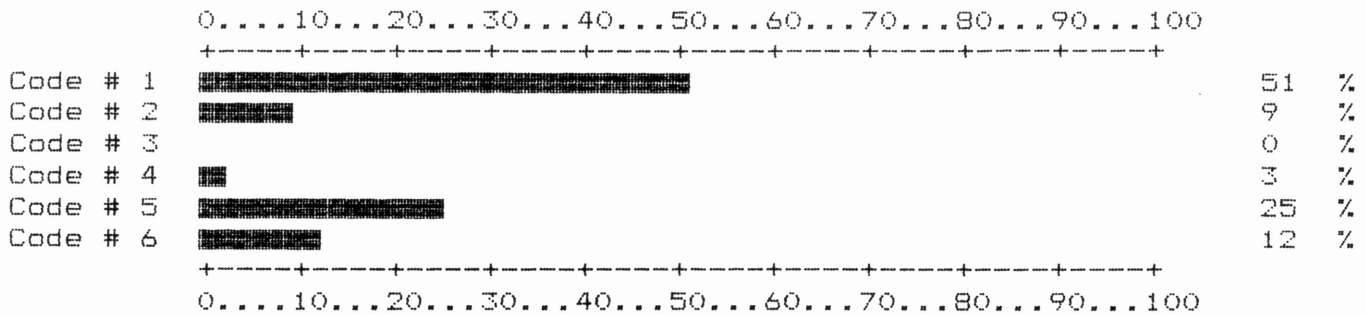
Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	60	31	34		34	53	0
2	60	28	34		34	54	0

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\*\*\*\* Data Analysis \*\*\*\*

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\* Percentage graph



\* Code description

Code #	Description
1	% of firms that write their own software and noticed increased efficiency in 1-6 mos.
2	% of firms that write their own software and noticed increased efficiency within 6 mos.-1 yr.
3	% of firms that write their own software and noticed increased efficiency within 1-2 yrs.
4	% of firms that write their own software and noticed increased efficiency after 2 years
5	% of firms that write their own software and have not noticed increased efficiency
6	No opinion

\* Code number breakdown

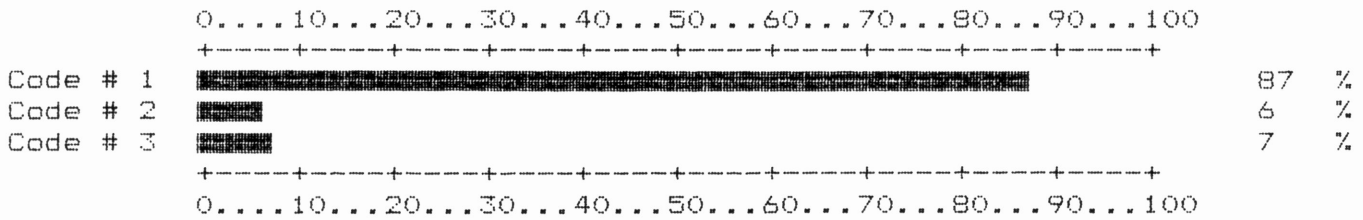
Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	31	16	53		53	55	0
2	31	3	53		53	56	0
3	31	0	53		53	57	0
4	31	1	53		53	58	0
5	31	8	53		53	59	0

Comment: By comparing this to the earlier efficiency analysis, it can be seen that firms that write their own software realize increased efficiency earlier. The % of firms reporting no increase remains the same.

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\*\*\*\* Data Analysis \*\*\*\*

\* Percentage graph



\* Code description

Code #	Description
1	% of firms that write their own software that are satisfied with the results the computer is giving their firm
2	% of firms that write their own software that are not satisfied with the results the computer is giving their firm
3	No opinion

\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	31	27	53		53	60	0
2	31	2	53		53	61	0

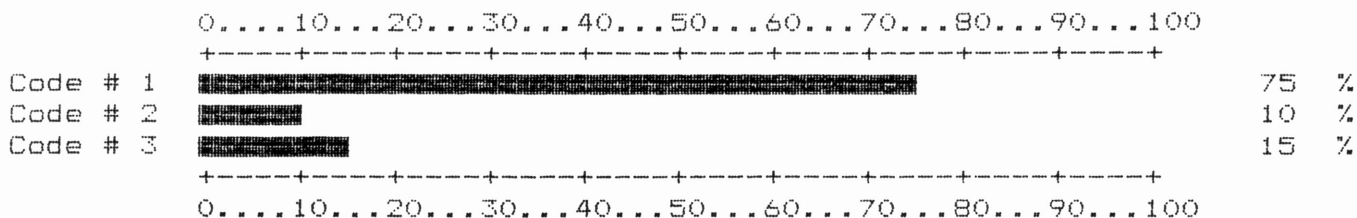
Comment: From this analysis and the one to follow, it can be seen that firms that write their own software tend to be more satisfied with their computer system.



\*\*\*\* Data Analysis \*\*\*\*

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\* Percentage graph



\* Code description

Code #	Description
1	% of firms that do not write their own software that are satisfied with the results the computer is giving their firm
2	% of firms that do not write their own software that are not satisfied with the results the computer is giving their firm
3	No opinion

---

\* Code number breakdown

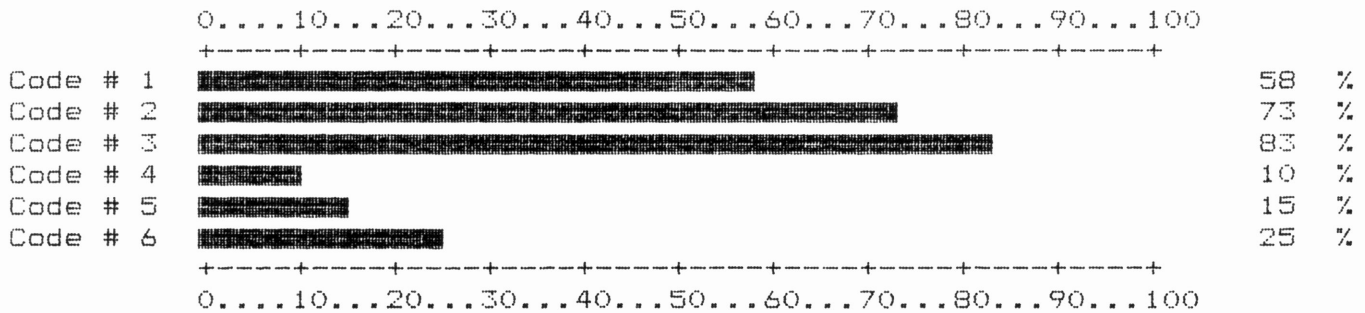
Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	28	21	54		54	60	0
2	28	3	54		54	61	0

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\*\*\*\* Data Analysis \*\*\*\*

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\* Percentage graph



\* Code description

Code #	Description
1	% of firms that use their computer for business management
2	% of firms that use their computer for accounting
3	% of firms that use their computer for word processing
4	% of firms that use their computer for automated drafting
5	% of firms that use their computer for electronic communication (mailing)
6	% of firms that use their computer for other purposes

\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	60	35	34		34	47	0
2	60	44	34		34	48	0
3	60	50	34		34	49	0
4	60	6	34		34	50	0
5	60	9	34		34	51	0
6	60	15	34		34	52	0

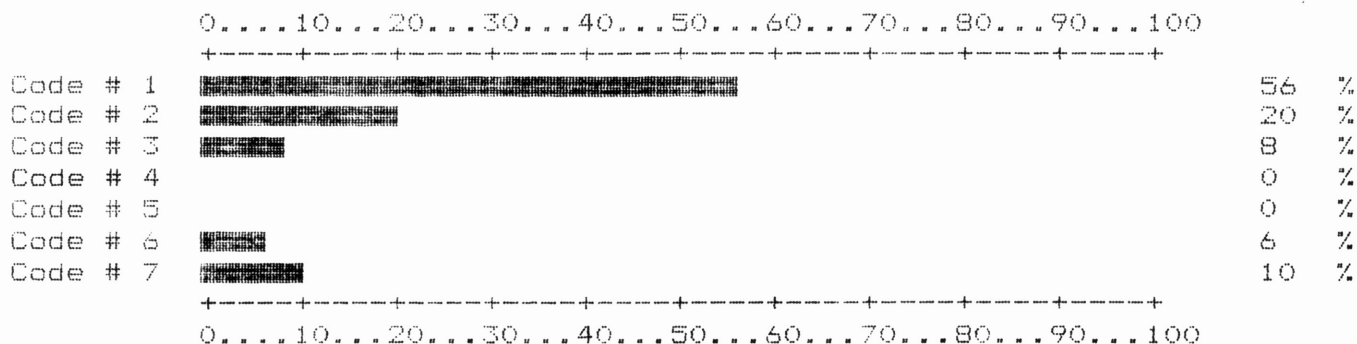
Comment: This shows a breakdown of computer usage currently being undertaken in the profession today.

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\*\*\*\* Data Analysis \*\*\*\*

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\* Percentage graph



\* Code description

Code #	Description
1	% of firms that own a computer that see the computer as essential to architecture within 1-5 yrs.
2	% of firms that own a computer that see the computer as essential to architecture within 5-10 yrs.
3	% of firms that own a computer that see the computer as essential to architecture within 10-15 yrs.
4	% of firms that own computers that see the computer as essential to architecture within 15-20 yrs.
5	% of firms that own a computer that see the computer as essential to architecture after 20 yrs.
6	% of firms that own a computer that see the computer as never being essential to architecture
7	No opinion

---

\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	60	34	34		34	64	0
2	60	12	34		34	65	0
3	60	5	34		34	66	0
4	60	0	34		34	67	0
5	60	0	34		34	68	0
6	60	4	34		34	69	0

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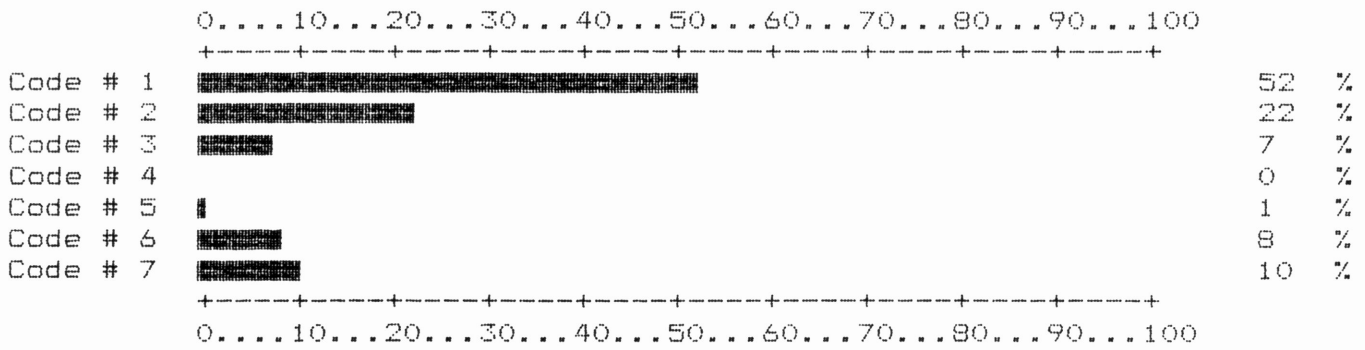
Comment: Most firms do seem to think the computer will be essential within 10 yrs. However, there is a large number who feel that the opposite is true.

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\*\*\*\* Data Analysis \*\*\*\*

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\* Percentage graph



\* Code description

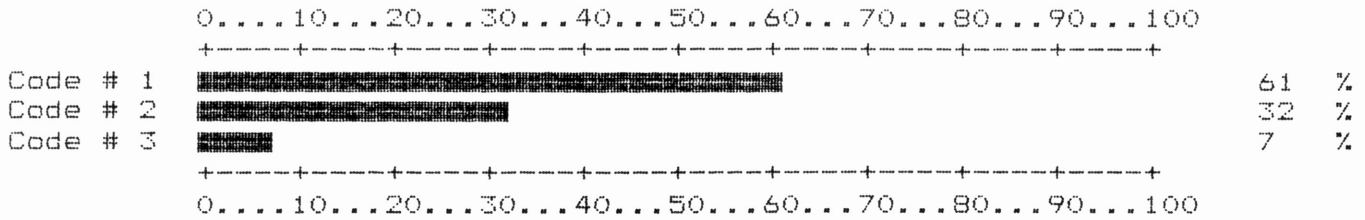
Code #	Description
1	% of firms that do not own a computer that see the computer as essential to architecture within 1-5 yrs.
2	% of firms that do not own a computer that see the computer as essential to architecture within 5-10 yrs.
3	% of firms that do not own a computer that see the computer as essential to architecture within 10-15 yrs.
4	% of firms that do not own computers that see the computer as essential to architecture within 15-20 yrs.
5	% of firms that do not own a computer that see the computer as essential to architecture after 20 yrs.
6	% of firms that do not own a computer that see the computer as never being essential to architecture
7	No opinion

\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	128	67	35		35	70	0
2	128	29	35		35	71	0
3	128	10	35		35	72	0
4	128	1	35		35	73	0
5	128	2	35		35	74	0
6	128	11	35		35	75	0

\*\*\*\* Data Analysis \*\*\*\*

\* Percentage graph



\* Code description

Code #	Description
1	% of firms that do not own a computer but plan to purchase one in the future
2	% of firms that do not own a computer and do not plan to purchase one in the future
3	No opinion

\* Code number breakdown

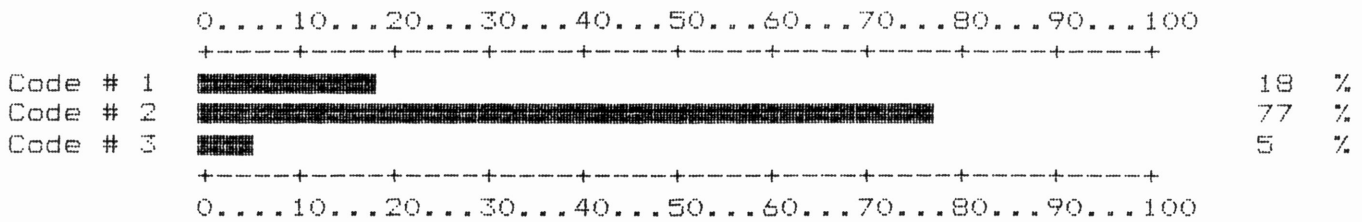
Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	128	79	35		35	76	0
2	128	42	35		35	77	0

Comment: This comparison shows the future of the computer in architecture. With a high percentage of firms planning to purchase, the computer will be common to most architectural firms in the future

\*\*\*\* Data Analysis \*\*\*\*

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\* Percentage graph



\* Code description

Code #	Description
1	% of firms that plan to purchase a computer that feel they have been exposed to enough information to make the correct choice for their firm
2	% of firms that plan to purchase a computer that feel they have not been exposed to enough information to make the correct choice for their firm
3	No opinion

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\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	79	15	76		76	78	0
2	79	61	76		76	79	0

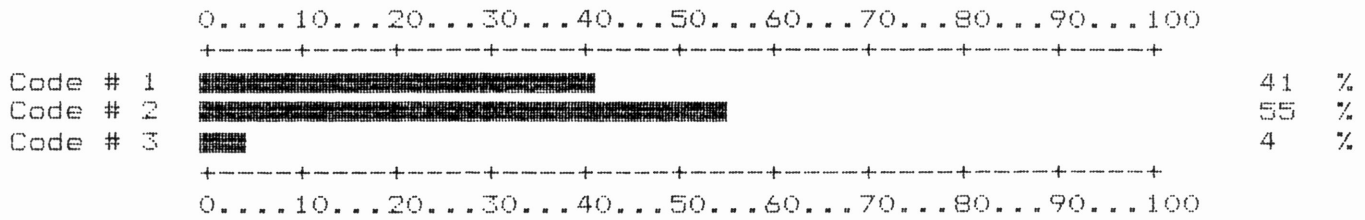
---

Comment: This comparison enforces the feeling that more information on the computer in architecture is needed for the profession to make the right choices.

---

\*\*\*\* Data Analysis \*\*\*\*

\* Percentage graph



\* Code description

Code #	Description
1	% of firms that plan to purchase a computer that have had a computer demonstrated for their firm
2	% of firms that plan to purchase a computer that have not had a computer demonstrated for their firm
3	No opinion

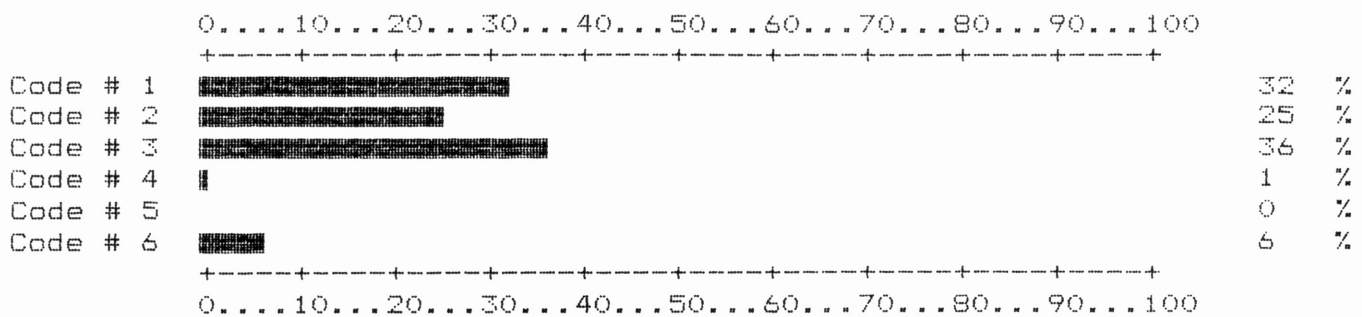
\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	79	33	76		76	80	0
2	79	44	76		76	81	0

\*\*\*\* Data Analysis \*\*\*\*

---

\* Percentage graph



\* Code description

Code #	Description
1	% of firms that plan to purchase a computer that plan to purchase within 1 yr.
2	% of firms that plan to purchase a computer that plan to purchase within 1-2 yrs.
3	% of firms that plan to purchase a computer that plan to purchase within 2-5 yrs.
4	% of firms that plan to purchase a computer that plan to purchase within 5-10 yrs.
5	% of firms that plan to purchase a computer that plan to purchase after 10 yrs.
6	No opinion

\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	79	26	76		76	93	0
2	79	20	76		76	94	0
3	79	29	76		76	95	0
4	79	1	76		76	96	0
5	79	0	76		76	97	0

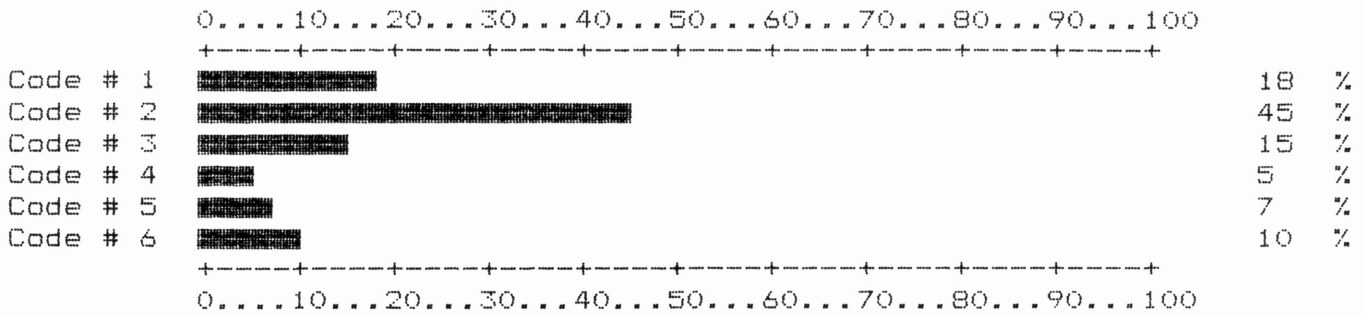
Comment: This conveys the general feeling of purchasing a computer within 5 yrs.

---



\*\*\*\* Data Analysis \*\*\*\*

\* Percentage graph



\* Code description

Code #	Description
1	% of firms that plan to purchase a computer and initially invest \$500-\$5,000
2	% of firms that plan to purchase a computer and initially invest \$5,000-\$10,000
3	% of firms that plan to purchase a computer and initially invest \$10,000-\$15,000
4	% of firms that plan to purchase a computer and initially invest \$15,000-\$20,000
5	% of firms that plan to purchase a computer and initially invest \$20,000-Up
6	No opinion

\* Code number breakdown

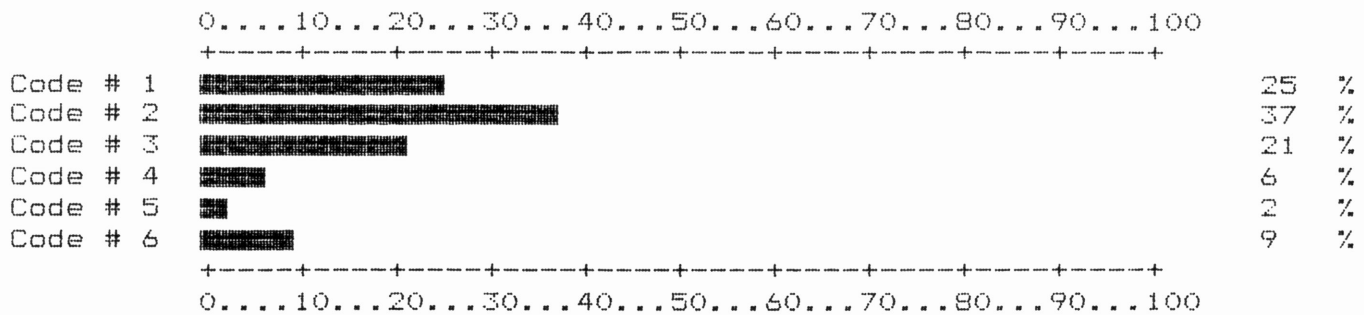
Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	79	15	76		76	98	0
2	79	36	76		76	99	0
3	79	12	76		76	100	0
4	79	4	76		76	101	0
5	79	6	76		76	102	0

Comment: These numbers suggest that if these firms are aware of current prices, most intend to buy systems of the microprocessor variety.

\*\*\*\* Data Analysis \*\*\*\*

---

\* Percentage graph



\* Code description

Code #	Description
1	% of firms that plan to purchase a computer that expect increased efficiency within 1-6 mos.
2	% of firms that plan to purchase a computer that expect increased efficiency within 6 mos.-1 yr.
3	% of firms that plan to purchase a computer that expect increased efficiency within 1-2 yrs.
4	% of firms that plan to purchase a computer that expect increased efficiency after 2 yrs.
5	% of firms that plan to purchase a computer that do not expect any increased efficiency
6	No opinion

\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	79	20	76		76	88	0
2	79	30	76		76	89	0
3	79	17	76		76	90	0
4	79	5	76		76	91	0
5	79	2	76		76	92	0

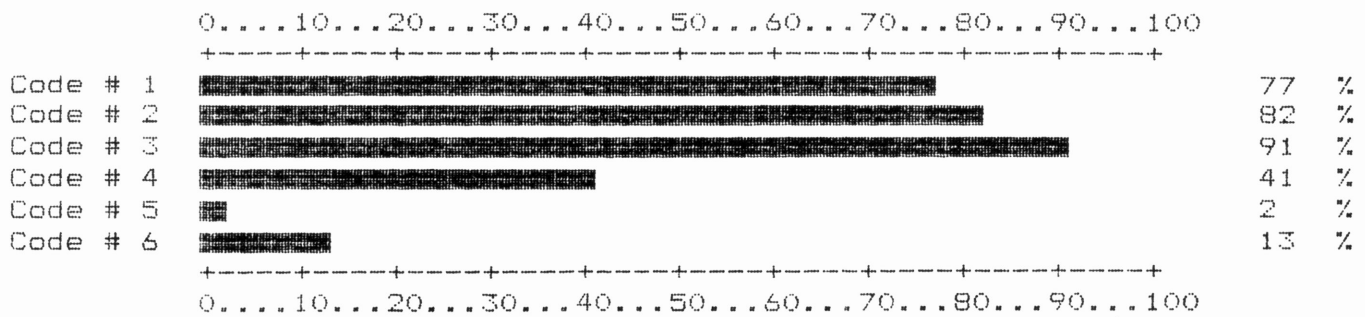
Comment: This shows that most firms planning to purchase expect increased efficiency within 1 yr. This assumption is accurate according to computer owners who answered the same question.

---

\*\*\*\* Data Analysis \*\*\*\*

---

\* Percentage graph



\* Code description

Code #	Description
1	% of firms that plan to purchase a computer and use it for business management
2	% of firms that plan to purchase a computer and use it for accounting
3	% of firms that plan to purchase a computer and use it for word processing
4	% of firms that plan to purchase a computer and use it for automated drafting
5	% of firms that plan to purchase a computer and use it for electronic communication (mail)
6	% of firms that plan to purchase a computer and plan to use it for other purposes

---

\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	79	61	76		76	82	0
2	79	65	76		76	83	0
3	79	72	76		76	84	0
4	79	33	76		76	85	0
5	79	2	76		76	86	0
6	79	11	76		76	87	0

---

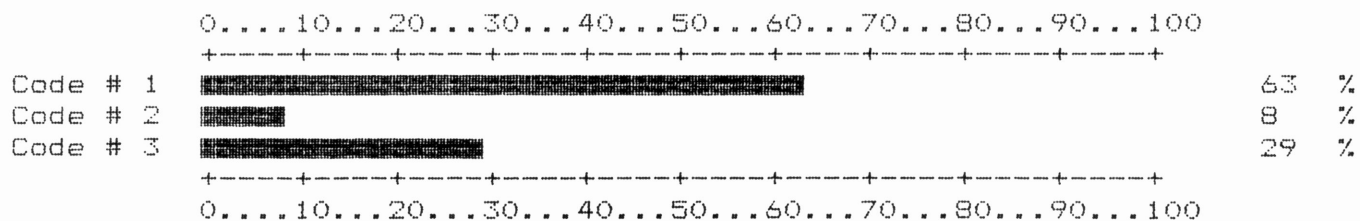
Comment: This shows the potential usage of the computer by those firms planning to purchase a computer system in the future.

---

\*\*\*\* Data Analysis \*\*\*\*

---

\* Percentage graph



\* Code description

Code #	Description
1	% of all firms that requested the results of this questionnaire
2	% of all firms that did not request the results of this questionnaire
3	No opinion

\* Code number breakdown

Code #	Base #	Comparison #	Base code	Comparison codes	1	2	3
1	187	118	0		103	0	0
2	187	16	0		104	0	0

---

Hank Weghorst  
Department of Architecture  
Texas A&M University  
College Station, TX 77843  
March 1, 1982

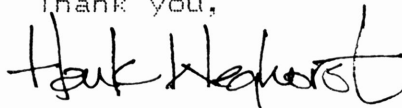
Dear Architect,

I would like to thank you for your response to the questionnaire sent out during November 1981 regarding the computer in the architectural profession. Your expressed interest in the results of the survey and the topic in general has prompted the enclosed analysis and encouraged further research along this same line. The overall response to the survey was extremely high, suggesting that the profession is not only interested, but also concerned about the direction the computer will take in regard to architecture and the resulting influence this might have on individual firms.

Your firm and many others across the state requested a need for more information on the computer. I hope this analysis will prove to be beneficial to this need. The analysis enclosed contains percentages derived directly from the questionnaire. These percentages, combined with your own experience, should give an insight into where you currently stand with respect to the computer in architecture and possibly provide direction for planning future expansions.

This analysis is part of a much larger, more comprehensive study being developed. If you have any questions or comments regarding this analysis or would like a copy of the overall study, please do not hesitate to contact me. An endeavor such as this study requires communication within the profession. Your participation has made it that much more complete and accurate.

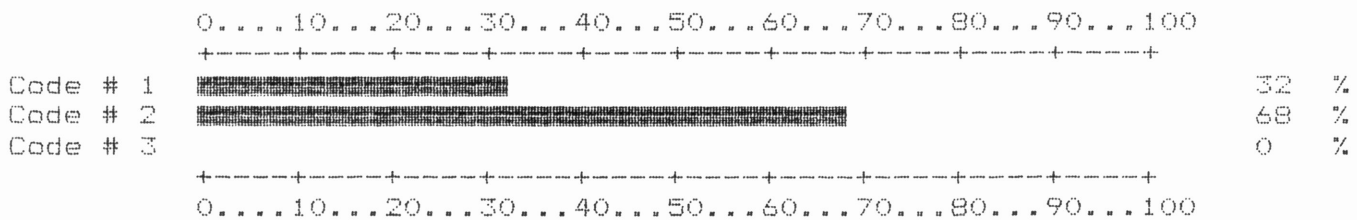
Thank you,

A handwritten signature in black ink that reads "Hank Weghorst". The signature is written in a cursive, slightly slanted style.

Hank Weghorst

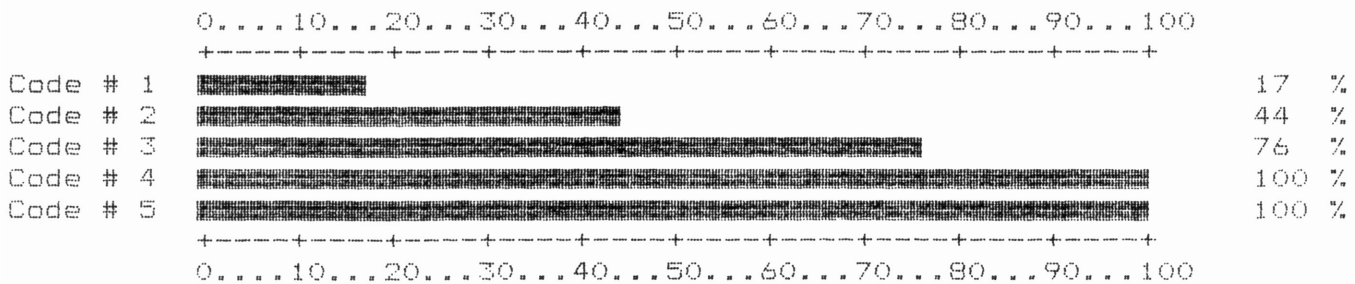


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**COMPUTER USAGE****Analysis # 2**

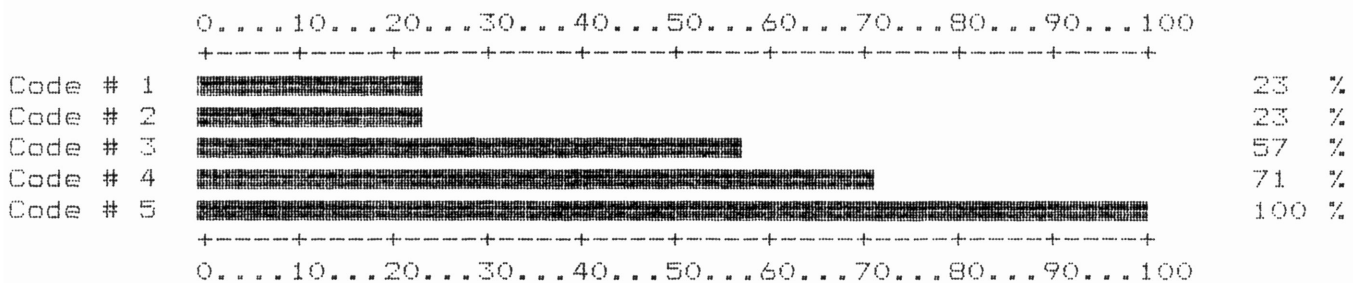
Code #	Description
1	% of all firms using the computer
2	% of all firms not using the computer
3	No opinion

---

**BREAKDOWN BY EMPLOYEES****Analysis # 3**

Code #	Description
1	% of firms with 1-10 employees using the computer
2	% of firms with 11-30 employees using the computer
3	% of firms with 31-60 employees using the computer
4	% of firms with 61-100 employees using the computer
5	% of firms with 101-Up employees using the computer

---

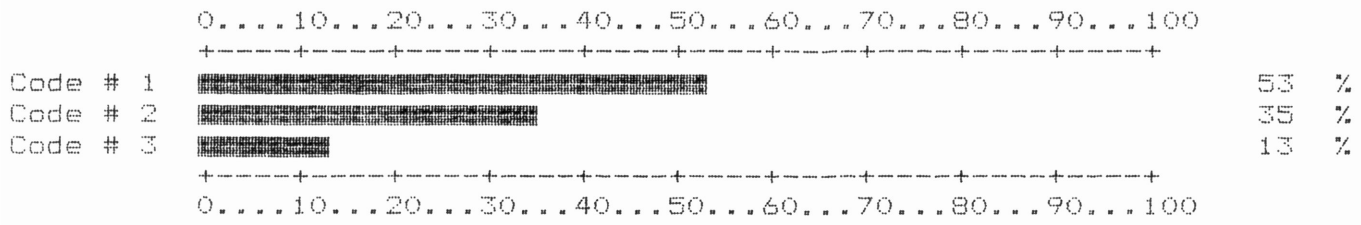
**BREAKDOWN BY ASSETS****Analysis # 4**

Code #	Description
1	% of firms with assets of 0-0.25 million using the computer
2	% of firms with assets of 0.25-1 million using the computer
3	% of firms with assets of 1-10 million using the computer
4	% of firms with assets of 10-50 million using the computer
5	% of firms with assets of 50-Up million using the computer

---

COMPUTER TYPES

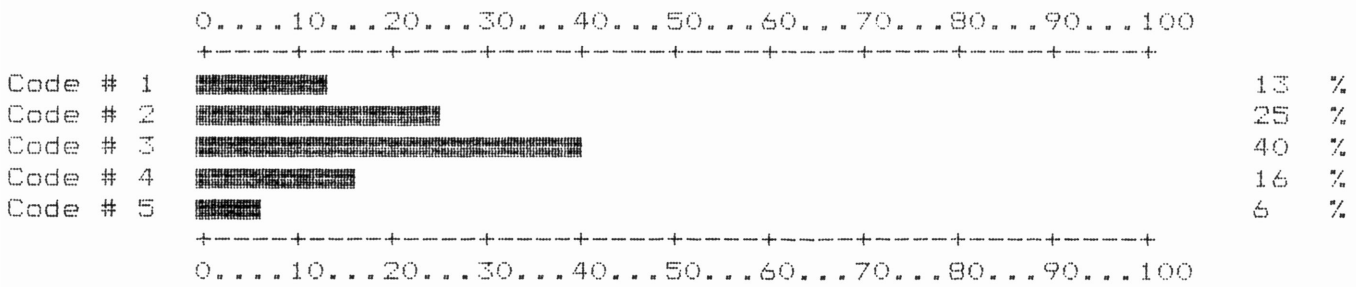
Analysis # 5



- Code #      Description
- 
- 1      % of firms using the computer : micro
  - 2      % of firms using the computer : mini
  - 3      % of firms using the computer : mainframe

INVESTMENTS

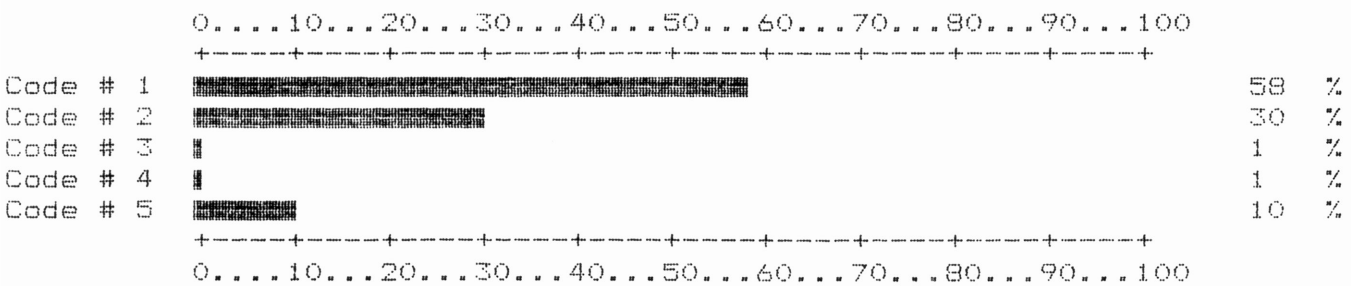
Analysis # 6



- Code #      Description
- 
- 1      % of firms that own computers with \$500-\$5,000 invested
  - 2      % of firms that own a computer with \$5,000-\$10,000 invested
  - 3      % of firms that own a computer with \$10,000-\$50,000 invested
  - 4      % of firms that own a computer with \$50,000-Up invested
  - 5      No opinion

PERIOD OF OWNERSHIP

Analysis # 7



- Code #      Description
- 
- 1      % of firms that own computers that have been purchased within the last 1-2 yrs.
  - 2      % of firms that own computers that have been purchased within the last 2-5 yrs.
  - 3      % of firms that own a computer that has been purchased within the last 5-10 yrs.
  - 4      % of firms that own a computer that has been purchased over 10 yrs. ago
  - 5      No opinion

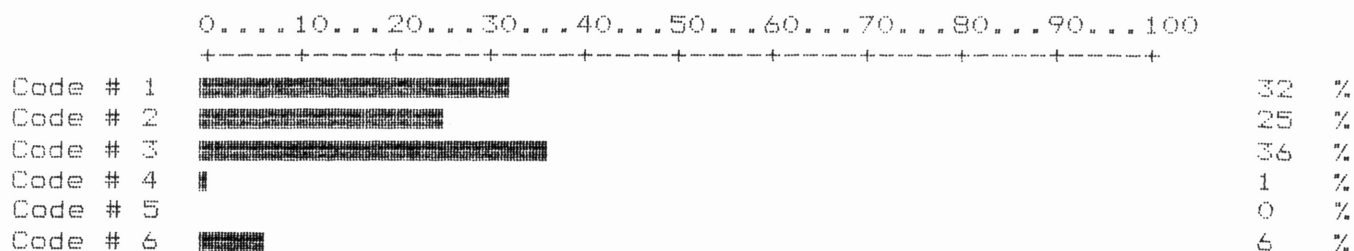






**PERIOD UNTIL PURCHASE**

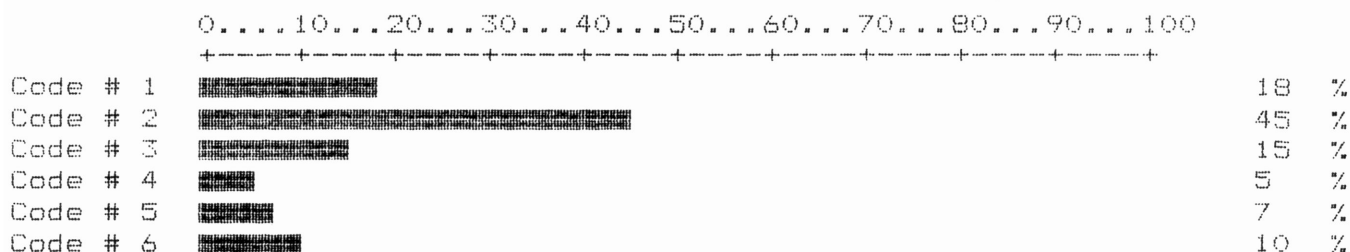
**Analysis # 14**



Code #	Description
1	% of firms that plan to purchase a computer that plan to purchase within 1 yr.
2	% of firms that plan to purchase a computer that plan to purchase within 1-2 yrs.
3	% of firms that plan to purchase a computer that plan to purchase within 2-5 yrs.
4	% of firms that plan to purchase a computer that plan to purchase within 5-10 yrs.
5	% of firms that plan to purchase a computer that plan to purchase after 10 yrs.
6	No opinion

**INVESTMENT UPON PURCHASE**

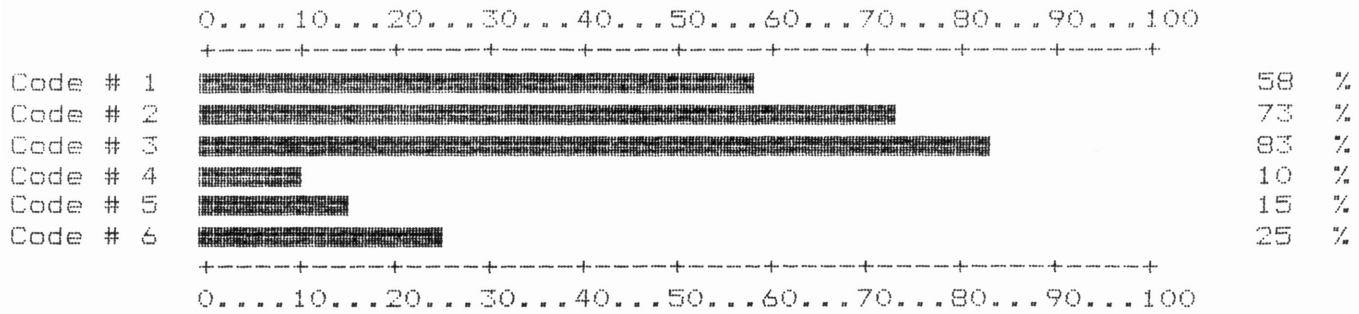
**Analysis # 15**



Code #	Description
1	% of firms that plan to purchase a computer and initially invest \$500-\$5,000
2	% of firms that plan to purchase a computer and initially invest \$5,000-\$10,000
3	% of firms that plan to purchase a computer and initially invest \$10,000-\$15,000
4	% of firms that plan to purchase a computer and initially invest \$15,000-\$20,000
5	% of firms that plan to purchase a computer and initially invest \$20,000-Up
6	No opinion

**CURRENT COMPUTER USAGE**

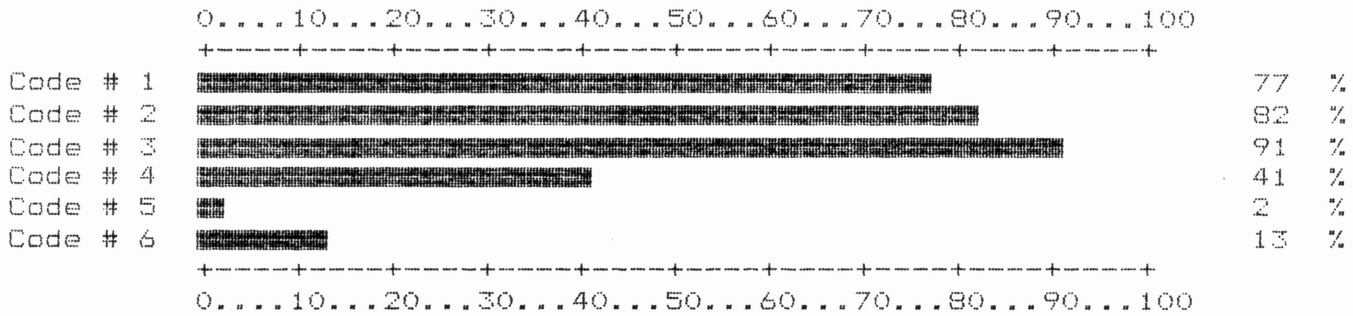
**Analysis # 16**



Code #	Description
1	% of firms that use their computer for business management
2	% of firms that use their computer for accounting
3	% of firms that use their computer for word processing
4	% of firms that use their computer for automated drafting
5	% of firms that use their computer for electronic communication (mailing)
6	% of firms that use their computer for other purposes

**FUTURE COMPUTER USAGE**

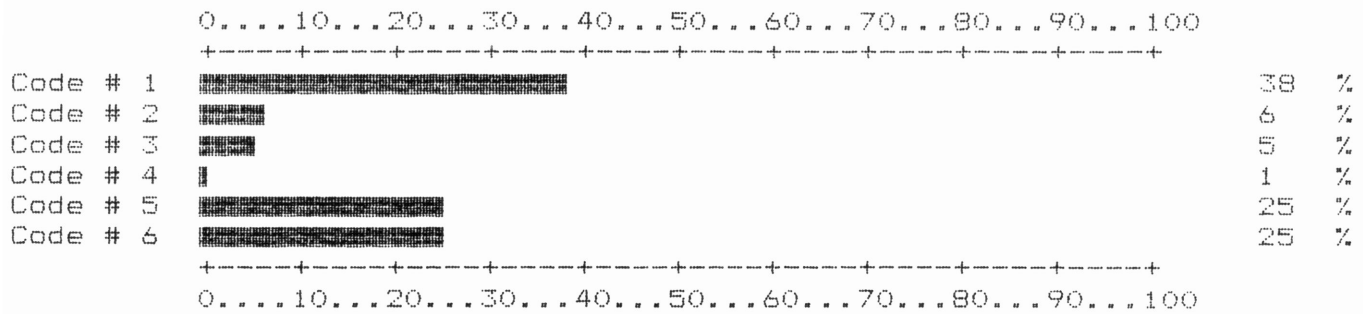
**Analysis # 17**



Code #	Description
1	% of firms that plan to purchase a computer and use it for business management
2	% of firms that plan to purchase a computer and use it for accounting
3	% of firms that plan to purchase a computer and use it for word processing
4	% of firms that plan to purchase a computer and use it for automated drafting
5	% of firms that plan to purchase a computer and use it for electronic communication (mail)
6	% of firms that plan to purchase a computer and plan to use it for other purposes

PAST PERFORMANCE

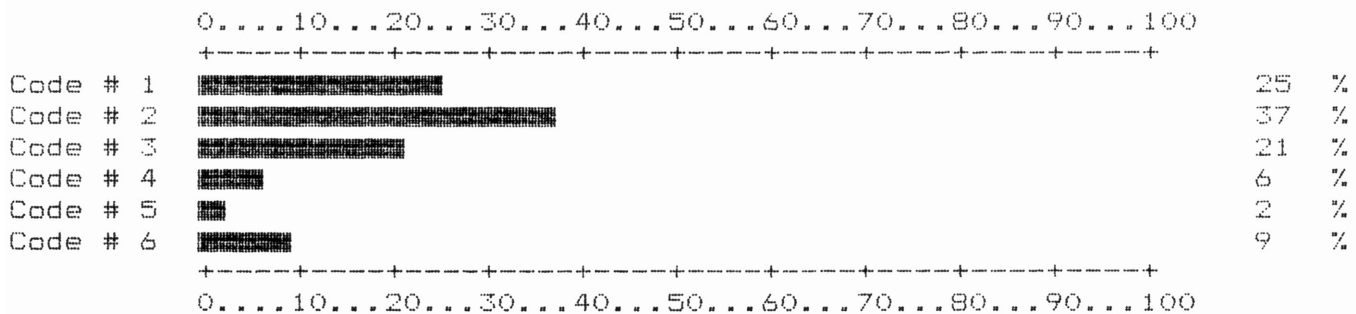
Analysis # 18



Code #	Description
1	% of firms that own a computer that noticed increased efficiency within 1-6 mos.
2	% of firms that own a computer that noticed increased efficiency within 6 mos.-1 yr.
3	% of firms that own a computer that noticed increased efficiency within 1-2 yrs.
4	% of firms that own a computer that noticed increased efficiency after 2 yrs.
5	% of firms that own a computer that have not noticed increased efficiency
6	No opinion

FUTURE EXPECTATIONS

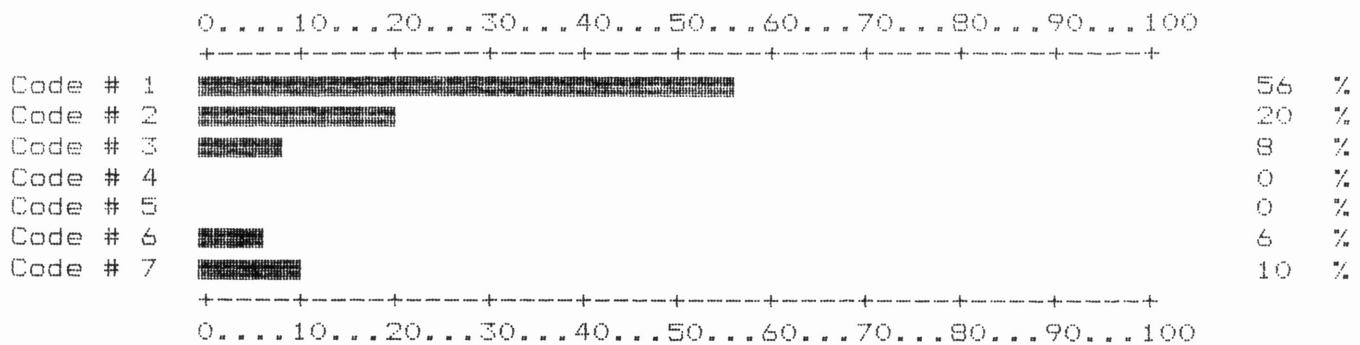
Analysis # 19



Code #	Description
1	% of firms that plan to purchase a computer that expect increased efficiency within 1-6 mos.
2	% of firms that plan to purchase a computer that expect increased efficiency within 6 mos.-1 yr.
3	% of firms that plan to purchase a computer that expect increased efficiency within 1-2 yrs.
4	% of firms that plan to purchase a computer that expect increased efficiency after 2 yrs.
5	% of firms that plan to purchase a computer that do not expect any increased efficiency
6	No opinion

COMPUTER OUTLOOK BY OWNERS

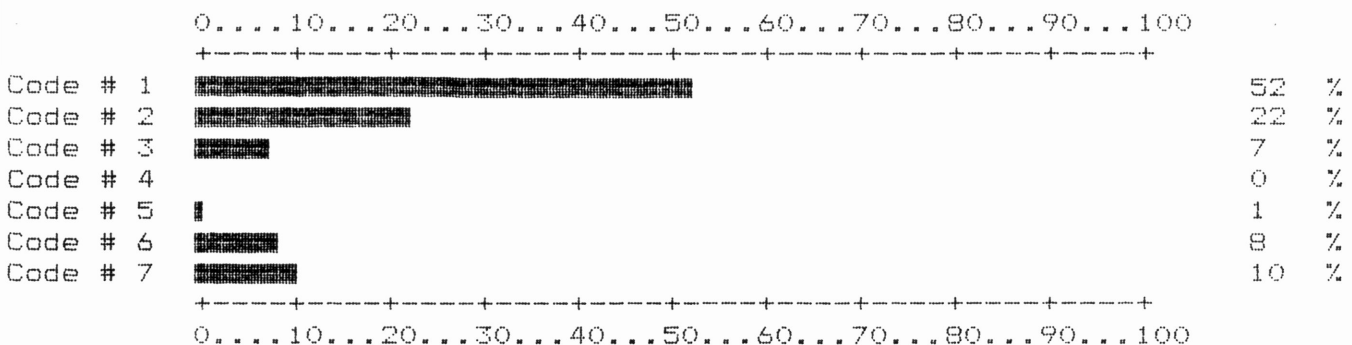
Analysis # 20



Code #	Description
1	% of firms that own a computer that see the computer as essential to architecture within 1-5 yrs.
2	% of firms that own a computer that see the computer as essential to architecture within 5-10 yrs.
3	% of firms that own a computer that see the computer as essential to architecture within 10-15 yrs.
4	% of firms that own computers that see the computer as essential to architecture within 15-20 yrs.
5	% of firms that own a computer that see the computer as essential to architecture after 20 yrs.
6	% of firms that own a computer that see the computer as never being essential to architecture
7	No opinion

COMPUTER OUTLOOK BY NON-OWNERS

Analysis # 21



Code #	Description
1	% of firms that do not own a computer that see the computer as essential to architecture within 1-5 yrs.
2	% of firms that do not own a computer that see the computer as essential to architecture within 5-10 yrs.
3	% of firms that do not own a computer that see the computer as essential to architecture within 10-15 yrs.
4	% of firms that do not own computers that see the computer as essential to architecture within 15-20 yrs.
5	% of firms that do not own a computer that see the computer as essential to architecture after 20 yrs.
6	% of firms that do not own a computer that see the computer as never being essential to architecture
7	No opinion