COMPUTERS AT HOME: NEW SPATIAL NEEDS?
A CASE STUDY

by

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Licenciatura en Psicologia Universidad de Belgrano
Buenos Aires, Argentina 1979

Submitted to the Department of Architecture
in partial fulfillment of
the requirements for the degree of

Master of Science in Architecture Studies

at the

Massachusetts Institute of Technology

June 1982

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ABSTRACT

This thesis investigates five families in Boston who have introduced computers into their homes. The analysis is interdisciplinary and each case has been considered in terms of psycho-social and architectural terms. The conclusions address issues of control, gender relations, feelings toward computers, and architectural constraints to easy adaptation to the computer. The thesis concludes that the computer is not just a machine that one takes out of its box and plugs in. There are many considerations in bringing computers into the home.

Thesis Supervisor: Edward Robbins, Assistant Professor
of Anthropology-in-Architecure

acknowledgments

figure I

ACKNOWLEDGEMENTS

My thanks to the following people for helping me in this thesis: Professor Edward Robbins, Professor Julian Beinart, Professor Sherry Turkle, and Professor Phillip Stone who introduced me to Teleinformatics.

Elizabeth Cordoliane and Bailey for their drawings, Lindy Biggs for her editing.

Special thanks to the people who allowed me into their homes and Professor Michael Detrouzos.

Thanks to Antonio Battro and Horacio Reggni who encouraged me to come to the United States.

Thanks for Pam Wessling, Anne Crowley, Beverly Seronick, Perihan Boutros-Ghali who could cope with a nervous friend and a disordered roommate.

My dearest thanks to my mother and sister for their support even through long distance calls.

Bamba, thank you for being there.

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Today computers are the subject of speculation and philosophical discussion with greater and greater frequency. These discussions have overlooked the affect of the computer in the home. The following study addresses this issue with the goal of informing architects, social scientists and computer manufacturers.

In 1982 we are experiencing a new era in the history of civilization. The United States is the leader in this new era of electronics development, also known as the "information era." Discussions abound in the computer sciences around technological impacts. Researchers in environmental design study how these technological advances are affecting, or will affect, architecture and social relations.

Some of these changes are articulated by Alvin Toffler in his book The Third Wave (1981). Toffler describes an era characterized by an informatic and technocratic society that imposes changes in the means of production. The industrial era, which we are in now, will be overcome by one with different working relationships. This change in the labor structure will be translated into the homes.

Toffler argues that the new production system will "revolutionize our homes as well."[1] The new mode of production makes possible a return to the cottage industry on a new, higher, electronic basis and with a new emphasis

on the home as the center of society. Since technology will allow more and more people to work at home, the house will be equipped to work as an office. Computers at home will facilitate communications that do not need a face-to-face interaction. Fewer workers will be needed to manipulate physical goods. "Given the right configuration of telecommunications and other equipment. . .[the work] could be accomplished anywhere, including one's own living room."[2]

Toffler's "electronic cottage" provides the underlying theme for this study. The home computer is examined as a physical object which changes the environment of the house and as a dynamic influence that changes the social and psychological relationships within the home. I have examined what is happening today in homes with computers in order to offer better solutions for tomorrow. If computers are indeed introduced into homes at the rate predicted by computer manufacturers, architects, social scientists, and the manufacturers themselves must pay attention to the changes that will result.

A Quick Look at Some Different Perspectives:

Many views of computers have been expressed in recent years. A look at them will help understand why it is important to pay attention to this new era of information technology and will provide a context for this research.

In "House Breaking with Software," Robert Cowen

shows the magnitude of the home computer phenomenon.

"In 1981, there were already one million computers in

private homes."[3] Different marketing predictions of

computer manufacturing firms affirm that within the next

two or three years the computer sprawl will continue at

at least the same rate it has in the last two years.

Jack Tramiel, the vice chairman of Commodore Inter-

national was interviewed by Newsweek. In the article,

"To Each His Own Computer," he said that "by most

estimates almost three million personal computers will be

sold this year alone."[4] He is then quoted as saying

"I believe we'll see fifty million worldwide by 1985."[5]

It is not only manufacturers who are talking about

the magnitude of sales. Diltea, in his book Simple Guide

for Home Computers, talks of the computer explosion, the

reactions of people, and compares the computer with a

household appliance.

> This nation is on the verge of changes as revolution-
> ary as those caused by the advent of the automobile,
> the commercial airliner, and the television. Like
> any technological breakthrough offered to the pub-
> lic for the first time, the home computer is
> generating its share of excitement and wild eyed
> predictions, as well as suspicion and misinformation.
> All around the country, Americans are taking the
> measure of this sophisticated new household appliance.[6]

He uses the television as an analogy to the computer.

Discussion about computers are much like those about

television. Even today, forty years after Marshall McLuhan's

prediction, television's merits are still questioned. Its

impact on society and its role in children's education
is constantly debated. When the television began to
enter the home the issue of where to put it was a major
one. This is a major issue with the home computer today.

In <u>Mindstorms: Children, Computers, and Powerful</u>
<u>Ideas</u>, Seymour Papert expresses two sides of the current
debate over computers. "The skeptics "do not expect the
computer presence to make much difference."[7] The critics
"who think that the computer presence will make a dif-
ference and are apprehensive. Papert has a third posi-
tion which is optimistic and affirms that computers can
be oriented in positive directions.

The mixed reaction of the public, of fear and excite-
ment, is, in part, merely a social reaction to novelty.
The computer has the ability to scare and fascinate.
Pursuing the emotions of fear and hope, of freedom and
slavery, in this thesis, I have observed family responses
to the computer. I have not undertaken an ethical
critique of the computer. But the following quote
expresses my basic views of technology as a whole.
"The new technology may change us, but only in ways
already set by the structure and values of society."[8]

This position is not an uncommon one. Leo Marx also
believes that persons are responsible for machines, that
technology is under human control, and that society reflects
itself in technology. He says "it is, in fact, an expression

of our very human desires and fears."[9] These quotes
demonstrate the presence of technology, information and
computerization in the thoughts of active scholars and
students of society.

Orwell, Papert, and Marx are concerned primarily
with a level of social analysis broader than the focus
of this thesis. But they are important for two reasons.
First, the family constitutes the nucleus of society.
Finding out about families and their homes will help
understand the process of change in society. Second,
because the promenade through many levels of analysis
is important for the study of any social phenomenon.

The State of the Art:

Because few people have considered the impact of the
computer on the home it follows that there is little
literature on the subject. Literature on computers
begins with claims about the expansion of computers, the
power of computers, the computer sprawl, and the promises
of computers.

In skimming magazines of the recent years and par-
ticularly 1981, one finds an average of two advertisements
about home computers. This is true in fashion magazines as
well as weekly business magazines. The ads for computers
for computers appear with promises of how one's life will
be simplified by a personal computer. The computer will

prove to be an intelligent machine that is a patient game mate, a home accounting consultant, a helpful secretary, and a reminder of one's appointments.

None of these ads mention the home's physical environment. The photographs are invariably of the hardware and sometimes manuals and programs. They rarely show where the machine is located; it is usually a blanck background that symbolized the computer environment. If they do show some reference it is either a work desk or a counter, never the whole room. These ads support the findings of this thesis--that locating the computer in a home is a difficult task. Maybe computer manufacturers have not realized themselves that the home space is a difficult environment to house a computer satisfactorily.

Even Toffler does not talk about the home's physical environment. The electronic cottage refers to a family and working unit that is a auto-sufficient, telecommunication cell. Introducing the computer is really only like introducing a "smart typewriter" or computer console which will expand the possibilities of work at home. The reader will see that a computer is much more complex than a typewriter and that that complexity raises different issues. It is precisely the perception of a computer as a simple appliance that makes Toffler and other authors disregard, or at least underestimate, the consequences of the introduction of a computer into the home.

Computer advertisings do not show the environment.
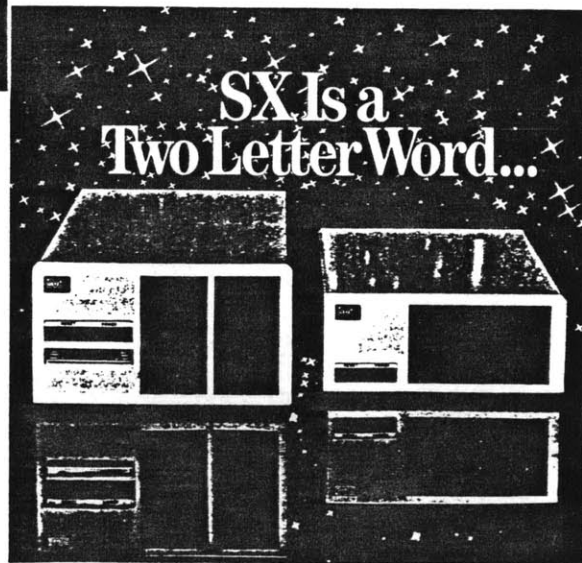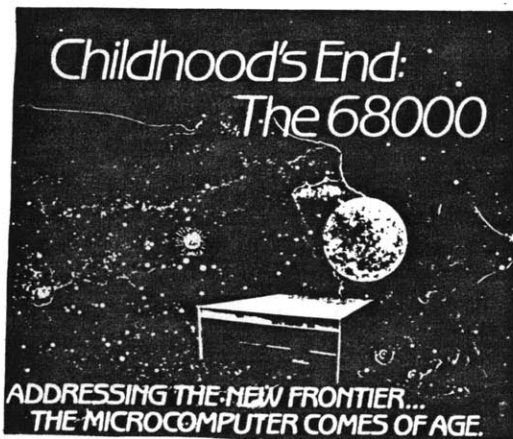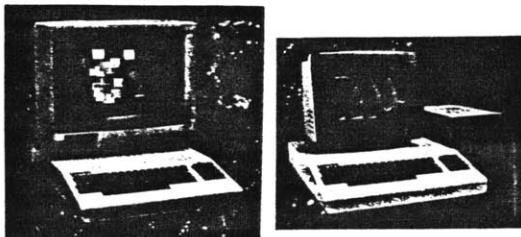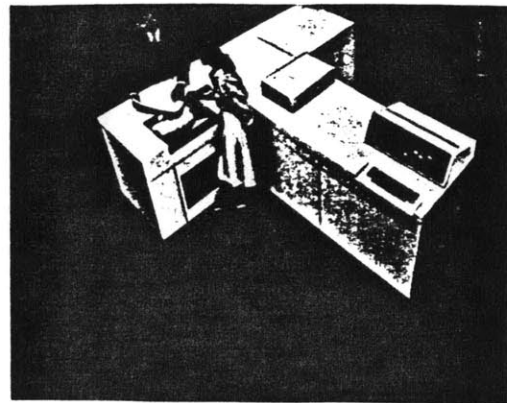
figure 3

Other social scientists are talking about the potential changes to the structure of society. Phillip Stone, a social psychologist at Harvard University, argues that telecommunications will change the production process, thus changing the social organization of industry. Face-to-face interaction will be unnecessary; with information filed electronically and remotely accessible by terminals office workers can work at home. "The most opitmal form of work localization, of course, is work at home."[10] It is not the scope of this thesis to discuss the best localization of the worker, but to stress that if this is done the home will become the working environment. The traditional home will have to accomodate new activities and new machines to fulfill this new function.

Michael Herrero, in a research report prepared for the New Towns Research Seminar comes closer to the focus of this thesis. He says that "with the home as the center of employment the entire family structure may be influenced." [11] Obviously, it is easy to presume that the family structure may be influenced. The important point is to start studying how. If one continues a step further the question is, how will the home be adapted to be the center of employment?

Audience:

This thesis is intended for architects, social scientists, and perhaps computer manufacturers.

Architects should benefit from this research because if the home computer revolution is real they will be designing houses for people with new needs. The research has uncovered important issues at a social level, at an environmental level, and a design level that architects should start considering. Most houses had problems with the introduction of a computer. Conventional house designs have to be reconsidered.

The findings of this thesis should prove interesting to social scientists because they address questions about families, female and male relations, and different perceptions and feelings. Sociologists and psychologists who are concerned with physical design issues will find the questions and findings helpful.

Computer manufacturers who have a different perspective of the home computer should pay attention to these findings. They should consider the problems discovered as questions for research and development.

For all three groups the message is: The computer is not simply a new machine to take out of the box and just plug in.

chapter 1
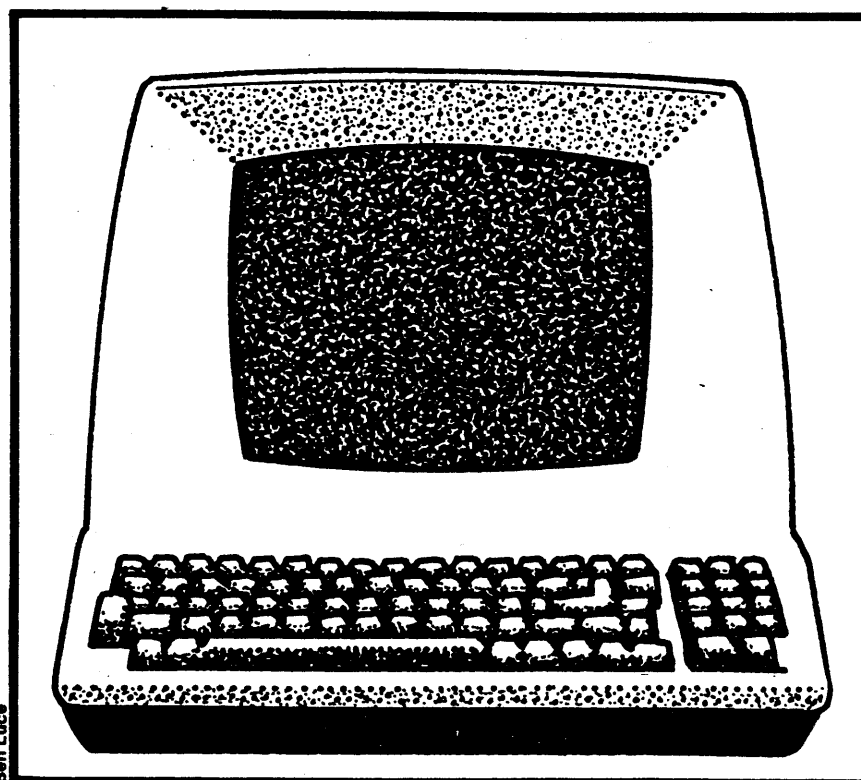
figure 4

What is a computer? It seems like a simple question. But the computer is not just another household machine, at least people experience it as more than a machine.

Some basic definitions are necessary for the discussion that follows. A more complete list of definitions is included in the appendix.

Telecommunications is a sizable segment of all communications which embraces the acquisition, transmission, and processing of information by electronic means.

Computers are electronic computational machines and communications devices. They are instruments that store data, transmit and retrieve information.

Hardware constitutes the physical equipment of the computer. It is a mechanical, magnetic, electric, or an electronic device.

Software is the entire set of programs, procedures, rules, and eventually documents related to the operation of data-processing systems. The software ultimately defines the use of the computer. The computer games, managerial programs, and the famous word processor are software.

A home computer includes a keyboard, which is the tool for feeding commands, a monitor, where the program is shown and the information retrieved, storage, which includes devices in which data can be entered, held and

retrieved. Storage is usually in magnetic disks, mag-
netic tapes, or videodiscs. Programs, which are stored in
a memory, tell the computer step by step what to do. And
the memory that includes the circuits controlling the
interpretation and execution of instruction. Some
home computers have a printer connected where the data
is printed on paper. If the computer works as a terminal,
it is connected by a modem to a network.

The following graphic shows the process the com-
puter goes through, from the input of information through
the processing and storage in the computer, the memory,
and the output.

CRT screen display

floppy disk
drives

memory

CPU

Keyboard

tel.

modem

Printer
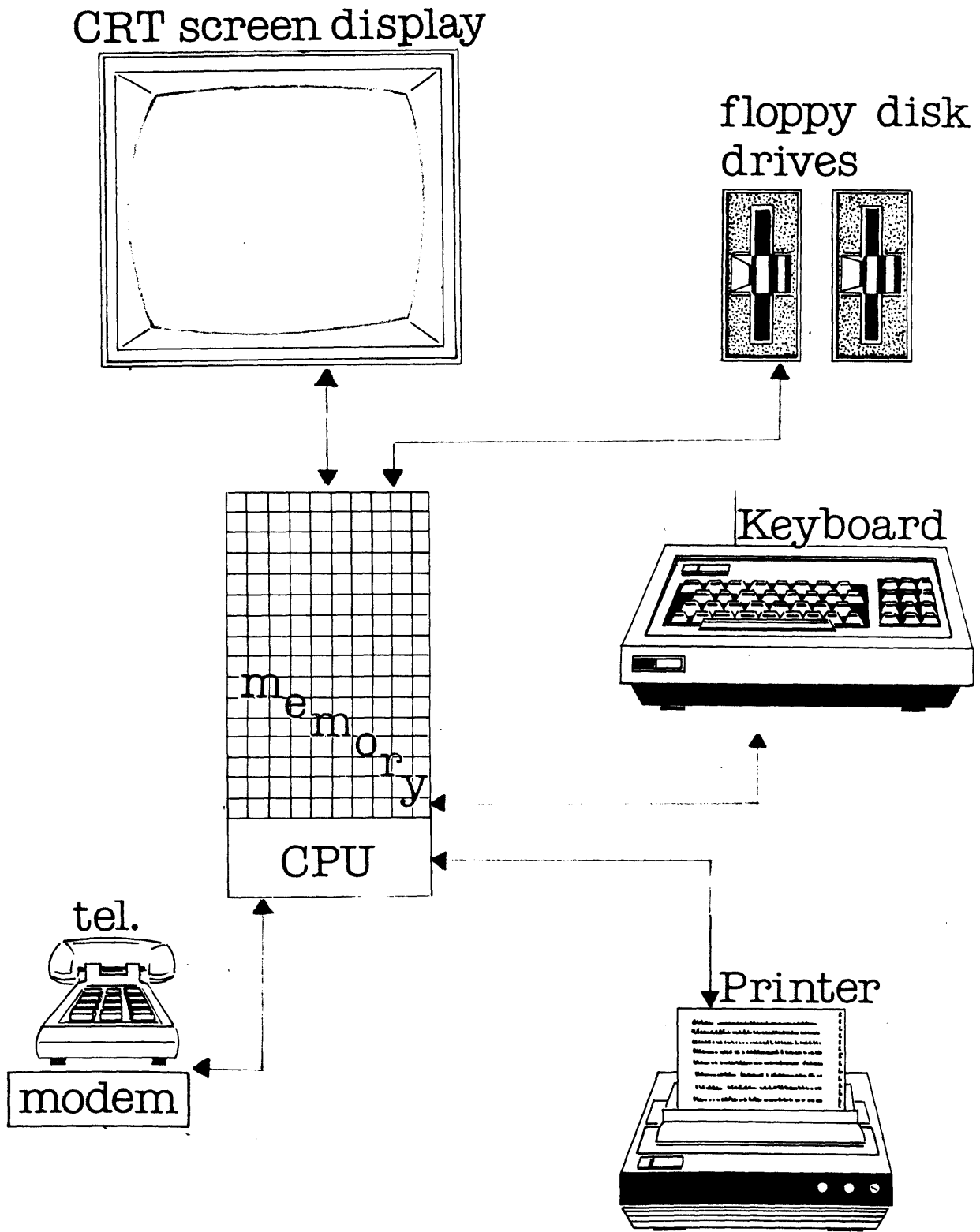
figure 5

Computers can be used for work, for entertainment, for education and for household activities. They can perform all of these functions or just one. Within one house the computer can be used for working by the mother or father and for learning and playing by the children. Each of these activities demands slightly different conditions. Yet, they are all happening in the same machine.

There many ways in which the computer performs as a working machine. It is a perfect live-in secretary-accountant-consultant as Joseph Deken describes it. A computer can do filing, listings, graphics and activities which are time consuming if done by a person. There are business, marketing, and financial programs that can be used in home computers. Cashflow programs are useful for bookkeeping, tax records, expenses, income, checking accounts, and general budget items.

The word processor is a time saver for writers. Work can be stored in diskettes and transported as the "paperless office" from home to work. This equipment will allow people to work from the home more and more and commute less.

The computer is an all-knowing, multi-faceted teacher. One can learn languages, music, math, and anything else that is taught in a classroom. It is a patient tutor which teaches facts and even how to think.

The computer gives the opportunity to be more reflective and self-conscious of the steps in thinking. Papert explains in his book that the children who master the art of deliberately thinking like a computer "learn the liberal mechanical fashion, following the process step by step."

Learning to use the computer is an end in itself because there is a widespread belief that knowledge of computers is necessary for occupational survival tomorrow.

Some people use computers primarily for recreation. Graphics and programming have become a major form of entertainment. They are visually attractive and intellectually challenging. Other people find computer games challenging, interesting, and enjoyable. The computer can play adventure games, and make one imagine ane intergalactical war. The computer is oriented to futuer and different worlds. The cowboy story is retold with new characters.

There are other categories of games like gambling and casino, sports stimulation, plotting and pictures, numbers and guessing and logic.

Some parents prefer to see their children play with computer educational games, than to see them watching television. These games are active, the children have to interact with the machine to give the orders.

Computerizing the environment is one of the
ways to control energy expenditures.

A domestic computer
system consisting of a host
computer linked through a
central control box to a
network of appliances and
other electronic devices.

David Johnson
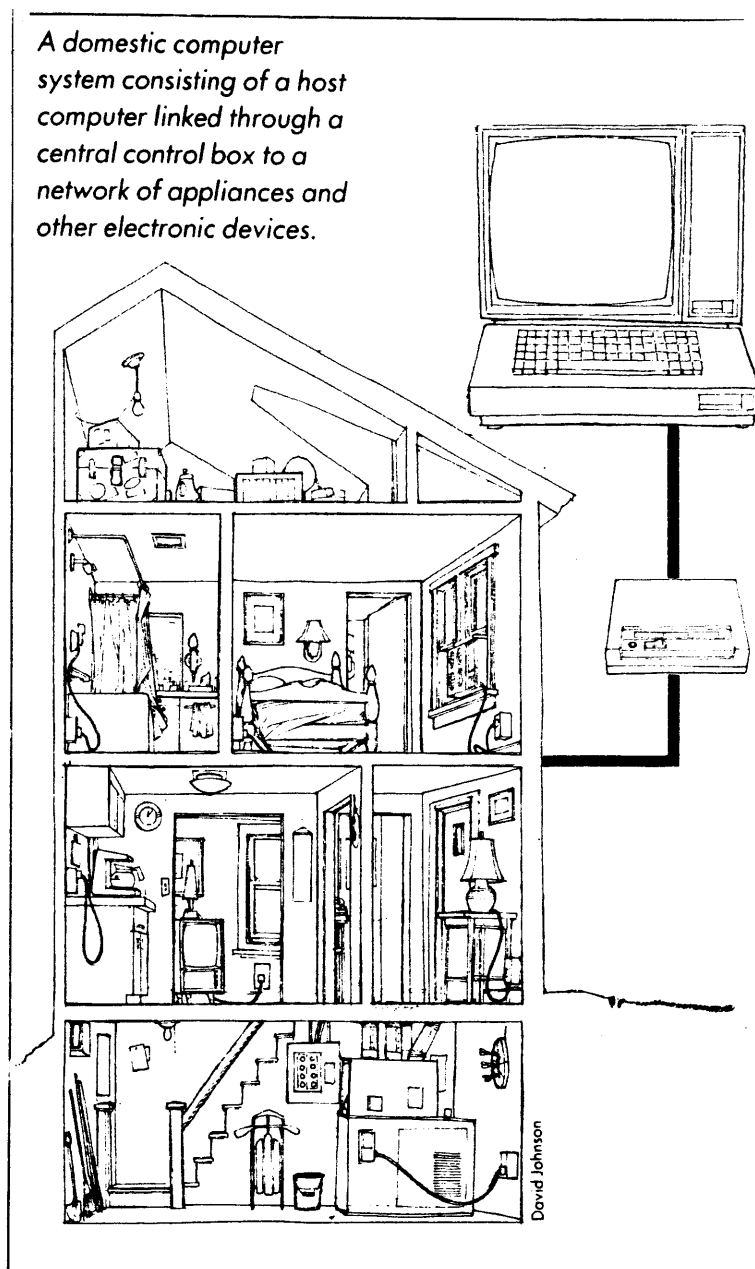
figure 6

On a more practical level, the computer can be con-
nected to household appliances, take care of the automatic
vaccuum cleaner, start ovens and washing machines. It
can be a guardian and control the home security system
or it can be helpful to control energy consumption.
It can store an appointment calendar, the family's
schedule, or a telephone directory. It can help the house-
wife with a list of cooking recipes, or wine selections,
keep a grocery list and nutritional program. People
use different combinations of the potential functions of
the computer. Some seem to want to find a computer
primarily to keep up to date; they want to be part of
the information era.

A Psychological Perspective: Sherry Turkle

Sherry Turkle has studied the subjective relation
between the person and the machine. Two of her ideas
are especially helpful in understanding the processes that
take place when a household gets a computer. She argues
that home computers have powerful subjective attractions
aw well as the intellectual appeal; "Frustrations and
aspirations are projected to the machine; and it bears
a political-ideological and personal connotation." These
feelings have nothing to do with the machine perse.
Rather, through working with the computer people create
a "model or metaphor" of the way they see the world. They

can establish a relation that has an emotional support, reassuring the ego and producing a sense of power.

This theory offers a means of interpreting the cases in this study. The concept of Pandora's Box is also helpful here. Turkle argues that people who can understand the way the computer works feel that they can overcome threat of the box of evils. This not only puts them in control, but also in an elite group.

In this thesis issues of control among family members was important. One question became whether the computer became an instrument of control in itself. Turkle's ideas are related to the cases in the way that if the computer is a threat to some of the members and a means of control for others it can raise tensions and issues of domination within the family. This subjective connotation may also be involved in problems of location. The way one member relates to the computer can also influence the other's subjective perception of the machine.

Physical Considerations:

The necessary physical considerations when installing a computer may be divided into three categories. Technically: the computer needs to be plugged to an electrical outlet. All the peripherals and hardware need to be connected to each other. This sometimes causes a sort of spider web of electric cords, they have to be arranged in

a way to keep them from underfoot. Computers working as
terminals usually use a telephone to "be in line" with the
central. Depending on the amount of work done through the
modem, it is advisable to have a second telephone line.

Technically: Lighting has to be oriented in such a
way that it doesn't interfere with the screen. If there is
a window it should either be on the sides with curtains
drawn to block the light. A window at the back does not
cause so much glare. Excessive heat and cold should be
avoided so the computer should be dept away from radiators,
hot air ducts, and direct sunlight. Dust and dirt should
be controlled. Humidity should be kept as low as possible
to compensate for static electricity. The noise of the fans
for ventilation and the noise from the keyboard and the
printer is disturbing to many people. Bells to cover the
printer, as well as silent printers are available.

The computer needs a firm base or enclosure to protect
it and keep it steady. A tremendous need arises for storing
the manuals, diskettes, and the printer's papers.

Free movement between the computer, the keyboard, the
writing space, the telephone, and the storage space is very
important. This can be easily achieved with chairs with
rollers and smooth shallow carpeting.

IBM office furniture designers figured out that one
hundred square feet are needed for one person using a
desktop computer. Computers have a defined shape, but
humans are variable. The furniture has to adapt to the

user whether adult or child. The furniture has to be com-
fortable and allow muscular movements because a person can
stay in one position for periods of forty-five to sixty
minutes. A chair has to have a seating height of seventeen
inches to twenty-one inches, the keyboard ought to be on a
surface twenty-six and a half inches tall and the writing
desk at twenty-nine and a half inches. These heights allow
an eye-to-screen relation of thirty degrees and a hand-to-
keyboard for greatest comfort.

Ergonometrics is the study of human energy used to
accomplish tasks. In Spaces for People, Bennett defines
ergonomics as "the human factors of design." Ergonometrical
studies have been used to design furniture for office
desktop computers. While the same ergonometrical princ-
iples apply to furniture for the home computer, designers
have not considered the difference in styles in the home.
Most people don't want their home to look like a business
office.

Future Tendencies:

There are two main lines of thought about the future
of personal computers and home high technology as a whole.
One is about the computer itself. Some people foresee the
computer becoming smaller and cheaper thus increasing its
portability and manageability. They will be the size of a
tape recorder or even a pocket calculator. The market has
already shown that technologically this is possible.

Portability may solve some conflicts, but
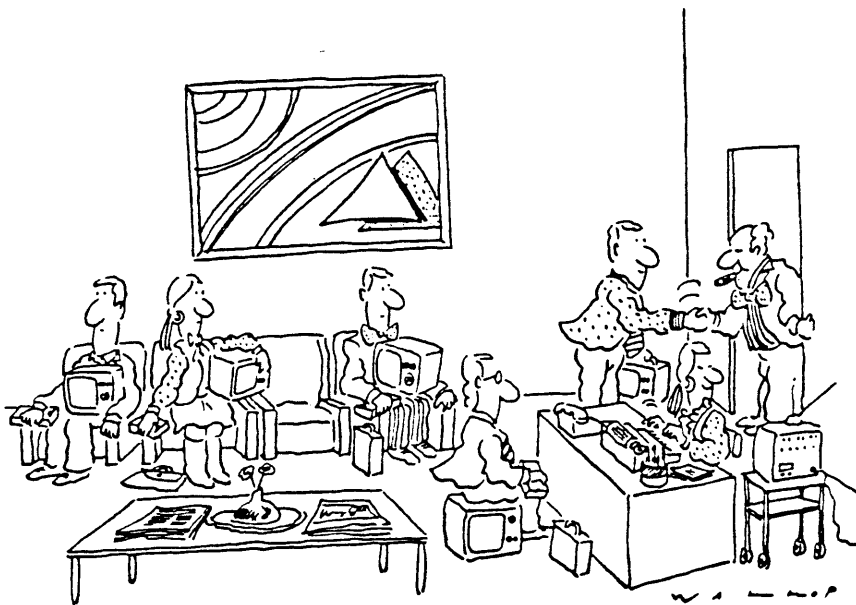
figure 7

it may create new ones,or emphasize existing ones.

How many activities will overlap in the future?

Seiko produces the typecorder that is small enough to carry in a brief case and big enough for a full sized keyboard. Ixo telecomputing service is a pocket terminal that has even a modem and an autodialer.

The other prediction is that all homes will start incorporating a media room. The September 1981 issue of the New York Times Magazine was dedicated to electronical intervention in private homes. The media room was one of the most important concepts.

One of the most advanced media rooms in the world is in The Architectural Machine at MIT. This media room is a room that was created in order to develop the best possible interface between human beings and computers.

Other media rooms are less sophisticated. The examples given by the Times Magazine showed people who had either decided to incorporate the computer into open spaces in the public areas of the house or privatize it as much as possible having equipment in bedrooms or even bathrooms. Although these examples may not be representative of a general social phenomenon, they clearly show a tendency or direction .

The media room is obviously a newcomer to the home that may change interior design and architecture. The electronic equipment demands consideration of a new set of issues in design. Today there is no easy solution for the person who takes the computer home without considering

physical and social issues. The only answer provided
today is in the sophisticated media rooms which are
adapted to the equipment and they are very expensive.

chapter 2
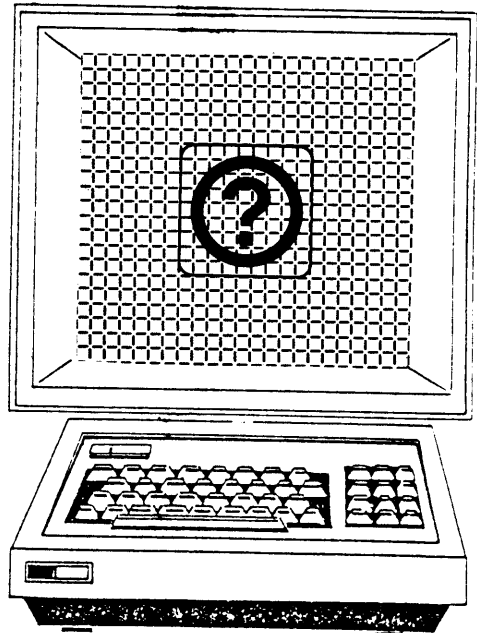
To examine what happened in homes after the intro-
duction of computers I used a descriptive strategy and
observed real settings. Lacking precedents in an area
where little research has been done, this research was
exploratory using the case study method.

The literature raised some questions which were
considered as points of departure. A series of questions
was developed and interviews conducted in the houses. Non-
verbal, as well as verbal, information was gathered by
the interviewer.

The questions were developed to gather data about the
family members as individuals and as a group. I was
interested in the psycho-social reactions to the com-
puter as they related to the home environment. I directed
some questions to the social relationships in the home and
relationships between the social and psychological environ-
ment. I was interested in how the computer affected
family lifestyle. Were there changes in family organi-
zation? Did the computer raise issues of control or did
it emphasize existing ones? How were the issues of public
and private space dealt with? What are perceptions of the
computer? Is it a working tool, an educational device, an
entertainment, or a secretary? Is it fascinating and a

machine to facilitate daily life or is it scary and a means of control? Were there uses that conflicted?

I was also interested in practical decisions that had to be made about physically adapting the house to the computer in terms of new uses of space and problems with design. For example, were new uses conflicting with previous uses of the space? Why did they conflict? How was the decision of where to place the computer made? How was the computer perceived aesthetically? Had they thought of where to install the computer before buying it? What physical requirements were necessary to consider when installing the machine? How accurately had they calculated the space needed? What environmental considerations were called for such as noise, heat, and light? Did they want to change the location of the computer? Was the original space sufficient to house the computer, the software, and the uses? Did they have problems with the furniture they had? How did they adapt it from adult use to children's use?

To address my more theoretical concerns about the concepts of the electronic cottage and other speculative theories I asked questions such as, will you computerize your home? Would you want to become a teleworker and work at home? Do you commute less since you have the computer?

I tried to consider how perceptions of the house may change as different perceptions of the computer develop. This led to one of the main insights of the research--that

the complexity of the subject does not allow phenomenon
and context to be separated. It is their juxtaposition
that is interesting, the dialectical relation between
psychological and social family factors and the use of
the spaces of the home.

The complexity arose from several factors: Difficulties
in defining terms. Computer can be defined as a piece of
machinery, as an information tool, as a work instrument,
as an educational game, as a hobby, and as entertainment.
These definitions raise the question of whether the com-
puter should be defined as a machine, an activity, or a
communications process. I decided not to define it but to
allow the people in each case to define it for themselves.

The Interviews:

The interview was open but directed, I kept it open
to allow the subjects to express themselves freely. The
interview was informal, the interviewer intervened only
to clarify and redirect the conversation. A few questions
were asked directly regarding ages, occupations, hobbies,
and how interest in the computer had begun. These ques-
tions had another function apart from a guide, they would
help deduce later points that were not directly addressed.

Observations of the house provided another important
source of data. I considered the use of space, decoration,
placement of furniture as non-verbal expression, and as

indications of behavior in the house. For example, I considered whether the furniture encouraged public or private interaction, are they close or distant?

Other non-verbal information was noted such as silences during the interview. I noted which topics were freely discussed and which ones avoided and what issues were brought up without being asked.

The interviews were recorded and kept in a log, the houses were photographed and sketched.

Analysis of the Cases:

Since the research was undertaken to find out if psycho-social and spatial impacts hav resulted from the introduction of the computer into the home, the main categories of analysis are psychological and social on one hand, and architectural on the other.

The psycho-social category analyzes the inter-familial and gender relations, issues of control and authority, social conflicts and social solutions to their problems. The more psychological aspect of this analysis touches topics such as adaptation, aesthetics, and fear.

The architectural category considers issues that are more directly linked to space and spatial organization. Problems of location, private-public issues because of present design, and environmental quality. It analyzes

the house space and the computer space itself. Although
the two categories have been separated for the analysis
one must remember that they are related and constitute
a single structure: the home.

chapter 3
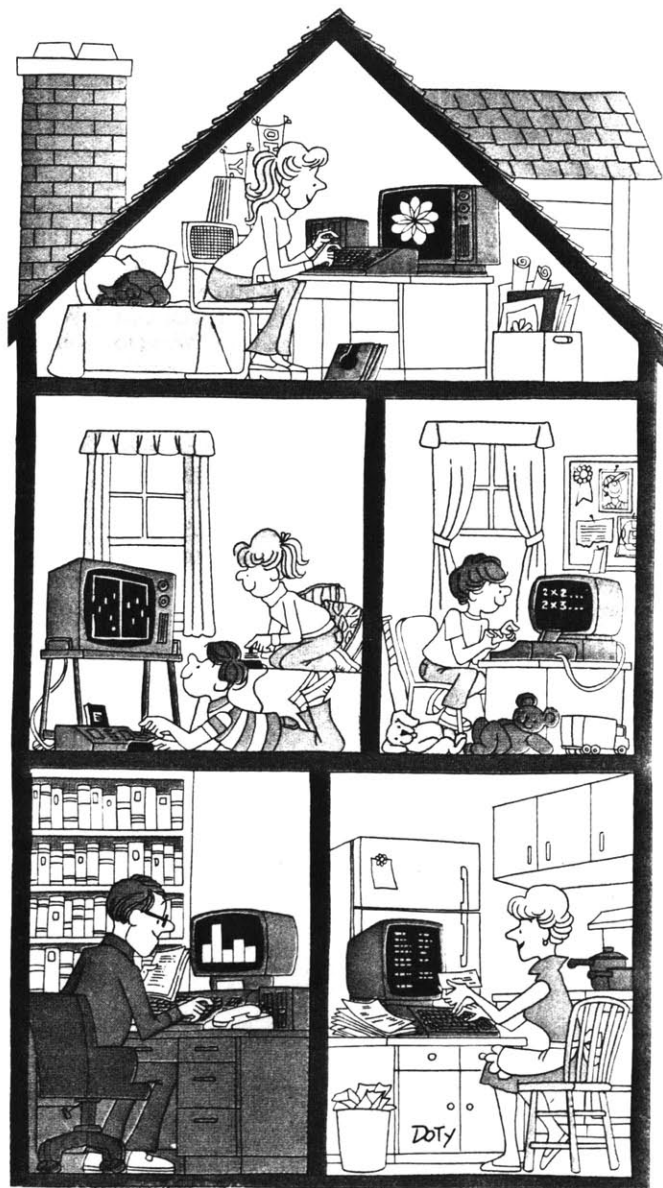
figure 8   *Out of sacristies, into homes: 'Curling up with a computer'*
Drawing by Roy Doty

This study examines five cases from the Boston area: two nuclear families and three young couples. They were chosen by means of an examplerary sample, so they had to meet only one condition--owning a home computer. It was important to choose poeple who had chosen for themselves to put a computer in their home. This insured that at least one member of the family would be positive about the computer. Thus, if a bias existed, it would be a positive one. It was important that there not be an obvious conflict over the computer. If people with a favorable attitude toward the computer had problems with the computer in their home the problems would not be the result of prejudice against them. Though unintentional, all of the families owned an Apple II computer.

The cases that follow will include a description of the household, reasons for owning a computer, a description of the computer and its uses in each household, the physical description of the house and the particular space which held the computer, and finally, the ways in which the computer has effected daily life in the households.

CASE I

Michael and Anne live with their two children, Alex and Anne, in Cambridge. Michael 39, is a physician and works in a school of public health, Anne, 31, is a graduate student, Alex is seven and Anne is two.

Michael's work in a Medical research laboratory requires him to work with computers. Though he says "he is not a computer man," he has always been interested in them. When he could afford one, he decided to buy one for his home, a decision that conflicted with Anne's plans to renovate the kitchen. They bought an Apple II one year ago which they have connected to an eleven inch television.

Michael felt strongly about the computer, he wanted it for his work, for fun, and for Alex. Michael uses it for filing student grades and for other work related to his courses. He draws graphics and has developed a program to facilitate his school work. Though he uses the computer for work, he thinks of it mainly as a hobby.

Michael wanted to give Alex the opportunity to learn about the computer. He wanted Alex to become acquainted with computer while he is still young.

The computer has games that can be played by all the members of the family but "the computer is mainly a single person activity." Alex is mastering certain games and is learning to program. Anne prefers to see him play with the computer "which is more active and interactive" the the television. "He has a great time playing Cops and Robots, Savotage, and adventure games."

Michael, Anne, and the children live in a two story, 1200 square foot house on a quiet street. The environment is relaxed and comfortable and gives one the feeling of a cozy home. The house is not large but its high ceiling

CASE ONE _ PLAN OF THE HOUSE

LIVING ROOM

BEDROOM

BATH

BEDROOM   BEDROOM

LIVING ROOM

LIBRARY
STUDY

KITCHEN   ENTRY   STUDY
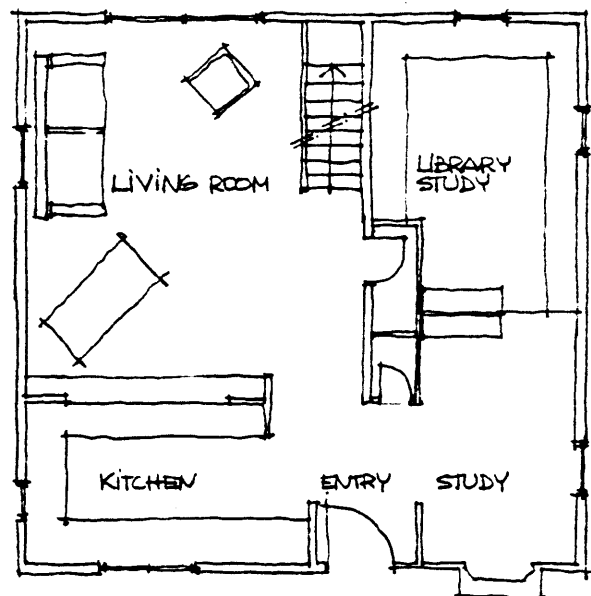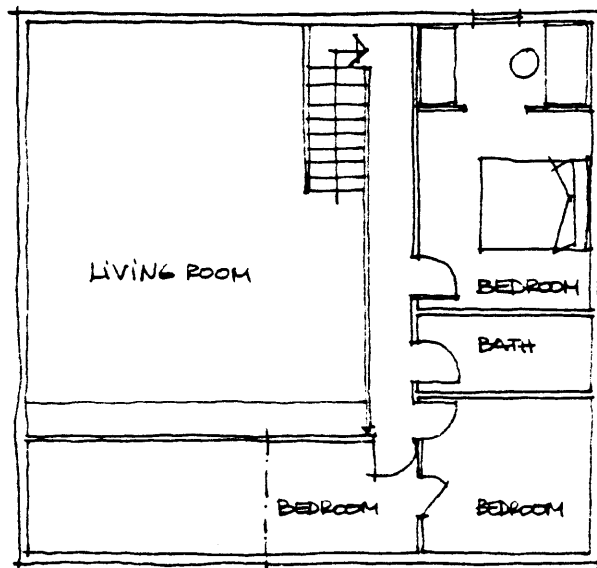
DIMENSIONS
9.50 x 9.50 m _
130,25 m²
1370 ft².
STUDY _ COMPUTER
3 m x 1,50 m
46 ft².

figure 9

and mezzanine which cantalevers onto the living room give
it the feeling of spaciousness.

The first floor is divided into three spaces: living
and dining, kitchen, and library and work space. The
living and dining areas are defined by furniture and rugs.
The openness and light furniture in this area add to the
feeling of spaciousness in the house.

Privacy on the first floor is obtained in the library
area. This room contains Anne's work space, book filled
walls, a comfortable sofa, and the television. Alex
watches television in the early evenings while Anne moves
freely around the house on her tricycle peeping into the
activities in the house.

The kitchen is an important part of the house, it is
wide enough to allow several activities to take place
simultaneously. Anne might be preparing dinner while
Michael open the mail, Anne sits in her little stool next

figure 10

Anne's working space

figure II

dinning-room--kitchen

figure I2

to the refrigerator, and Alex, who is very hungry, heats up a bagel in the microwave oven. There are drawings in beautiful colors done by the children hanging on the wooden walls. Pots and pans rest on the counters in a way that suggests a lived-in space, not disorder. The kitchen is open on one side and has a counter on the other side which separates it from the living room. This allows Anne to participate in family activities while she is preparing meals.

The staircase that leads to the upper floor is in a light colored wood. Anne decided that the space under the stairs was a good place to put the stereo because any kind of electronic equipment is ugly to her and should be as hidden as possible. At the head of the stairs is a corridor that connects the bedrooms. This is a good place to sit or lean and observe the activities on the first floor. It allows easier communication between the first and second floors.

The children have separate rooms. Anne has a small one and Alex a larger one that he is supposed to take care of. The master bedroom is larger and has a small room attached, this small room has become the computer room.

The bedroom walls are brick. The room has windows on three sides, one side being open to the corridor. Sliding doors separate the smaller room from the bedroom.

CASE ONE - PLAN OF THE STUDY

1 MONITOR
2 KEYBOARD
3 DISK DRIVER
4 BOOK CASE
5 SLIDING GLASS DOORS

STUDY DIMENSIONS
3m x 1,50m
4,50 m²
46 ft²
ACCES TO THE STUDY
THROUGH THE BEDROOM.
BEDROOM DIMENSIONS
10,9 m²
114 ft²
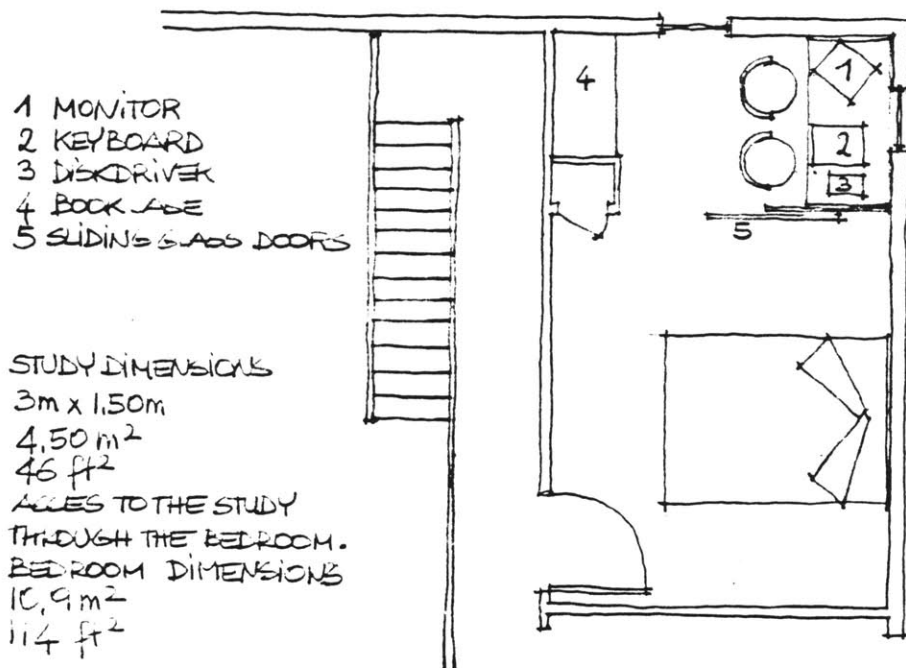
figure I3

figure I4

The computer is on Michael's table, which used to be his desk, in the small room. Bookshelves line the walls and hold the computer literature and references as well as his other papers and books. The study ends up being crowded and messy. This room was originally Michael's study, but since the computer arrived it has become an entertainment area for him and Alex. The room is so small that two adults cannot use the computer at the same time. But the size doesn't bother Alex and his friends who can play there for hours. The children are not bothered by the small space, or by the fact that Michael's chair is too low, requiring them to kneel in it or stand.

Michael and Anne considered several things before deciding on a place for the computer. First, they wanted an isolated place to remove the mess from the public areas and to protect the computer little Anne. Second, they wanted a spot with some connection to the rest of the house because they like to keep the family together.

Anne's basic distaste for the appearance of electronic equipment magnified the problem. The television and stereo were already essentially hidden but the activities around the computer made it resistant to being tucked away.

Before the final decision was made they experimented with several places. Anne's writing table was the first. This did not work because Anne disliked the mess created by all the papers. The next place was in the living area,

which proved to be even worse. Anne felt that she would
"rather have it packed away. . . In the living room the com-
puter interfered with social activities. It is not some-
thing to have where you are entertaining people."

Finally, Anne and Michael agreed that the small room
off their bedroom was best suited because, even if indirectly,
it related to the rest of the house through the window that
overlooks the first floor and is isolated enough from the
public areas. But even this room is not perfect.

Problems arise because of the room's location in
relation to the rest of the house and because of its
relationship to the bedroom. Alex, who uses the computer
regularly,is in the bedroom for long periods. Because he
is still young, his schedule can be determined by Anne.
But in a few years this social scheduling solution will
probably create tension since Alex will probably feel it is
a limitation.

Worse than Alex's use of the room are the occassions
when Michael shows the computer to his friends. Anne feels
that she has to run upstairs to be sure the room is in
order.

While Michael works late in the evening Anne often
works downstairs. But if she watches television in the
bedroom the noise disturbs Michael. Anne can lower the
volume or Michael can close the door. In the Winter closing
the door is not a feasible solution because there is no
heat in the room. There are curtains which can also be

drawn for noise and light isolation. Anne is not disturbed
by the noise of the keyboard. The simultaneous use of the
television and the computer does not bother them, they both
feel that they can tune out sound from the other instrument.

Some changes have occurred with the introduction of the
computer into the family. Michael finds new interest in
high tech and is waiting for cable TV to arrive in the city.
Alex now has more friends to play with. A major change is
that Michael will probably do more work at home. He feels
that he could have more privacy at home and thus be more
efficient, "I could write my papers and not be disturbed
as I am in the office with telephone calls and people coming
in." He doesn't think that doing more work at home will
change his work since "academia blends into one's life
so much anyway." In fact, he already does much work at
home. The hospital is planning to install personal com-
puters which will give Michael even greater freedom to work
at home. He will be able to connect his computer at home
with his computer at work and have access to information in
both places.

Michael has found that the computer gives him privacy.
The effect has been the opposit for Alex--it has become a
socializing tool. He has more friends who play at his house
with the computer.

Anne feels very strongly about computerizing the house
in terms of heating controls and power regulation. "Who
says I want to have the same water temperature in my shower

every day!" When it comes to housewife activities "I like to cook, just like the Italians, taking care of what I choose for the menu." Michael would "have fun" having the computer connected to the house controls but would not do banking with the computer. He believes that it is not in the customer's interest.

Analysis of Case I

Psycho-social:

The whole family went through a period of adaptation after the computer was brought home. The computer served to restructure the environment in that it changed functions of rooms in t he house. Adaptation was achieved by learning which functions a given room should serve.

The experimenting with placement of the computer illustrates the initial difficulty in adapting to it. The family associates the computer primarily with work and learning; the study upstairs fit with that image.

Anne showed some fears about the computer, she seemed concerned over being unnecessary as seen in the reaction against computerizing the environment. Her home is the place where she takes care of her family, just like a "Latin mother." She does not want a machine to do her job.

Other fears are related to technology in a broader sense, limiting her freedom to choose. "Who says I want the same water temperature in my shower everyday?" This Huxley paragraph in Brave New World footnotes these fears:

> Lenine got out of the bath, towelled herself,
> took hold of a long flexible tube plugged into the
> wall, presented the nozzle to her breast as
> though she meant to commit suicide, pressed down
> the trigger and a blast of warmed air dusted her
> with the finest talcum powder.[12]

Anne has made many concessions. The first was the use of savings to buy the computer instead of renovating the kitchen. The second, was tolerating the "mess" of the computer so close to the bedroom. Third, her privacy is invaded when Michael takes friends to see the computer. She does not mind Alex playing with a friend.

In Michael and Anne's relationship Michael has more control and authority. Nonetheless, Anne finally agreed that the study next to their bedroom was the best place to put the computer. On the other hand, Michael agreed not to control the environment by computer because it annoys her, although it would be fun for him.

The social analysis has two considerations, the influence of the computer on the family structure and the translation of this influence into spatial terms. We must first look at the reason that the computer was purchased.

In one way the computer was intended primarily to offer an "intelligent environment" to Alex. This , on the one hand, shows the parents' concern for their son's intellectual development. On the other hand, it is an index of discrimination against their daughter. The computer is for the son rather than the daughter. This is interesting considering the concerns Michael and Anne have for family participation.

The computer is perceived as something antisocial, "mainly one person activities." This quote summarizes another aspect of the family relation with the computer. It is something to do alone even though it was good to have it in the study for the visual contact with the rest of the house. The size do the computer room emphasized this solitary nature of the computer. Being such a small and crowded room it becomes very sociofugal space. The lack of space is a physical limitation. The activity around the computer appears as sociorepellant, it drives people away. "It is not something you want to have where you entertain people."

Architectural:

Bedroom activities overlap with work and play since the computer room is really an extension of the bedroom. If Alex is playing with a friend Anne will leave them alone.

The dominion of the space around the computer is mostly determined physically by the boundaries of the room itself. Yet it spreads into the bedroom because it needs the shades pulled taking natural light from the bedroom. Also, the person watching television in the bedroom must keep the volume low. It is always the activity in the computer room that controls what is done in the bedroom.

Michael thinks of working more and more at home. Until now they have been able to solve many problems of over-lapping activities by adjusting schedules. If he increases

the amount of time at home, the scheduling will become more difficult. It will also become more difficult to match Michael's and Alex's schedules. While he is young Alex's time is easy to control, but this will change in the future. The authority nonetheless remains with Michael who is the principal user now.

The spatial organization of the house was altered to accomodate the computer. The study was changed from a working space to a combined work and entertainment space. The most important alteration was that the bedroom has become a path to the computer room creating interference in the transition from public to private.

The major problem with the computer room is its size-- 8' by 5'. The space is crowded with the many reference materials needed for the computer. When Alex plays he has to be careful not to disorder his father's papers and he is constrained in the amount of space.

Problems of locating the computer were mainly social. Anne and Michael did not want the computer in a public space because of its appearance. But if they had the necessary space these problems would have been minimized. The problems were due primarily to underestimation of space.

CASE II

Alex and Mary are experiencing two new situations: their
marraige and the introduction of a home computer. Alex is
thirty-one years old and Mary is thirty-two. They are both
from Latin America and studying in the United States. Mary
is an economist, she worked in the public sector in her
country. Alex is also an economist and is taking care of
his import-export business from his house using a Telex
and the computer.

Alex has been interested in computers for the last six
years, he is oriented towards telecommunications and recalls
being considered insane when he used to talk about it in
his office in his country. He had planned to get a com-
puter prior to his arrival in the United States and use it
mainly as a databank. When he was a journalist he had
trouble with the retrieval of information. Now even though
he keeps files, he stores almost all of his information in
the computer. He is presently doing a great deal of
accounting and finance. If he uses it as a terminal, he
does research from data banks for his courses. He believes
that the main reason prompting him to buy the computer was
that "today understanding about computers is as necessary
as knowing how to type." He does not see the computer as
a hobby, his hobby is photography.

Mary is not enthusiastic about the computer. On the
contrary, she dislikes computers "almost by concept." She
prefers plants and animals and dancing as hobbies. "I'm

more into manual things." She does not use the computer, she finds that it is not helpful for her because she does not know how to use the word processor and wastes more time than typing normally.

They have an Apple II, tow drives, one monitor with a nineteen inch screen, a spin printer, and a Telex connected to the computer. The software Alex uses is Visicalc, Visitrend, Visiplot, and Easy writer, and Microtelegram, all business and managerial.

Their apartment in Cambridge is spacious (1110 square feet). The have divided the living room into a dining and living area that they use mainly for reading, watching television, listening to music, and entertaining visitors. The separation between the two areas is supported by a low table on which rests a stereo and bottles so that it works as a bar.

The colors in this room are earth colors, browns, beiges, and creams. They have numerous plants that create a warm ambiance. Even though the space could feel un-comfortably void with the little bit of furniture, the pieces they have are large. A sofa breaks one of the angles and thus the square shape. The walls have color and tex-ture added to them with lithographs and cloth.

The bedroom is the smallest of the rooms; they chose to use the larger room for the computer. The bedroom is also decorated with vivid colors giving the room a cozy atmosphere.

CASE TWO - PLAN of the APARTMENT
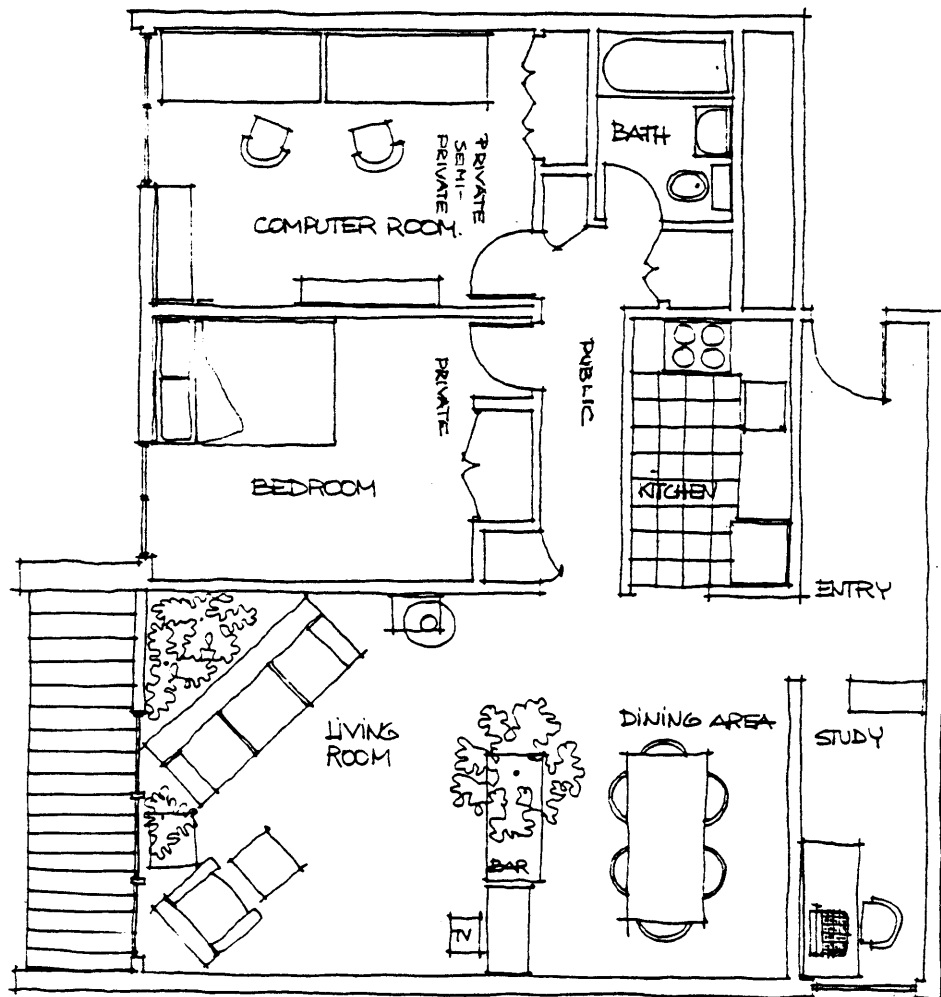
HOME DIMENSIONS
11,50 m x 9,50 m
109,25 m²
1110 ft²

COMPUTER ROOM
5 x 3,25 m
16,25 m²
171,6 ft²

STUDY
3,50 x 1,50 m
5,25 m²
54 ft²

figure 15

figure 16

In the living-room plants all over

figure 17

In the living room and the bedroom one can see newspapers on the floor and books and magazines on the table so that it looks like a dynamic living house.

There are two different working spaces in the apartment. Mary's is a small space near the entrance packed with books and stationary which gets cluttered from time to time. There are two bookcases overloaded with file cases, books and papers. The computer was originally placed in this space. But Alex needed more space around him. They had underestimated the space he would need to work. He found that the space was insufficient for him to spread the printer's copies, it was too narrow and small. He found that with the computer he uses more space than working in the library or just writing before he had the computer.

Besides the insufficient space Mary did not like the clutter from the computer in such a public space. The computer and the papers from the printer seemed worse to her than her own papers. Another problem with that space was that the noise of the printer would disturb conversations in the living room. Activity in the living room also disturbed Alex who needs a quiet place for work. Alex argued that "the computer is not like a typewriter that you can carry with you." So they had to change to another room.

When they decided to take the computer out of Mary's present space they also moved the master bedroom to the smallest room. At the beginning Alex occupied half of the
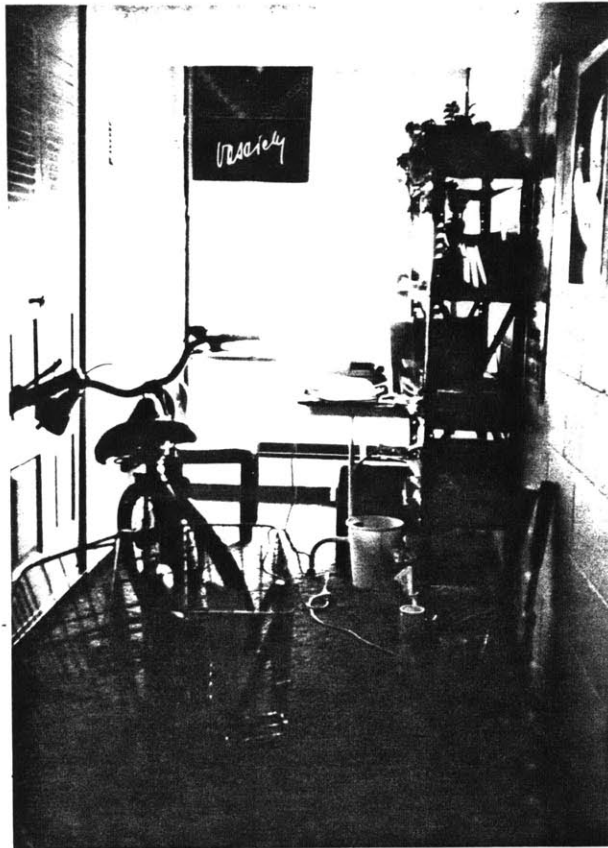
Mary's working space

figure 18

Alex's working desk

figure 19

CASE TWO - PLAN OF THE STUDY
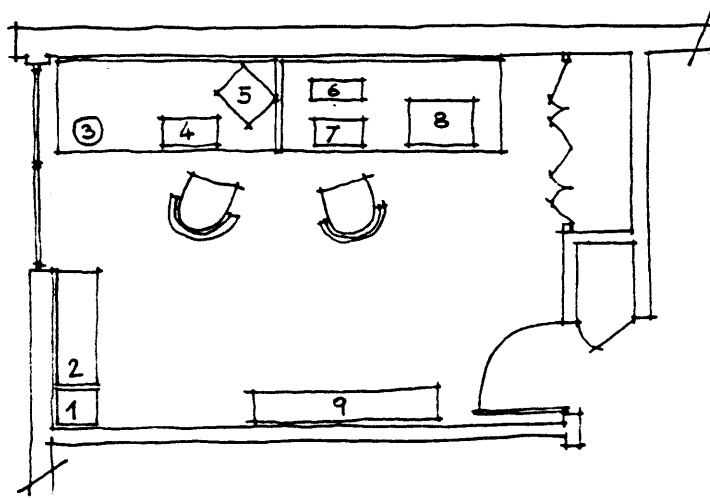
1 TELEX PLUG

2 COMPUTER REFERENCE

3 TELEPHONE

4 MODEM

5 MONITOR
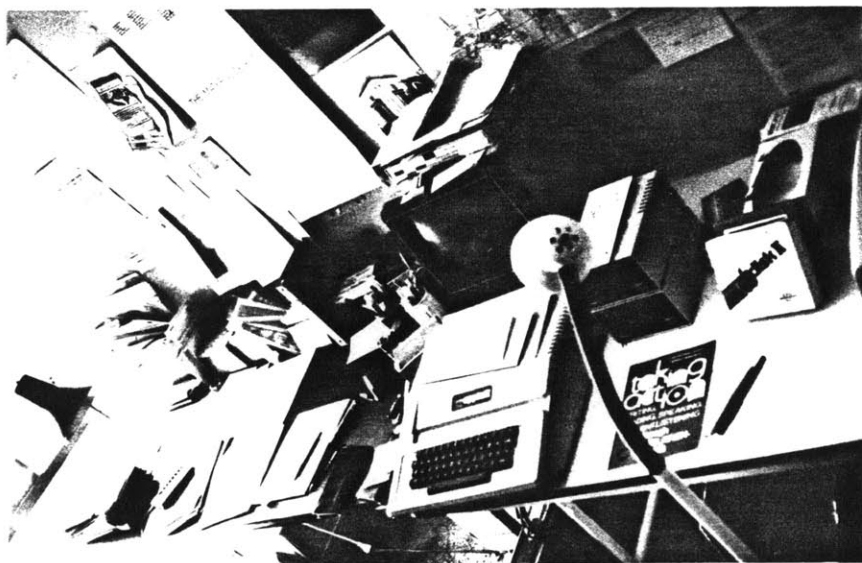
6 DISK DRIVER

7 KEYBOARD

8 PRINTER

9 BOOKCASE.

DIMENSIONS

5m x 3,25m

16,25 m^2

171,6 $\frac{m^2}{i}$

figure 20

room and there was room to have a bed so that the room could be a guest room if friends from their country visited. Then he spread up to the point where the bed had to go.

The computer is different from the rest of the apartment, it seems as if it were a different world. The furniture is white metal, unlike the wood in the rest of the house. There is only one plant which also reflects a different attitude about this room. The computer rests on part of one table and spreads to the other where the enormous printer occupies a third of it. Each table is six feet long, they together against the wall. On the wall there are a couple of posters, sheets of paper with codes for the Telex numbers or codes. Alex has papers from the printer surrounding the tables and the floor, others are stuck to the opposite wall. It is a whole environment that allows no other activity but work. It isn't really a paperless office as advertised.

Mary foresees their house in their country with a study where Alex will have his equipment. It will be a large room and probably decorated differently than the rest of the house. It should look modern with bright colors, straight and functional lines. She points out the white metal bookcases they now have in the computer room. Alex also thinks of a separate room but with wood furniture. He thinks of shelves that can be easily adjusted. He says that computer equipment will change so much that in a few years what he has now will look like his grandmother's radio. When

computers are designed more carefully they may even be more decorative. Mary agrees that in the future computers may be designed in bright colors as if the idea of color added to its attractiveness. "Then I would not mind putting it in an outstanding place in the room."

Since they have had the computer Alex feels that he has become both more gregarious and more isolated. He works at home on the computer six hours a day. Before, he would spend time at school which was not only studying but sociolizing. During his breaks in the library he would have coffee with someone, and at lunch time he joined other and went to restaurants near the university. Now he only goes to school for his lectures and special events. He is able to spend two days without going out of the apartment.

At home, Alex can spend more time close to Mary. He has met people through his visits to computer stores where he discusses computers with others interested in them. He describes it as like "belonging to a fan club."

His interests have grown. He widened his interest in Teleinformatics. He is fascinated with the speed of communications and explains that the computer has changed his life not in the sense of having a new hobby but it is a "very complete thing." "It is like being on the moon, but connected everywhere."

Mary prefers to go out more often than Alex. Conflicts arise when whe wants to go to a movie but Alex wants to stay

on the computer. These conflicts are partly due to her

reaction against the computer as an intruder between them.

When I asked if they would have the computer connected

to household controls Mary reacted very violently. "My

hair stands on end just to think about it," she said. "I

like to do my own laundry, decide how much I want to clean."

This reaction seems to be derived from a 1984 point of view.

On the other hand, Alex looked excited about the idea, but

he respects Mary's feelings.

Mary has contradictory feelings about the computer

and she, for instance, would recommend it to certain

people. "I would suggest it to people like writers, not

to people who are obsessed with technology, I'm afraid of

alienation."

Alex, on the contrary, hopes that more people get in-

volved with the computer, then he could use it much more

for things like electronic mail. Also he says that "the

more you talk to people who have computers the more you

learn." Alex belongs to the Global Village, a group of

intellectuals who are talking about more communications

through computers. He talks about his business trips and

says that in the future whenever he travels overseas (five

or six times a year) he will take diskettes with him

instead of "tons of paper." He is more of "paperless

traveller" than a "paperless office man."

During the interview, Mary had the opportunity to think about issues that she had not considered before. Although she continued to have mixed feelings about computers, she realized that they could be useful to her. She plans to get more involved with the computer when she returns to her country because it will allow her to take care of her work at home. She will have more time for kids and the house-hold . "Actually it could help my private life. I would be able to write my reports and papers with the word processor."

Although Alex is presently teleworking, he does not know for sure if he will be able to continue doing this in his home country. He will probably end up having two terminals.

Analysis of Case II

Psycho-social:

It is particularly interesting in this case to link the concept of adaptation with culture shock. An optimal range of stimulation to reach homeostasis is an important factor in adapting to a new environment. Mary is overloaded from stimuli from the whole environment. She has arrived in the United States from a developing country where technology is not a daily ingredient in one's life. Not only did dish-washers and frozen food confront her but also her husband's computer equipment which is particularly sophisticated and she is reluctant to approach it. She says the whole concept scares her.

If adaptation to a home comes partly from knowing what functions a given room should serve she obviously has problems in adapting to a telecommunications room where all the functioning of the room depends on the computer. This overstimulations acts as a behavioral constraint because she cannot deal with such an enormous amount of new stimuli. The overloaded environment paralyzes her. She does not want to learn how to use the word processor, it is more practical for her to use the "normal" typewriter. The overstimulation is considered in terms of quality and quantity. The quantity issue arises because of the number of pieces of equipment--disckettes, telex, computer, keyboard, modem, and printer, and the many code numbers and programs. Issues of quality arise because of the complexity of putting hardware and software together to work. She is afraid of "the Pandora's Box," to put it in Sherry Turkle's terms. The warnings on the equipment "do not open" and "warranty void if seal is broken by owner " feed this fear. She cannot really touch the machines to get used to them, to accomodate and assimilate their functions so that she can eventually adapt to the machinery and ultimately the room.

Mary's fears are directly linked to technology and mechanization. "My hair stands on end to think about it," she says about computerizing the home. "I want to choose my laundry." It is the fear of losing the freedom to choose. This is confirmed when she says that she would recommend

computers to certain people--writers, people who are

linked with humanism. Her fears relate to a 1984, Orwellian

image of being controlled by a machine. She literally says

that "I'm more into manual things." She is afraid of

alienation, isolation from humanity and nature. She

prefers to have plants and animals as hobbies.

Her attitude is one that the computer is a rival to a

pastoral society which she somehow pictures with her

hobbies. The pastoral cannot exist with the "intelligent

environment." She can only see the computer as a positive

and enriching experience when she realizes that it could help

her if she wants to work at home in the future. When she

perceives the computer as a useful tool she accepts it. A

word processor can help her in her family life. She will be

able to stay at home with her children. It will facilitate

her work and allow her to continue with her mother/wife role.

When they bought the computer Mary had to give up three

things which meant alot to her. The guest room had allowed

her to invite friends and relatives from her country. This

was important to her because she misses her home land. This

sacrifice of humans for machines created an image of a

struggle where one must exclude the other. Thus the machine

appears as a repressive element,limiting her freedom to

choose.

She also ended up having the smallest work space which

is not as comfortable as if she and Alex would be working

together in the same room.

Finally, she sees Alex less, even though he works at home. He needs total privacy to work and since their work spaces are far apart she does not work near him. She does not walk into the computer room comfortably as she does when Alex is reading elsewhere. The computer becomes an an obstacle between Mary and her husband.

Since they have the computer Alex is more reluctant to go out. Outside entertainment is important for Mary. The computer is her rival to socializing.

Alex wants to share the computer with Mary and would like her to ger involved and profit from it. He is sensitive to her feelings and would help her to overcome her fears.

The computer has helped Mary to put the image of mother and working woman together. The computer, in this instance, serves as a synthesizer for Mary as a woman of a particular generation.

Mary gets involved with the computer when she is asked about the decoration of the computer room in their home country. Interestingly, Alex, who has incorporated the computer into his life, imagines an environment in keeping with the rest of the house. Mary still has a vision of the computer as separate from the rest of the house and imagines a technological environment, with metal furniture, where functional considerations dominate. Hers is an image of a futuristic, computerized environment. Colors will be the

element to add an aesthetic touch. They soften the silver, chrome, grey, white, and black.

We need to translate the couple's relations into broader social relations to analyze control issues in the social domain. Since the computer , in this case, is a working tool and not a hobby the control is based upon the fact that is a source of income. It is Alex who earns the money so that imposes a dominant position. Since the power structure is based on economics the work-computer relationship gives the computer a priveleged existence in the house. Translated into spatial terms, Alex and the computer took over the master bedroom. Mary's spaces became the smaller bedroom and a small, crowded work space.

Alex's need for privacy when concentrating was stronger than Mary's. He can close the door and be completely alone or feel like "he is on the moon, yet connected anywhere." Thus, his territory is physically defined by the room while his "personal bubble" spreads around the world in a telex.

The reasons to buy the computerwere based on the feeling of being in the "information era." Alex believed that understanding computers is as necessary as knowing how to type. The computer goes far beyond the analogy of the typewriter; it is a working tool, an educational device, and a communicator. Not only does Alex prepare his research for school with the aid of the computer, but he uses it to participate in the world, to know what's going on.

People come to use the computer and just to see it. This can be considered an invasion of privacy, but Alex will always ask Mary's consent before making appointments that will suit her schedule.

The computer is anti-social because Alex can spend days without leaving the house while he is working or studying. Mary feels more isolated when this happens. She feels she has make an effort to convince him to go out. The isolation is made even worse by the fact that the telephone is tied up while Alex uses the computer.

The computer is socio-appealant because the communication function allows Alex to contact other people with the telex. People come to see the computer and his group of acquaintances has spread through meeting other computer fans. Alex also like the image of the Global Village.

The computer room itself does not appear as a place where activities overlap. Nothing else can be done in it. It constitutes a sociofugal space. The fact that the floor is constantly covered with paper from the printer prevents people from getting in.

Architectural:

The organization of the spaces in the apartment has changed because of the computer. The master bedroom is now the computer room. The guest room was given up to create the computer room.

The public-private transition space was disturbed.
The master bedroom was the most private room since it was
the last one in the corridor and the one farthest from the
public areas of the apartment. These advantages now belong
to the computer room. Now their bedroom is passed by every-
one who goes to the computer room. The privacy of the bed-
room is threatened by all of the traffic.
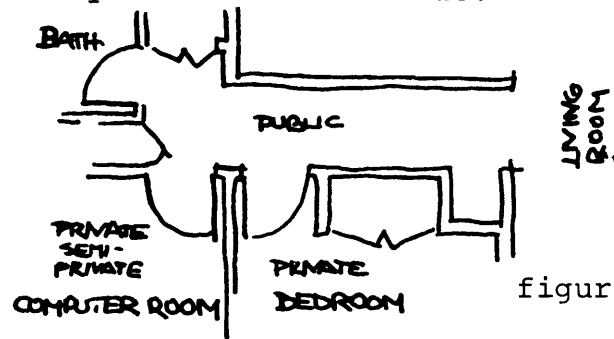
figure 21

The computer is a sociofugal space because of the
amount of paper all over the floor. Nobody will dare
enter and step on them. Alex keeps his door half-closed
so that no one will enter without knocking.

The couple went through different location problems.
The original space for the computer is not Mary's work
space. It is really a wide part of the corridor. She has
had to adapt it to her working habits.

Alex, who needs more space, found this space too small
for the computer and decided to move to the master bedroom.
The volume of the equipment seemed even bigger after it was
spread out over the two tables in the larger room. The
reference materials, manuals and programs also took up more
space than anticipated. Thus they had underestimated the

space required, in terms of vital space, and physically in terms of storing space and volume of hardware.

Another problem of location was the overlapping of activities. Alex could not work close to the door of the apartment because is it next to the internal corridor of the building that is noisy. Neither could he work close to the living room because conversation in he living disturbed his concentration. And the sound of the machine disturbed conversations.

The final and most important point was Alex's need of privacy. It is more important to have a more private environment while working than a less private bedroom. The privacy of the bedroom is maintained at night.

Another issue was aesthetics because they both find the computer relatively unattractive. One problem is the size. In their home country they plan to have a larger computer room where they will try to blend the equipment more with the room. If computers ever satisfy their aesthetic values they would put it in a more prominent position in the study. It is interesting to note that the television and stereo aren't considered as ugly as the computer.

There were other physical considerations. The lighting from the window affected viewing the screen. Alex draws a curtain down to the height of the table. There is some natural light in the room and artificial lighting from a directed spotlight to the keyboard.

Alex bought computer office furniture so that he is comfortable while using the computer. The printer's noise is a problem. They have a bell on it but it is very bulky and not often used.

A technical problem is that their telephone cannot receive calls while he uses the modem. This could have been solved by installing another line.

CASE III

Christian and Laura live in Cambridge; she is twenty-nine years old and works as a librarian, he is thirty-one and is an architect. Christian also works in a shop that sells computer hardware and software. He is very interested in computers and he teaches a course for architects with computers. Whenever he is not working he reads "escapist literature" or plays with the computer.

Their computer is an Apple II, they two monitors, thirteen inches each, a silent printer, two diskdrives, and a word processor. His software is Visicalc, Visiterm, Visitec, Basic, and a managerial programming. He also has graphics.

Christian uses the computer to do price quotations for his customers. He prepares correspondence in the evening and takes it into his office on a diskette and has it typed the next morning. Once a week he teaches a course for architects. Normally he is on the keyboard for two to

CASE THREE . PLAN OF THE APARTMENT

DIMENSIONS
14,30 × 7m
100 m²
1090 ft²

COMPUTER AREA
8m²
85 ft²

BATH

BEDROOM

TV

DESIGN TABLE

ENTRY

COMPUTER AREA
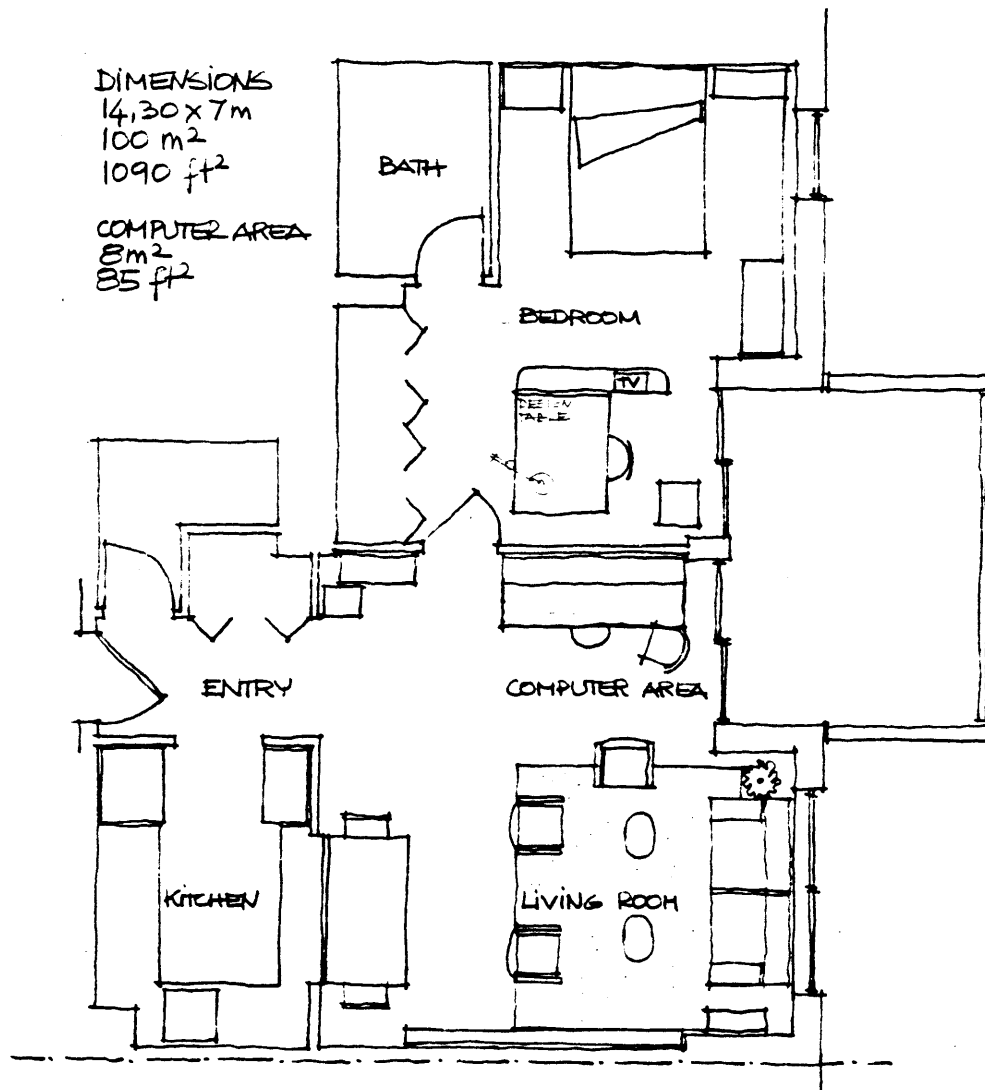
KITCHEN

LIVING ROOM

figure 22

three hours two or three times a week. He works either in the mornings or late afternoons. Laura was very interested in buying the computer but now she does not use it.

Their apartment is on a high floor and offers an incredible view of Boston. The furniture serves to separate the three different areas of the large living space into living, dining, and working. It is crowded but well defined. The room is kept in careful order because it is a small space with much furniture. They have combined the things they both had before they lived together. The furniture is casual and they have some antiques that give softness and warmth to the modern things. The have many plants and warm,light colors.

The kitchen is large and open to the corridor on one side. On the other side, it is separated from the living room by a counter.

The bedroom is a multiple activity space. It is divided into two areas, one holds Christian's drawing table, two taburets, chests for drawings and storage for drawing equipment. Beside the bed is storage space. One of their stereos is there, along with books, flower pots,and small decorative objects. Their portable nineteen inch television is in the bedroom.

In the living room Christian has designed a wall unit in wood where he has put all the electronic equipment together. The computer is on the right side and the stereo on the left. He built it with ergonometrical considerations
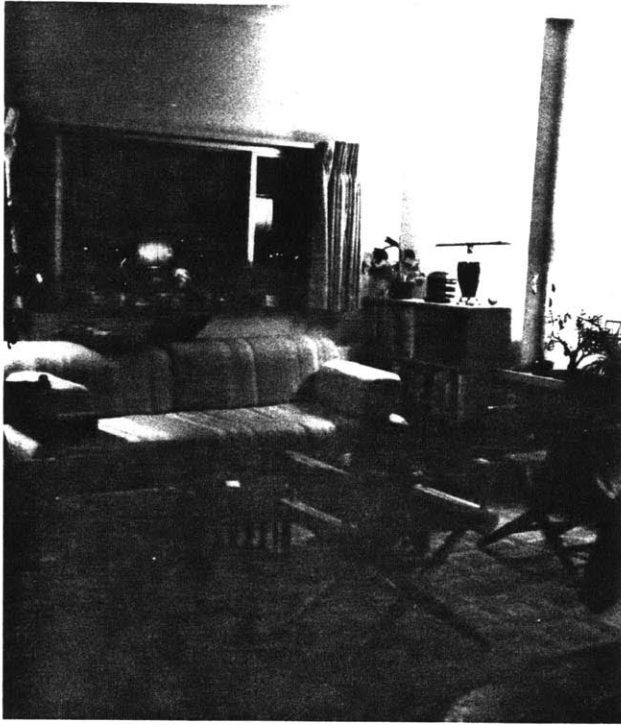
living-room figure 23

computer area figure 24
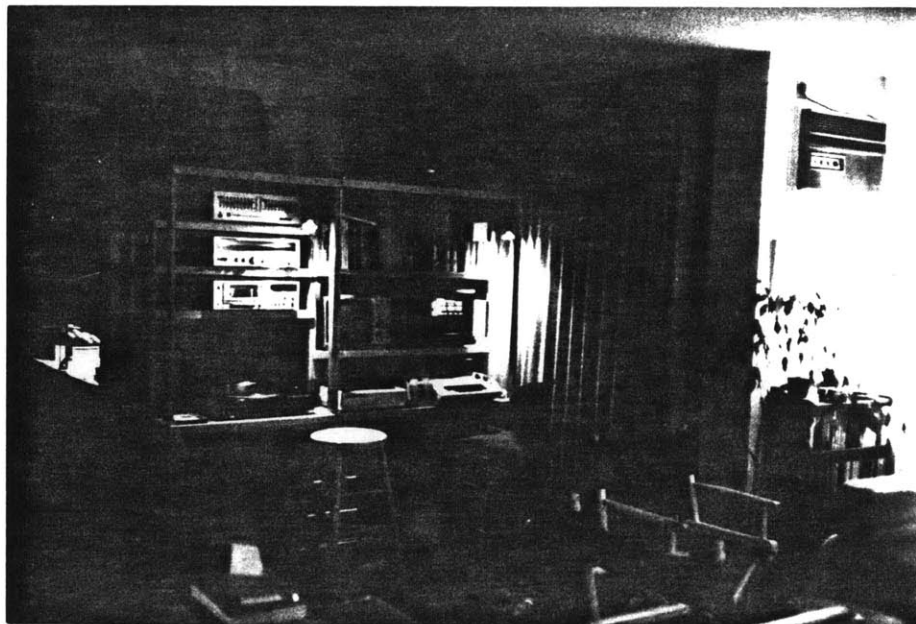
CASE THREE. VIEW OF THE STUDY
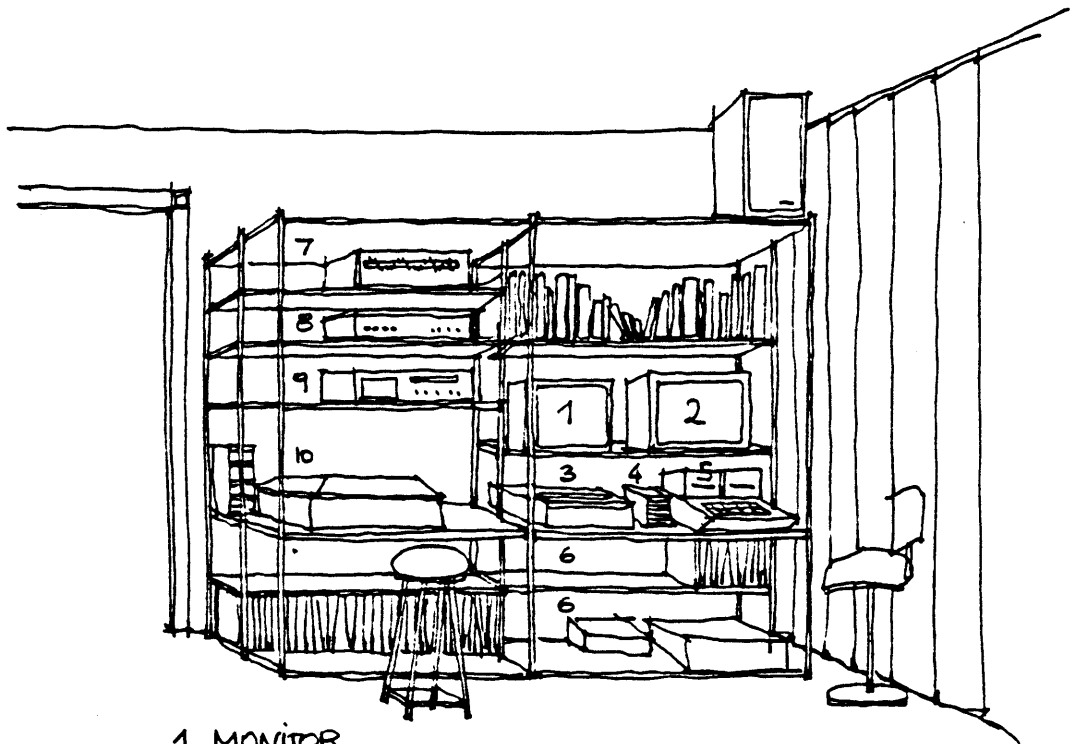
1 MONITOR
2 MONITOR
3 PRINTER
4 REFERENCES
5 DISKDRIVERS
  & KEYBOARD
6 REFERENCES
7 EQUALIZOR
8 AMPLIFI & TUNER
9 CASSETTE DECK
10 TURN TABLE

figure 25

using dimensions of computer furniture. But he miscalculated the space he needed for references. He has to use a stool to store these books and stationary while he uses the computer. The problem is temporary because he built the wall unit so that he can add more shelves. The combination of all the electronics and the wood make the wall appear as a Louise Nevelson sculpture.

Christian has a chair with rollers which allows him to move easily from the keyboard to the stool. The natural lighting from a window on the right. During the morning he draws thick cotton curtains to prevent glare and uses spotlights to read the keyboard and references.

Laura's working space is on the other side of the door. Her shelves are less crowded than Christian's and hold books, flower pots, and pieces of decoration. The spaces are separate enough to allow them to work without bothering each other.

Before building the shelves they went through some trouble finding a place where the computer would work. Christian first put it on his drawing table. This was uncomfortable and he had to remove the equipment every time he needed the board.

Next he built a movable cabinet for the computer. He could move it around the living room but usually rested by the side of the dining table. Christian soon realized that he had underestimated the space he need for the hardware itself and for the storage space. When the

This is the most complete text of the
thesis available. The following page(s)
were not included in the copy of the
thesis deposited in the Institute Archives
by the author:

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computer was kept in the angle between the kitchen wall and the southern wall they felt that all the technology was packed together.

Christian dislikes having to rearrange his house every time he wants to do something different. He decided on the wall unit based upon the need to reunite all of the "dedicated activities." The wall unit works well. "The computer is much more than a typewriter and needs more space aroung it." This space is achieved with the new shelves as a total working space. The computer no long interferes with the dining space.

Whenever Christian works with both the computer and the drawing board he finds it convenient to have them in different spaces and walk between them. This kind of movement is apparent in his walking around the apartment with the long telephone cord while having a conversation and with his chair equipped with rollers.

The simultaneous activities in the living room might be intolerable for some people, but works fine for the two. Christian continues to work while Laura works in the kitchen. When Laura's friends visit Christian will continue to work or roll his chair around to join the conversation

The computer has been integrated into the apartment much like a stereo would be. If Laura is watching television Christian closes the door to use the computer, just as he would if he wanted to listen to the stereo.

They do not have noise problems coming from the computer because they have a silent printer.

Initially there were tensions over different expectations about the computer. This was a subject neither Laura nor Christian wanted to talk about during the interview. Christian said "I know where you are going" and moved on to another subject. At first, Christian was caught up with the computer as a hobby and Laura was essentially excluded. During that time their outside activities declined. Laura was resentful of the computer and said that "he would spend more time on it!" Now Christian goes to Harvard Square every Saturday morning go see what is new in the computer shops and their recreational life continues as before. Christian is definate about not wanting to work at home more than he does now. It is important for him to have interactions with other people with work. He left the architectural firm he worked in because there were only four people.

They do not have the computer connected to household activities. Christian remembered at this point about his old image of the computer as the "central intelligence" and controlling everything. That image has changed and he relates to the computer in a natural way.

Their social circle has spread, they are members of the Boston Computer Society, though they feel that most of the members are too romantically involved with technology.

Analysis of Case III

Psycho-Social:

In this case adaptation was eased by the fact that Christian sells computers. Computers were part of their daily lives. Thus, they did not have obvious problems with the computer itself but they did have problems in adapting their apartment to the computer, as seen in the difficulty in placing the computer. The functions of the dining room was changed if the computer was close to the table, likewise the seating area. Adaptation was achieved when they differentiated an area within the living room to put the equipment. The function of the computer in this case was as a hobby, a work tool and a piece of electronics. They had no trouble introducing these functions into the living room. The appearance as electronics did not conflict with their concept of decoration since they likk the technological design.

Fears about computers were of less importance in this case than in the others. Both of them had dealt with those fears before bringing the computer home. The "old image of the computer being the central intelligence that would control the environment" was a conception of the computer that they had had time to think over and change.

This might mean that the original fear of the machine as control vanished more and more when people establish a relation with the computer. They realize that the machine does nothing by itself, and that it is not a threat to their freedom.

There are some fears and feelings of rivalry in
Laura. The computer was at the beginning something she
jealous of, because she felt Christian's attention was
taken away from her by the computer. Initially Laura
saw the computer as a rival which created some feelings
of jealousy when Christian spent more time with the com-
puter than with her.

Christian works on the computer in the evenings
two or three times a week for two to three hours. In this
way, even if they are in the apartment at the same time
they are not together. In the beginning this created ten-
sion between them; she felt displaced by his new hobby.
Laura was a bit resentful. But since she did discuss this
in the interview it cannot be known for sure if this little
bit was what she felt or just Christian's perceptions.

Laura has a hint of the "Pandora's Box" feeling
that she could probably get over if she started using the
computer. Particularly because computers are so linked
with Christian's life outside the home.

The most obvious displacement is in the separate
activities in the evenings. When Christian uses the com-
puter Laura watches television. The television acts as a
substitute. So they each have an electronic companion.

Laura and Christion like the "high tech look." They
do not see the computer as ugly and they have integrated
the electronics into a whole piece of furniture. An
important aesthetical issue for them is order. Nothing in

this apartment is out of order. Limited space is the main
reason to keep such strict order.

Social organization has to be analyzed in a micro
groupal level of a couple living together. It is relevant
to look at the power structure and social-space domains
to see this phenomena.

The computer is a working tool, thus it means a source
of income. Even though they both work, the part-time jobs
are done by Christian with the computer at home. It means
  extra money that they need to keep their standard of
living. This argument gives the computer some power.

The social power translated into physical domains
shows in the relative sizes of the work spaces--his is
seventy-five square feet and hers is thirty square feet.
Christian has two work spaces.

In general, Christian has more space in the apartment
than Laura. When he talks on the telephone he wanders
form the living room to the kitchen to the bedroom. While
on the computer he rolls around on his chair.

Laura has her space in the corridor with much less
privacy. His space is in a corner making a well defined
territory. While he is using the computer he uses the
whole corner area, though he monopolizes the whole living
room. Occassionally if Laura is inthe bedroom with the
television on he closes the door between the rooms. His
territory is thus invaded from the other room through noise.

This never happens the other way around because Laura doesn't mind the noise from the computer.

The computer tends to be socio-appeallant. Christian teaches graphics and programming to a group of architects in apartment onee a week. He made many acquaintances through the computer store. Many of his customers phone him for advice, many of them become friends.

What makes the computer especially socio-appeallant for Christian is that he will not work at home. He enjoys the social quality of his job. Laura could profit from working with the computer at home but she has no desire to do so.

The major conflict is between the computer and the television. The solution is to close the door.

In a small apartment like this one the conflict between activities could have been a major issue. Christian has great powers of concentration and normally he can stick to the computer without losing attention even if Laura is moving around or cooking.

Architectural:

Spaces in the main room of the apartment are defined by function rather than by structural divisions. The dining area is determined by the space created by the table and chairs. The social area is the space delimited by the sofa and armchair. The working areas are defined by the desks and computer equipment

There are two factors to consider in the transition from public to private space in the apartment. Laura's desk is at the end of the entry corridor so that she has no privacy if they have visitors. There are no architectural devices possible to preserve her privacy while working. Christian's work spaces are more removed from social spaces. The drafting table is in the bedroom so that he has one entirely private place. The computer is in a corner with two sides protected. If Christian goes to the kitchen or has telephone calls he has to pass through Laura's space. His space is never intruded upon like that.

Laura is also more exposed visually. Her desk is the first thing everyone sees from the door of the apartment.

The problems locating the computer were mainly due to the size of the apartment. This case has more spatial problems than the others. Christian and Laura under-estimated the space needed for the hardware and storage of references and manuals. It is interesting that this happened even with an architect who works with computers every day.

They tried the computer in three different locations. First, they put it on Christian's drawing table. But he did not like to move it every time he needed the table. Next they tried the movable furniture but he calculated it wrong and it turned out to be too small. Finally, Christian built the wall shelf unit to hold the computer. Even here he underestimated the amount of space needed for storage.

The computer space constitutes a sociofugal space. Not because of the space itself but through the placement of furniture. The makes a loop where all the most social activities take place. And the sofa and armchairs are oriented to the small table between them. The computer contrasts with this arrangement with the absence of any chair near the computer. The stool doesn't have any social function , it is used to hold the references while Christian works at the computer.

Christian draws the curtains just next to his space. Since there are other windows he does not darken the whole room. Also, he uses the computer early mornings when Laura doesn't use her desk and the natural lighting of the other windows is enough.

The noise is no problem. He has a silent printer and the fans don't bother them.

More room is needed for storage space for references, manuals and software. The computer work space is comfortable. with an office height adjustable chair. Christian has no ergonometrical problems.

CASE IV

Janet and Eric live with their two children in North Cambridge. Janet is thirty-eight and is pregnant with their third child. Eric is forty, he is a doctor in charge of a clinic. Their two children are Greg, seven, and Susan, four.

Janet and Eric bought an Apple II with a silent monitor some months ago. Their was based on their children and themselves. They want their kids to become familiar with computers while they are young. They believe that familiarity with the computer will be more and more important in the future. The couple got involved with computers through friends who had them and through Eric's sister who works with computers in education for children. She demystified computers. Eric also felt the need to know about computers "because we are entering the informationera." In the clinic there are computers and he does a number of things with them.

Their house is an open plan. Rooms are connected by large spaces. These spaces were achieved by removing doors and enlarging the openings. Nonetheless, every space has a clearly defined character.

The living room is defined as the adults' space. It it the room where visitors are entertained. Next to it, the playroom is the children's domain. The floor is covered by toys and books. The television is in the playroom, subject to strict schedule by the parents.

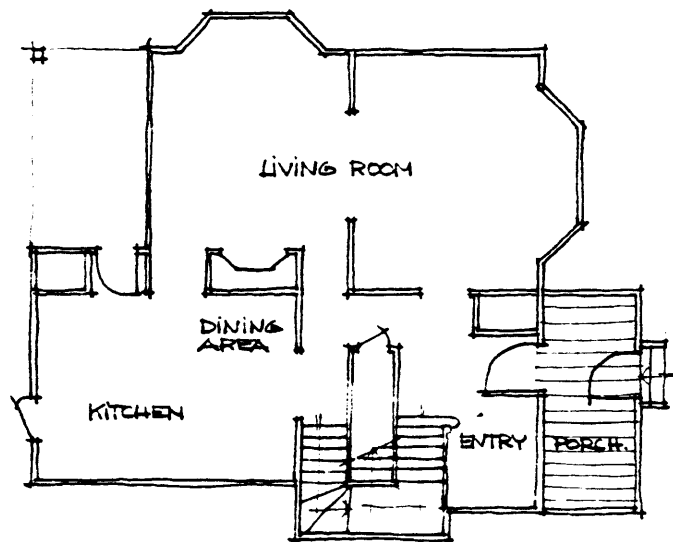The kitchen is an important room for the family's interaction. Toys from the playroom spill over into the kitchen to the extent that one does not really know where the kitchen begins and the playroom ends. The kitchen is a large room with a big table in the center creating

CASE FOUR. PLAN OF THE HOUSE
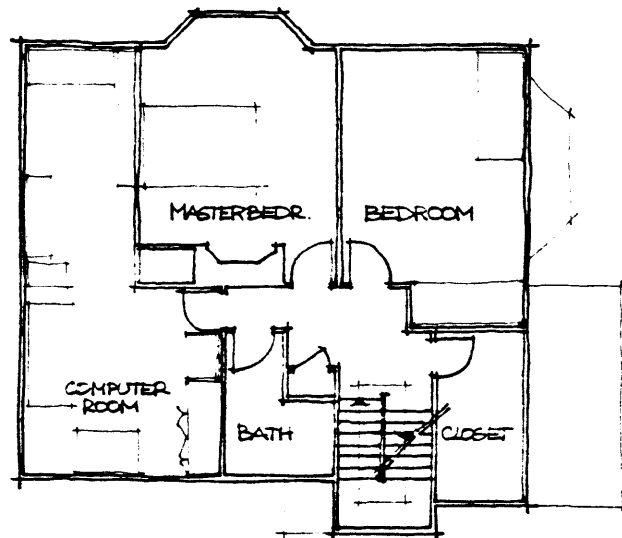
SECOND FLOOR

FIRST FLOOR

DIMENSIONS. HOUSE

8m x 9m

144 m²

1608 ft²

STUDY

22 m²

239,8 ft².

figure 26

the image of happy family meals. The chilren's drawings are hung aroung the walls, colorful statements of their priveleged status. One senses that this is a house where the children are free to move and be very free with the living room the only limitation.

The playroom used to be the only family room before the computer arrived. The family would play games or read together. Now they have two family rooms, the second one being the computer room. The new family-computer room has moved more activity onto the second floor of the house. Before playing was limited to the first floor playroom. Now the children play in the computer room and the playroom.

It seemed obvious to put the computer in the upstairs room though the room had to be changed from a guest room. In order to place the equipment they had to move furniture and now they plan to buy a new, longer table, a higher chair, and Eric will build a shelf for the monitor. The furniture they have now makes using the keyboard uncomfortable.

The computer room is a large rectangle. It has been unintentionally divided into two areas for writing and working with the computer. The computer equipment ended up demanding more space than they expected even though they knew the dimensions of each piece. The two activities in the room sometimes conflict.

When the computer room was created the guest room was moved to the third floor which had been Janet's study. She

CASE FOUR _ PLAN OF THE STUDY

1 KEYBOARD
2 DISK DRIVER
3 PRINTER
4 MONITOR
5 FILE
6 FILE
7 DESK
8 BOOK SHELVES
9 DRESSER & MIROR
10 CLOSET.

DIMENSIONS
7,72 m x 3,67m
22 m^2
239,8 ft^2
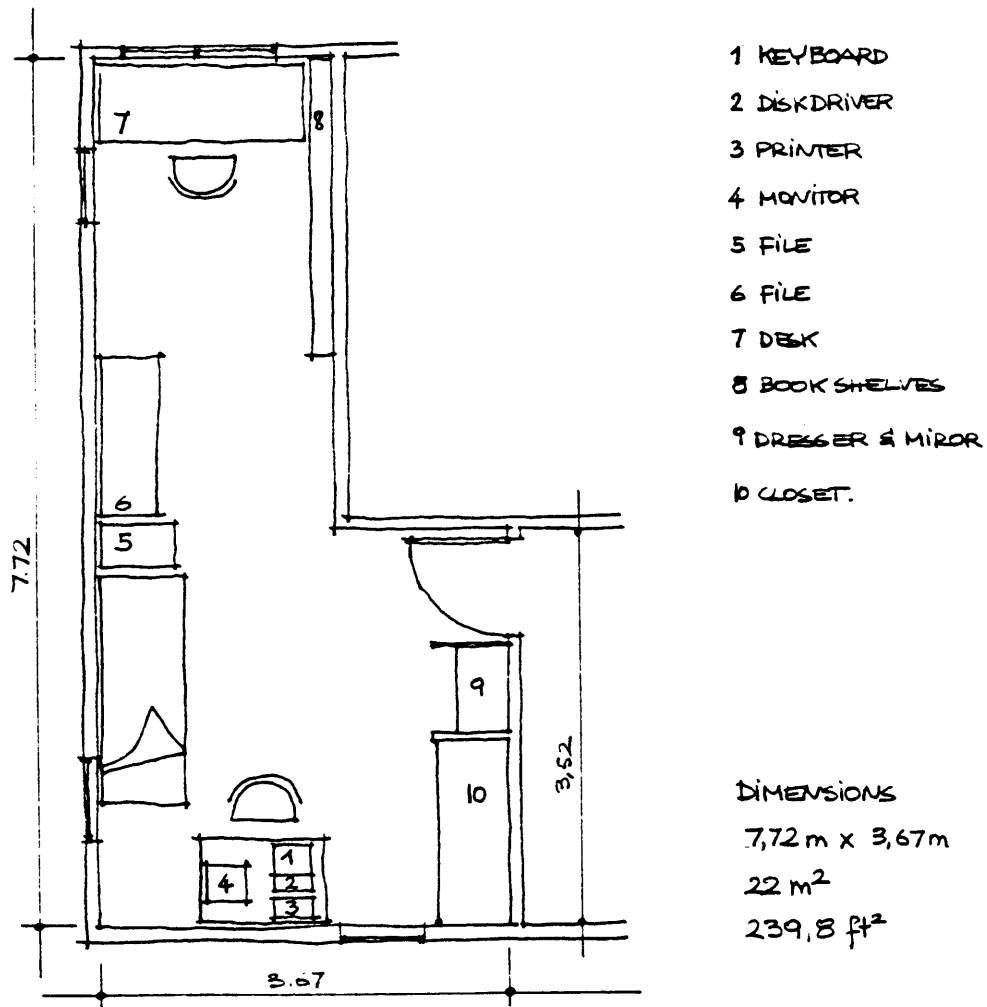
7.72

3,52

3.67
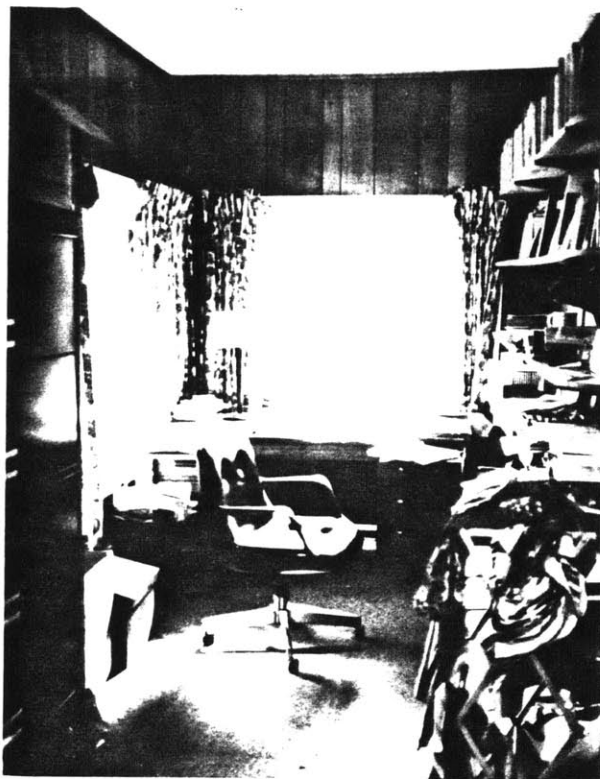
figure 27

Janet's working space   figure 28

figure 29   computer table

moved her desk into the new computer room. This room
gives less privacy as she works so she has had to rearrange
her schedule to work when Eric and the children are out.

The children's use of the house has changed. They often
play in the computer instead of the playroom. They often
prefer the computer room but are sent to the playroom
when Janet or Eric are working.

The greatest tension around the computer is that
Susan is too young to play with it. She feels excluded
when her brother plays with Eric developing a new
adventure game. Janet reads to her when the "men" are
on the computer.

The family's daily schedule has changed significantly
since the introduction of the computer into the house.
What used to be their reading and playing hour has been
changed to the computer hour. Eric works or plays with
the computer after the kids are in bed but he cannot work
late because he feels he gets over excited and then has
trouble sleeping.

The family is planning to start using the computer
more and more for work. Janet wants to stay home after the
baby is born and would like to learn typing and word
precessing. Greg is learning to program and Eric would
like to have the computer connected to the clinic. He
would be able to control the functioning of the clinic
and do graphics for diagnosis at home. He is actually
very tempted to bring more work home and do the filing

with the computer. Janet and Eric like to do their accounting with a home finance management program and would not hesitate to use electronic mail and banking.

They think that since they bought the computer they have become more gregarious, although their increased activity is with other computer people.

After I finished the interview Janet wanted to talk about the importance for women to learn about computers, she felt that if she did not become involved she would be obliterated. Computers are not considered a woman's activity.

Analysis of Case IV

Psycho-Social:

The problems this family had in adapting to the computer were in defining the computer--is it working tool, an educational device, or a hobby? Is it to be used by the parents or children or both?

Adapting to the computer room meant adjusting to a new kind of room. A room that served several different functions--study, play, and work.

The guest room was relocated to create space for the computer. The family room could not overlap with the guest room.

The persistent problem in adaptation is the occassional overload when there are too many things going on at one time. It is not unusual for Eric and Greg to play and

program while Susan is on the floor playing with toys
and Janet trying to write or just playing with Susan.
All of this activity leaves a mess for the person who wants
to work after the kids go to bed. It is important to
remember that these parents do not mind this. It is more
important to them to allow their kids to grow up free and
happy.

Early fears of technology and the home computer were
lost through their own observation of friends who already
had computers. Janet's sister's praise was reassuring to
them.

Janet has the only fears linked directly to the computer.
She wants her kids to play outside in the good weather.
Her image of children running around in the garden may
suggest that she fears the image of the 'super intellectual
child.' Some of this also appears with the scheduling of
the television, the brain drainer.

Janet has probably made the most concessions. The
new family-computer room used to be the guest room. She
had her study in the third floor of the house where she
had a private, secluded work space. Since they turned
the guest room into a computer room the guest room was
relocated to her study and she moved her desk and books
to the computer room. Even though she deals with privacy
through scheduling when everyone is away from the house
she gave up a private space that belonged to her.

Whenever Eric and Greg are playing or programming on the computer Susan feels excluded. Janet then plays with her thus strengthening the male-female separation. Otherwise the separation is not obvious. Janet plans to use the computer. Her pregnancy helped to rush them to buy the computer so that she could stay at home in the future. Janet believes that computers belong to a man's world and she want to be involved so that she does not exclude herself from that world.

They do not have any aesthetic problems with the machine. They look at it strictly as an instrument, a necessary piece of machinery.

The democratic organization and power structure of this family are reflected in the reasons for buying the computer which included the whole family. The parents wanted to have their children acquainted with computers while young. The feeling of the 'information era' encouraged this. Janet's pregnancy encouraged her to learn about the computer so that she could use it to work at home after the baby was born. Eric also wanted to start working at home. Educationally, not only would the kids profit from using computers when young but Janet wanted to learn programming.

Eric's dominance does show in the fact that whenever Susan feels excluded it is not Eric to leave the computer, but Janet. She does not play with Greg at the computer, the team is always Eric and Greg.

Another index of the power structure is Janet's giving up her study for the guest room. On the other hand Janet and Eric do the accounting together with the computer. They figure out the family budget and make financial decisions. In other cases the computer has created a male-female separation, but here the couple are brought together.

The parental power exercised in this family is clear in the restrictions from the computer room when quiet is needed for work, in the television restrictions, and the limited access to the living room.

In general the limits upon the children are not strong; the family works together as a unit not as father,mother, sone, and daughter. An architectural index can be the oppenness of the connections between one room and the other.

The overlapping of activities in the computer room is complex. There are four main activities. When the space is used by the four members together all of the activities cannot be done simultaneously . Work needs concentration and privacy. Janet uses the room primarily for work. Eric programs and uses his computer as an educational tool for himself and Eric and Greg program together. Eric and Greg play games with the computer while Janet and Susan usually play together in the same room with toys and books.

Playing and programming can be done at the same time in the room. Janet and Eric can work at the same time because their spaces are far apart but they must exclude the children when they work. They usually use the room for work when the children are at school or sleeping.

Both parents plan to work at home. Janet because of the coming baby, Eric because he would like to stay at home more and control activities in the clinic from the computer.

Architectural:

In this case the effects of the computer on the reorganization of the spaces are interesting. Activities in the house always centered around the family room. When the computer was introduced and placed in the second floor the guest room became the second family room. Consequently the division of the house became less obvious. The public spaces that were before in the ground floor spread to the second floor. They had two family rooms with quite different characters.

The room downstairs is the children's space which the adults enter from time to time. The room upstairs is an adult room in which the children play sometimes. Both are public to the family, but the first floor room is most public to outsiders too.

The other change is that the room that was previously used as a guest room has a new function and holds individual family activities when everyone is involved in something different.

The guest room-study was a private place. If used as a study it was quiet for the person working there. For a guest it was a private place. Now, at least in family terms this room has become more public. The privacy of the master bedroom is disturbed now that it is open to view by people going to look at the computer. Everyone who goes to look at the computer passes by the bedroom.

Environmentally, they have had problems because of light coming in the windows and reflects on the screen. If the curtains have to be drawn they darken the room. The study area has its own windows aroung it but it is nonetheless left with less light.

Spatially, they faced two problems: they under-estimated the space the equipment would take. The table they chose was too small. Eric has to put the reference material on a desk next to him and finds that he needs a longer table to work more comfortably. The other prob-lem is that they did not realize how difficult it would be for Greg to use the computer. He has to stand or kneel in Eric's chair and has trouble reaching the keyboard.

CASE V

Diane and Daniel are a young couple living in an apartment in Beacon Hill. He is a practicing architect, thirty-one years old, she is a security analyst in the stock market, she is twenty-six years old.

Daniel is very visually oriented and became interested in computers through computer graphics. He has had a home computer for two and a half years. His first computer was a Texas Instrument but after having it for nineteen months he found its software insufficient for his needs. Now he has an Apple II, a printer, a color television as a monitor, and a graphic paddle. He has a connection to Boston University's central and prepares his homework for a course he is taking there on a Modem. His software is Visicalc, Visitek, Visiterm, a work processor, and magic window (graphics).

Daniel use the computer six hours a week on and off in the evenings and weekends. He figures out their budget, does bookkeeping, and uses the computer as a checkbook. He also has games on the computer such as backgammon. He uses the computer most for graphics.

Diane has computers in her office. She does not use them although she realizes that she will have to learn soon. She sees them as a tool not as a passion like her husband.

CASE FIVE _ PLAN OF THE APARTMENT

BEDROOM

STUDY

BEDROOM
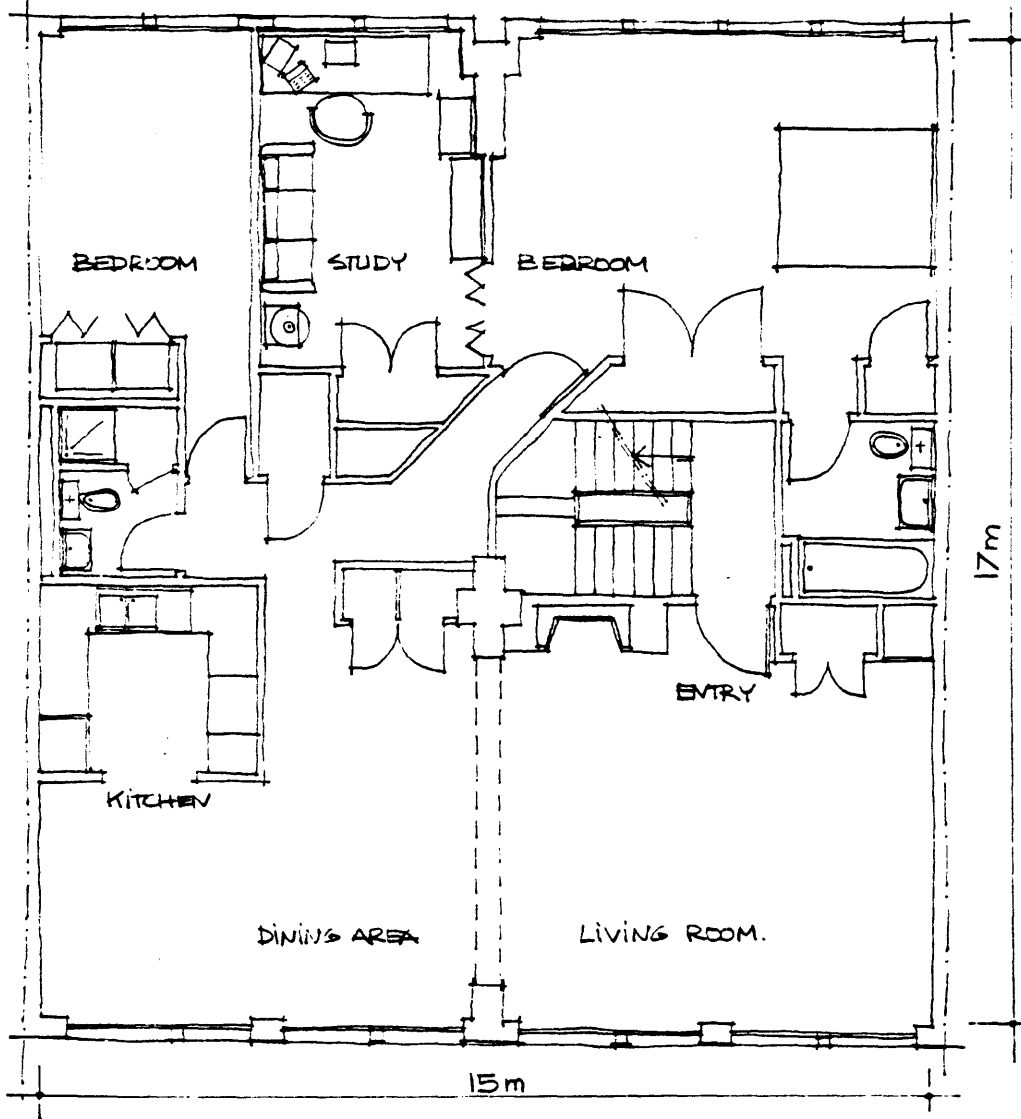
KITCHEN

ENTRY

DINING AREA

LIVING ROOM.

17m

15m

figure 30

Their apartment is large, the different areas are defined by differences in levels in the floor and ceiling. The living room has two main areas, a formal area next to the fireplace with two blue velvet sofas. It is the place where they entertain. The furniture is bulky and in dark bright wood. The second area is an informal reading area with a stereo built in the wall. All of the walls in the living room are covered with posters from art exhibits that contrast with the severe elegance and sobriety of the furniture.

The dining room is less formal. The table and chairs are in white wood, much lighter than the living room.

The transition from the public rooms to the bedroom is notable. The corridor to the bedroom is an angle that blocks all vision to the room.

The bedroom is spacious. The colors are warmer tones than the blue of the living room. The furniture is colonial and the bed is covered with a patchwork quilt.

The computer is in a room off of the bedroom. It is Daniel's dressing room and study. This is room is perceived as an extension of the bedroom, not as a room of its own.

The room is crowded with media equipment, a sofa, and a chest of drawers. Daniel has a Vetamax, a twenty-three inch television , and a stereo. The computer is on a six foot long drawing board which has become too small. When Daniel discovered that he needed more space he built a

CASE FIVE _ PLAN OF THE STUDY
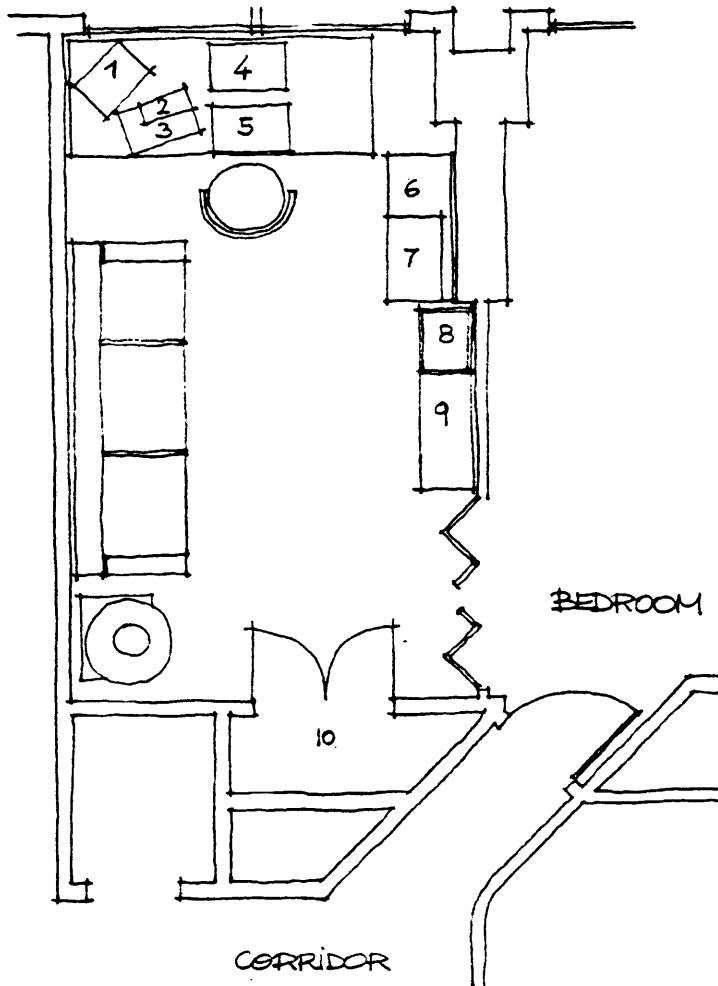
1 MONITOR
2 DISKDRIVERS
3 KEYBOARD
4 PRINTER
5 GRAPHIC PADDLE
6 DRAWERS
7 STEREO
8 TV & BETAMAX
9 BETAMAX REFERENCE
10 CLOSET

DIMENSIONS
3,6m x 6,0m
21.6 m²
242 ft²

BEDROOM

CORRIDOR
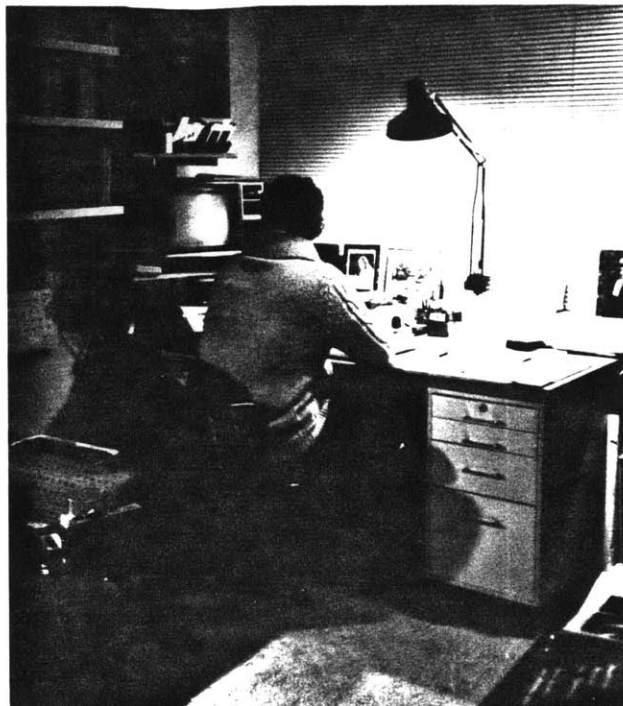
figure 31

figure 32

Daniel's working space

figure 33
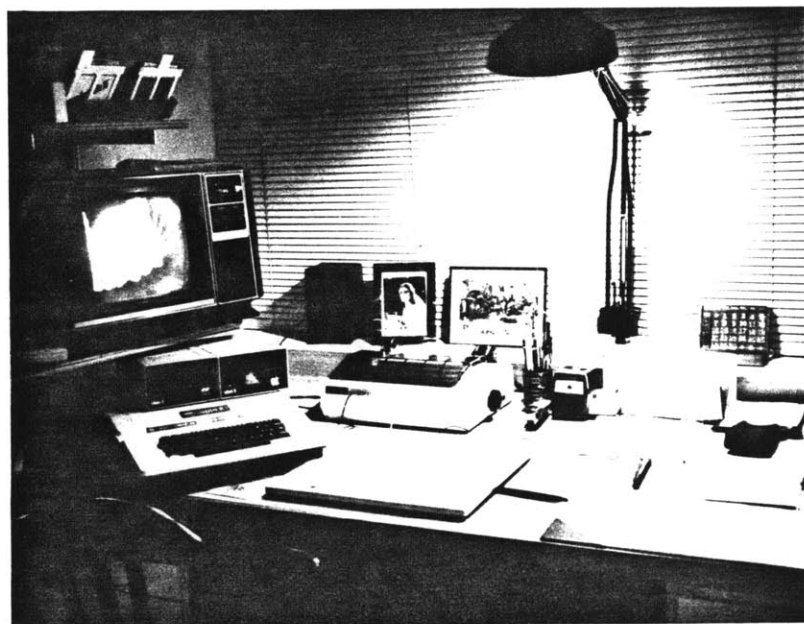
shelf for the screen which he can fold back when he does not use it. He finds that he needs more space to move around in also. The density of this room contrasts with the openness of the other rooms.

There is a window the length of his table whose curtain he has to keep drawn because of the glare on the screen. Sometimes this limitation bothers Diane if she wants to read or knit with natural light. Diane usually stays near Daniel while he works with the computer, watching television or knitting.

The computer room holds many activities: the computer, the television, reading, drawing, dressing. They have adapted to these multiple functions but they would like to have a separate room for the computer. The media room would be in a public area of the house and while describing it Daniel pointed out what he found wrong with the current situation. He would like the media room to be more accessible so that other people could be present in the room without having to walk through their bedroom. He would like it to be an extension of the living room, between the living room and kitchen. He wants it to be open so that he doesn't feel secluded.

Diane would be happier with a new media room. Now she is bothered by the wires that she constantly steps on and she is disturbed by the noise of the computer when she wants to sleep.

The creation of the media room changed the use of that room. They use it far more as a media room than they did as a drawing room and study. Now it is an entertainment room more than anything else.

Daniel and Diane have no plans to computerize their home, although Daniel is very interested in computers. He would like to use electronic mailing and banking. Now he is restricted by the small numbers of people who use those services.

The couple has joined the Boston Computer Society and have expanded their acquaintances with other people who own computers.

Analysis of Case V

Psycho-social:

This couple had to adapt to a new use of the room that they perceived as a continuation of their bedroom. The room was originally Daniel's dressing room. Then he added his drawing board, then the electronic equipment.

The difficulty in adaptation comes not only from the new and different function of the room but because it is crowded in comparison to the rest of the apartment. There is an overload of stimulation and one does not really know what is going in the room. The room has been this way for two and a half years so they have become reasonably well adapted. The final step in the adaptation process will be

for them to view the room as part of, and not contrasting with, the bedroom. This difference is still the main problem.

The computer is a hobby and a passion for Daniel, Diane never uses it. There could be some resistence to given the way she emphasizes that her hobbies are jogging, riding, reading, and knitting which linked to nature and are manual activities.

This case probably shows the clearest example of "the rival." Diane does not care about the use of the computer until she is in bed when she is annoyed by the sound of the keyboard. Otherwise she usually stays in the room with Daniel watching television or knitting while he uses the computer.

Professionally Diane accepts computers as an efficient tool but in her home she relates to them in a different way. Diane allowed the computer to be in this room. Like the other cases, even if the women do not directly relate to the computer, they accept it passively.

The male-female relationship appears unbalanced with this imposition of the computer in the extension of the bedroom. Another reflection of the imbalance is that even if Diane uses the room, it is by definition Daniel's room, not theirs.

The transition from public to private space is prob- lematic. Friends who want to see the computer pass through their bedroom to go to the computer room. The decoration

shows that the bedroom is considered a private place. Now when people pass through it they begin to invade this privacy. And since the room is a public way to the computer it needs to be kept in order at all times.

Daniel finds the computer a social entertainment, socioappealing because friends come to play with it. He realizes that the room where the computer is now is not the best place for public use, so he wants to have a separate, contained media room.

Architectural:

This new media room would be located in the public areas of the home, preferably close to the living room. He realizes that the current room is inconvenient and that it has changed the organization of the house in terms of public and private space. The new media room would only have the computer and media equipment, his drawing board would stay in his study-dressing room. Many of the problems due to overlapping activities would disappear.

The problems they had locating the machine were due to an underestimation of the space needed for the hardware. Daniel built a shelf for the monitor that can be folded up when not in use. The storage space is beginning to be overcrowded. In terms of personal space he needs more space to move around on his chair.

The physical considerations involved lighting, noise, and electrical wires. The lighting comes from a window

beside the screen. Daniel draws a shade, but his becomes
a problem for Diane and she has to go to the living room
if she wants natural light. Diane complains about the
noise;even with the doors closed she has trouble falling
asleep. The electrical wires that cross the floor
disturb Diane. She wants to be able to walk freely with-
out stepping on cords every time she steps into the room.

The carpet on the floor also creates a problem. It is
too thick to all the chair's rollers to move easily. The
office furniture itself is comfortable for working with
the computer but it conflicts aesthetically with the bed-
room. The furniture is bulky, adding to the congestion
of the room.

The computer seems to be a social status symbol. They
consider it a hobby and would not care for programming the
computer to control the environment.

INTERVIEW WITH MICHAEL DETROUZOS

As a follow up on the case studies I interviewed
Michael Detrouzos, who edited a book about computers,
society, and telecommunications. His comments are in-
forming on both a theoretical and personal level.

Detrouzos is a computer scientist at Massachusetts
Institute of Technology. He revealed that he still has
locational problems with his computer after seventeen years
of close contact with computers in his work and at home. He
is sure that computers have an impact on his life, he said

that "computers affect people's lives in the physical environment." By this he means that the computer can serve as a tool to help people in the way they organize their lives. He told an anecdote of some years ago. A snow storm had caused a power outage in his Boston suburb and the whole area was declared in a state of emergency. He had to catch a plane to fly overseas but the airport was closed and he couldn't get to the airport anyway. He finally took a train to New York City and left on time. When he arrived he realized that he had forgotten half of his things. He keeps a file on the computer of the clothes he takes with him and following this list he makes sure that he doesn't forget anything. With the electricity off the computer was not working and his list was unavailable.

Detrouzos uses his office computer like an appointment calendar. Within the office they communicate with the computer to any other terminal in the building.

At home he has three computers, two of them with high speed memories are connected to MIT's central computer. In the basement Detrouzos turns out to be a rennaissance man. His biggest computer and his woodcutting equipment are side by side. If it would be feasible to animate these two hobbies one could say that they play a game of rivalry. The wood wastebothers the computer that cannot close his nostrils to the dust and the wood is annoyed by the computer's heat.

The second computer is in his study. He has about one hundred and twenty square feet. The computer is on a portable stool that allows him to move it around. His chair also has rollers that allow him to move from the keyboard to the desk. He doesn't have a printer, "printers are for beginners who need to grasp something." The main space issue arises when the computer changes from an individual to a social activity. "I can't and wouldn't hide the computer in a corner." When his friends or his children's friends come to play with the computer he wants the computer to be accessible and move so that people can gather around it. This computer is also used as a piece of furniture since diskettes are stored on top of it. When kids play with the computer they use taller stools to reach the keyboard and screen. Detrouzos believes that the computer helps his kids to sociolize in two ways: with their friends at home and through games they play with other kids in parts of the country.

The main problem in this household is with space and aesthetics. Computer furniture is designed for office space, it is bulky and doesn't suit a home setting. Detrouzos doesn't like his home study to look so much like an office.

The third computer is in the son's room. Since Detrouzos is an amateur architect he decided to allow his son to try to design too. He is, at the age of eleven, deciding how his bedroom should be arranged. Having to

install the computer was his first design problem. The
counter where he does his school work is divided into two
parts. The one directly under the window where he does his
homework and the other against the wall for the computer.
When he does homework he needs natural light and he likes
to look outside. When he is on the computer he does not
want light reflecting on the screen.

Professor Detrouzos sees the main problems with the
computers at home as: the volume of the machine, the need
for ventilation, the disturbing noises, the heat of the
machine. Another problem is a communications one, his three
telephone lines are constantly busy. Two of these lines
are permanently connected to MIT's computer.

Detrouzos's wife is a chemist. But like the other wives
in the cases she has little to do with the computers even
though she is a scientist.

This interview supports the analysis of the cases.
Even a scientist who is closely involved with computers
has some problems with the computer in the home. Some
problems are aesthetic, as in the office furniture. Others
are social; after seventeen years one of the members of the
family still doesn't use the computer. Still other problems
are environmental--problems of noise, heating, and dust.
These will probably be corrected with advances in the
technology in the future. Today they require solutions in
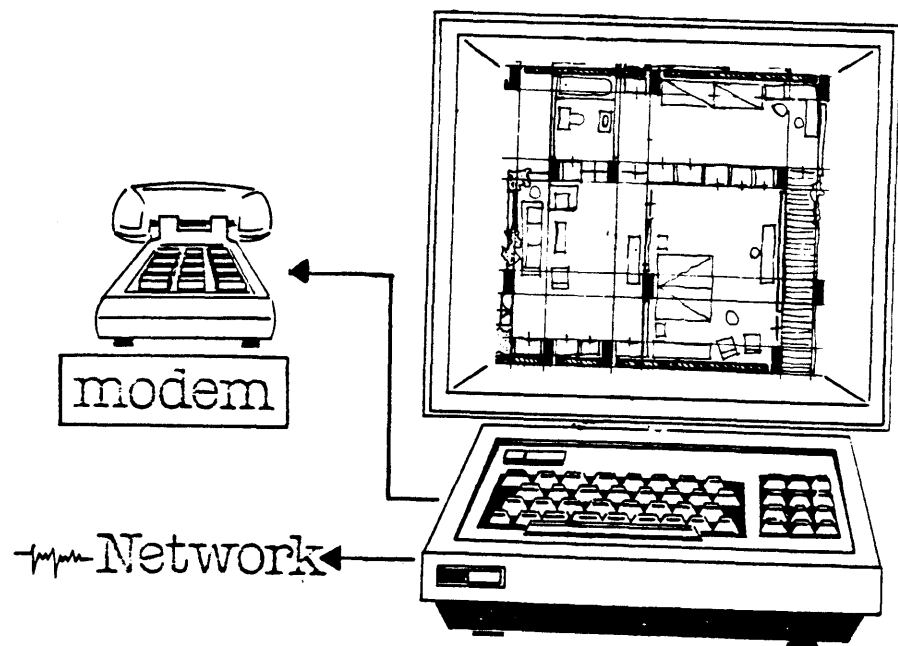the home.

chapter 4

figure 34

Though these cases are few in number and all taken
from upper middle class families, some generalizations
can be made. As important as the generalizations,are
the questions that can be raised as the result of this
study.

Adapting to the new machinery and to the new use of
space was a difficult task in all of the cases. The
difficulties resulted,in part, from problems in defining
the computer. Case I had problems in locating the com-
puter because they did not clearly define the computer
as a working tool, an entertainment, or an ugly piece
of machinery. Not understanding clearly the use and
definition of the computer made it difficult to adapt it
to an environment where they already knew what were the
activities and uses of that space.

Case II had trouble adapting, as part of a cultural
shock. Not knowing the function and use of the computer
made adaptation difficult.

Case III adaptation was achieved only when all the
electronics, including the computer was put together,
thus clarifying the use of the space around the computer.

In Case IV the computer room used to be a guest room,
but became the second family room after the arrival of the
computer. They had to adapt to the same room with a dif-
ferent function.

Case V faced the computer as an intervention to their room. The adaptation process was also in terms of new and crowded use of the room.

Detrouzos's case faces adaptational problems in terms of aesthetics and the concept of a home. He has trouble with office furniture in his home.

The affective response in general was strong. The most obvious one was the way women reacted against the computer.

In Case I the computer was felt as an ugly and messy intruder that imposes itself on the family's privacy. The woman had to accept the computer instead of a new kitchen. Then it became a sort of rival to have in her study.

The subjective responses in Case II were very strong from the woman. She is scared of technology and it is a threat. The computer is also a rival in social activities and in time shared with her husband.

The computer is also a rival in Case III. Although the woman is not afraid of computers, she does not use it. The computer sometimes evening entertainment for the man she lives with.

In Case IV the fears were minor because the couple had carefully evaluated the computer before buying it. The fears appear in the woman being afraid of the image of the "ultra intelligent kids."

Men and computers
Women and nature.

figure 35

Sometimes
the machine is
eroticized

figure 36

In Case V the affective response appears as a reaction against the rival, the husband's passion for the computer. The woman does not use the computer at all.

The issues of control that appear in all the cases translate either in schedules, space use, and conflict of activities.

Case I shows control and authority in the decision to buy the computer, in placing the computer, and invading the female's privacy.

In Case II the male hierarchy is evidenced in his territory in the master bedroom, the time spent in the computer and that the computer is a work tool.

The control or dominant male position in Case III is shown in how much more space he uses in the house. He has two working spaces and the computer is a working tool.

In Case IV control and hierarchy tend to be more of a male domain, but it is less because she participates more.

Control and hierarchy appear in Case V in the use of space and the invasion of the woman's privacy and in his schedules of using the computer late in the evening.

The overlapping of activities appears as a problem in all of the cases where they have not isolated a special room for the computer.

Case I has bedroom activities overlapping entertainment and work.

Case II has no overlapping activities.

Case III has dining, kitchen, and social activities overlapping with computer work; they are mostly solvable by scheduling.

Case IV has television watching or music overlapping with computing.

The architectural problems show differences depending on the size of the house, who lived in it--a couple or a family. The issue does not seem to be square footage but traditional organization.

Case I had problems of lack of space and of definition of space. Computing could not conflict with social activities, it needed a private space. They underestimated the space they needed for the references and for the people using it.

Case II had two problems of underestimation of space and privacy. It required complete privacy and isolation.

Case III underestimated the space for the hardware and the references and built a special piece of furniture after trying three other locations.

Case IV underestimated the space required for the hardware and software. They had problems with the furniture because it is used by adults and children.

Case V also underestimated the space needed for references and hardware. They have lighting problems and technical problems because the room is full of wires. They used office furniture to solve ergonometrical problems.

In all the cases the transition from public to
private has been altered. The most obvious Cases are
I and V, to a lesser extent in Case II and IV, and still
less in Case III. In Case II and IV the access to the
computer room has become a public way to visitors who
have to pass through the private corridors, being able
to see the bedrooms if the doors are open. In Case III
the private bubble imposes itself inside the public
sector with no transition at all. Case I and IV are the
most clear examples since one has to pass through the
master bedroom to get to the computer room.

At a social level the issues of control, dominance,
and possession reproduced themselves in each case in the
person who used the computer the most. Since this person
was the man in all cases, it established an unbalance in
the gender relation and sharing of control and power.

The women who controlled the home now found that their
husbands have more control over their domains, either by
schedules if the husband works more at home, or by spatial
domain with the husband getting more space and time in the
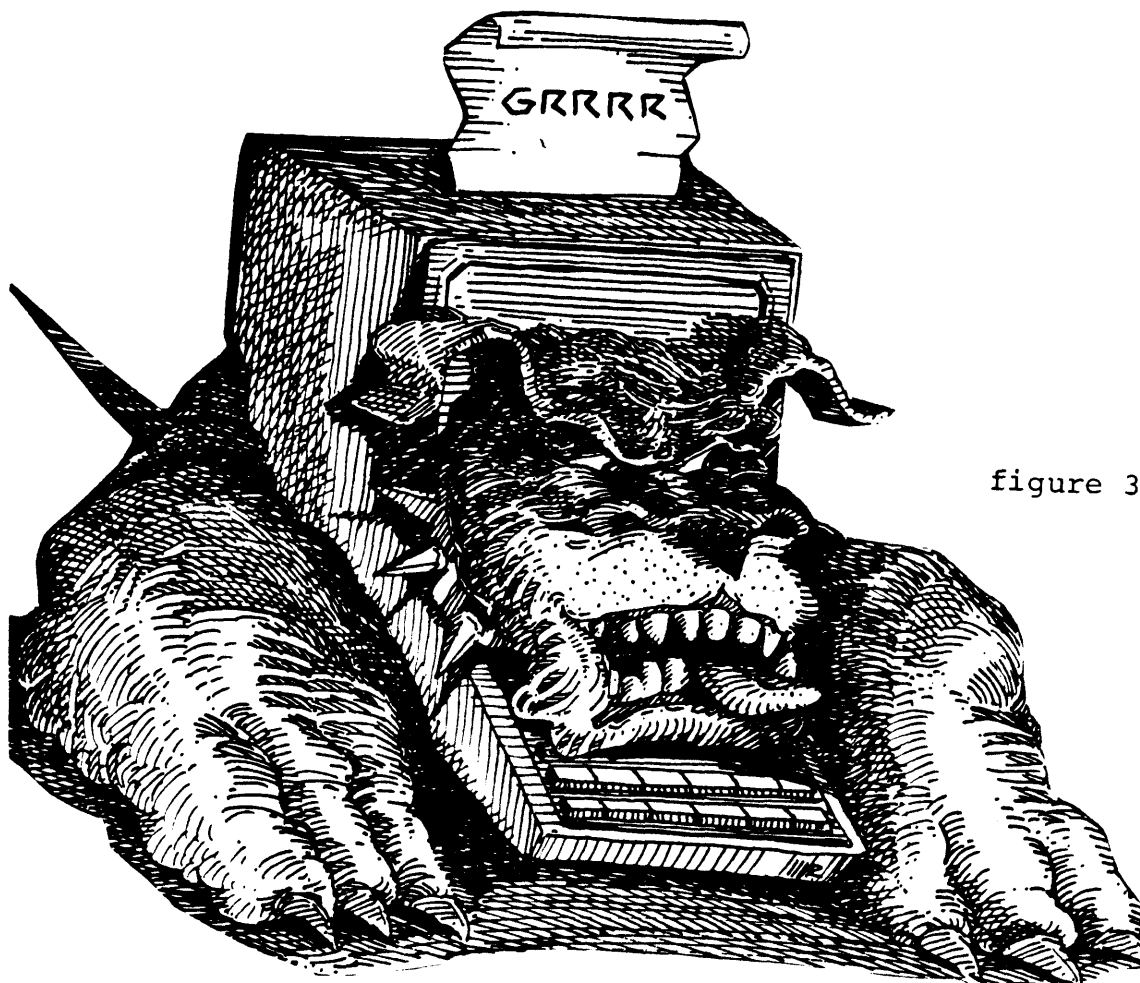house.

figure 38

For some people the computer
is a terrifying threat.

Women rarely used the computer. Some of the women
showed a fear of computers and of technology as a whole.
There were fears of being displaced from their relation-
ship with their husband. There were fears of technology
controlling their life and freedom to choose.

In the cases where the computer was a work tool, it implied even more control because it was a source of income, particularly if the woman did not work. Control also appears in the dominance of the needs of the computer and the person using it. Everyone in the house had to accomodate the computer even if it created annoyances such as noise and less light.

The cases showed that lifestyles have changed. The families stayed at home more where the computer was new. Lifestyles may change even more when people can do their work at home instead of at the office.

Notions of public and private in the house is a complex issue. The computer space is a space that needs privacy for concentration and at the same time needs public access for visitors. The computer space ends up being a public place in the private areas, thus disrupting the family's privacy. The privacy assumptions are reflected in the fact that the cases show that the computer space was planned for only one or two persons.

Another point in the public-private issue is the design of the computer. Some people considered the computer as ugly and not social, so it was better kept out of sight. Others thought that the computer could stimulate social activities in entertainment so they wanted the equipment in public areas.

Men invade
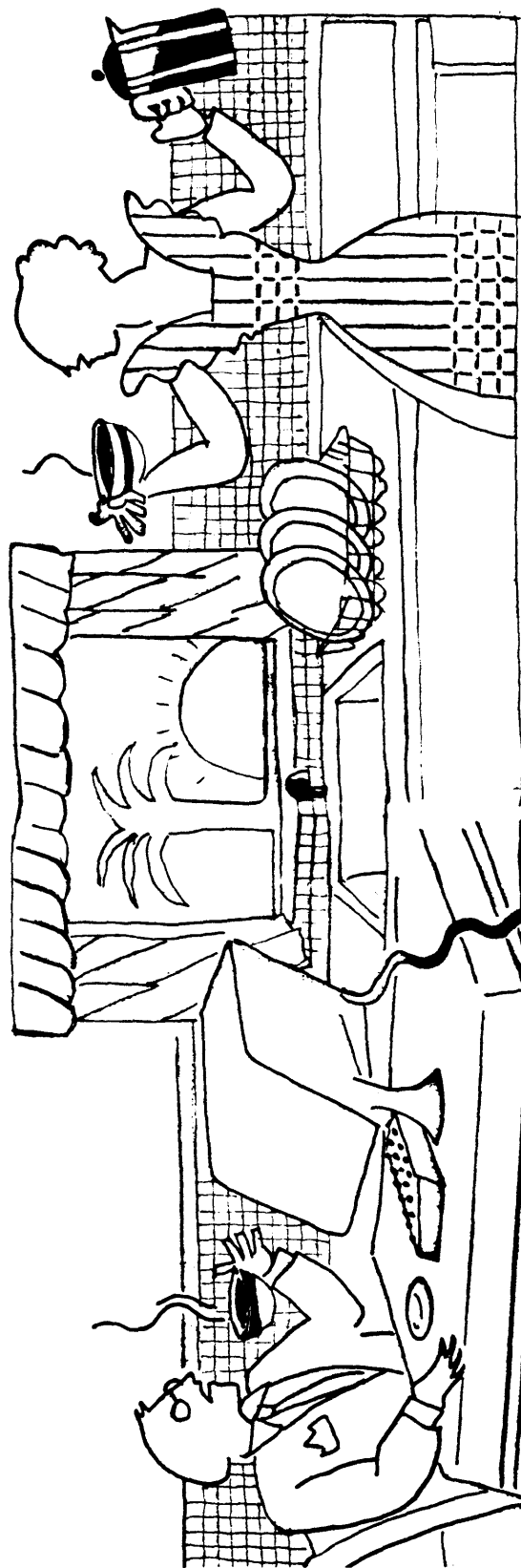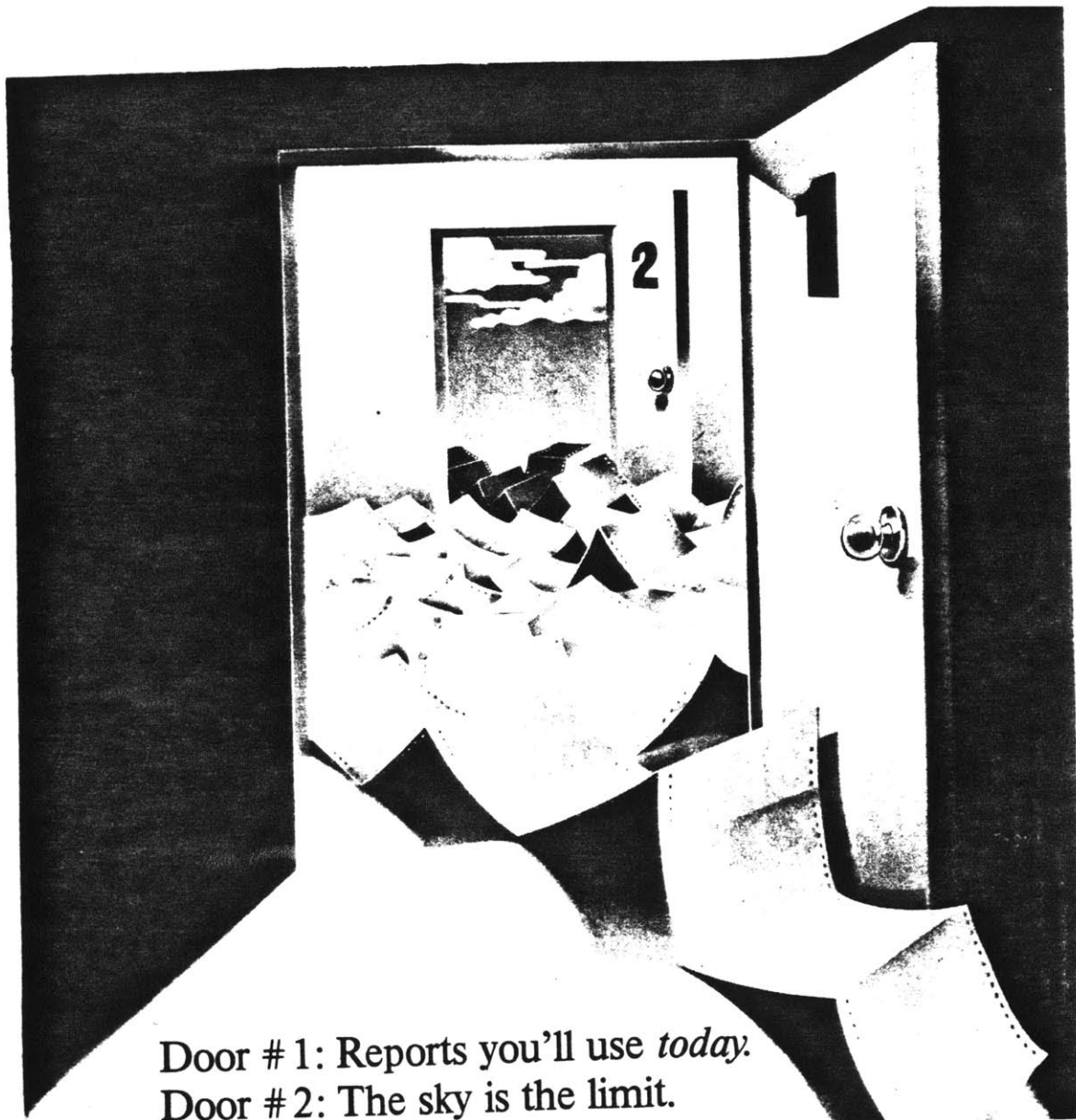
the traditional

female spaces

in the home.

figure 37

At home it was not the paperless-office.

Door # 1: Reports you'll use *today*.
Door # 2: The sky is the limit.

figure 39

The problem of defining the computer is spatial as well as social. Locating the computer ended up being a problem in all cases, how to choose a space that could accept overlapping activities, activities that would require different spatial qualities.

All of the families underestimated the space needed for the computer. The spatial insufficiencies were due to the hardware itself, the storage space for references, and working space. Perhaps the underlying reason for this underestimation was that until the peoplr had to actually place the computer in their home it held an abstract image for them; in the abstract it was just a household appliance. Somehow this suggests that they had also underestimated the impact it was going to have.

The location of the new computer was problematic in all cases. The computer is still a non-traditional machine that is not really "furniture." So where can it be placed to suit the rest of the house? The references and manuals are as problematic as the computer itself.

Ergonometrical arguments proved out; people were uncomfortable when they did not have suitable furniture. The price and aesthetics of the furniture is a problem, people do not necessarily want their houses to look like offices. This was a complaint made by Detrouzos.

All of the cases had either technical, environmental, or spatial problems. Technical problems included the excessive wires which were often in the way and the modem

tying up the telephone. Environmental problems included lighting, heating, and noise. Natural light created a glare on the screen. When the light was blocked others in the room were deprived. Heat considerations could become an issue in warm climates even if the computers have their own fans. Noise from fans and printers is a problem for the user and for the others in the room. Fans and non-silent printers disturb many people. The constant buzz could lead to stress. These problems might be best resolved by isolating the computer in its own room.

The portability of the machinery could help to ease the strain of overlapping activities. Even if the computer is portable, the references will continue to be troublesome. Private spaces will still be sought out.

Social conflicts may have design solutions, for instance, the transition from public to private may be reestablished by design interventions and new house plans. This adapts the untraditionality of new new homes. Other social conflicts can be solved only socially, for instance the differences of balance of power between male and female.

Scheduling is a social solution to conflicts that arise now from the amount of computer use. A schedule acts as a limitation.

There are design conflicts with social solutions. From another perspective, scheduling acts as a social

solution. If there is no space for private work, the person who works at home adapts to the schedules of the rest of the family to find privacy.

Design solutions can be used to solve design problems--architectural design solutions to environmental problems of lighting and noise, or ergonometrical solutions for a better furniture design, or the design of more storage space for smaller computer spaces.

Implications for women are potentially very serious. If women continue to ignore the presence of the computer in their homes their traditional domain may change. New roles within the family may subvert the traditional roles in the gender separation of space and schedules.

In Human Aspects of Urban Form, Amos Rapaport discusses the importance of spatial organization. For him, a fundamental issue is "to organize space for different purposes and according to different rules which reflect the needs, values, and desires of the groups and individuals designing the space."[13]

The computer in the home brings new requirements in organization of the house. The traditional rules of house design may change along with the traditional social patterns in the family.

Physically, the most obvious requirement is to create a private space within the public space. The computer space needs easy connections to public zones, but it has to be private for the user. The home organization has to be

such that the family's private spaces are respected. The
design interventions should be directed to transition
areas, corridors, open spaces that might be closed,
distribution of the rooms, and most private areas.

Questions for the Future:

The new functions of the house and changes in
scheduling may lead one to think of an untraditional life-
style. The electronic cottage may appear as a way of
living not without a series of different implications.

The problems that arose in the cases show how the
computer brought along with it unanticipated consequences.
Will the computer be monopolized by the man, or will the
woman also use it for working at home. The women in these
cases worked outside. Might this be the beginning of a
fundamental change--that the man works at home and the
woman goes outside to work? Finally, how will today's
children, who grow up with computers, relate to their
homes as adults?

Will the computer be an instrument of social con-
trol within the house, through the control of the use
of space?

Will the tradition meaning of home be changed? The
media room is a portent of change. How will the environ-
mental design of a home respond to changing needs of
privacy, isolation, concentration, recreation, and educa-
tion?

If these questions are difficult for middle class
families who have chosen the bring the computer into their
homes what will happen in the homes of the new workers
who have less choice?

appendix

RESEARCH TOOL

Description of the Household

Family members - Who are they?

    How many are you?

    Age ~ Sex

    Occupation - Income?

    Hobbies/Interests

    How did you get involved with computers?

Description of the House/Apartment

    Description of the Space organization.

    of the use of space.

    of the different spaces.

    Dimensions.

    Interior design. Use of space.

    Hierarchical decisions

    Atmospheres in the environments.

Domestic Space

    -What are for you important space requirements within
    the home?

    -Did you have difficulties in placing the computer?

    -Why

    -Did the computer stimulate changes in the home spatial
    organization? in spatial use?

    -Do you use more of the room that you didn't use before

after the computer came in?

-Do you feel the introduction of the computer has
hardened your environment?

-In what way?

-What happened with the intra-family definition of space?

-Has the environment changed since you have the
computer?

-Did you redefine spaces publicly-privately wise?

-How did the new activities around the computer affect
the other activities of the home?

-Was there conflict between different technologies?

-Have you had thoughts about the computer and the space
before this interview?

-Do you care about the introduction of the computer
physically? in the house?

-Do you feel any impact at all?

Computer Space/Computer Intervention in the House

-Did you have difficulties in placing the computer?

-Did you think of a place shareable by all the members?

-Did the computer stimulate changes in the home space?

-Do you feel the computer takes more space than you had
imagined?

-Do you feel it hardens the environment of the home?

-How - physically? Decoration wise? Intra-family defi-
nition of space?

-If someone needs privacy around the computer, how do

you get it?

-How was the home space used before the computer?

-Were there any changes? Which ones?

-Did you have to redefine public-private spaces?

-Does the computer take more space than you thought
 it would take?

 Vital space

 Hardware

 Software

-What use-spaces (rooms) would you like to have close
 to the computer room?

-Connections of the room now with the rest -

 Advantages

 Disadvantages

-Did you have problems with: light, noise, temperature,

-How did you solve these?

-Is there a space where you need concentration?

 dispertion -

 openeness -

 relation to the outside - more than other spaces?

-How do you need to be sitting?

-Do you need special setting of the furniture?

-Description of the Hardware.

 What computer?

 What accessories?

 Space occupied by the machine.

 Space occupied by other components.

Storage of information.

-Description of the software used by casee -

What programs?

Which uses most?

For what kind of work?

Type of Use

-Why did you bring the computer home?

-What kind of uses do you give it?

-Is there any difference in the use you give it during

weekdays - weekends?

-What uses do the different members of the family

give it?

-Are there any activities that you used to do before that

you don't now?

-Which are they?

Work

-What kind of work do you do? (with the computer?)

-How much of your work do you do with the computer at

home?

-Do you use it for part time jobs?

-Why do you work at home?

-Is the quality of your work better?

-Do you work more?

-How do you schedule your working time?

-How do you deal with other people's 9 to 5 schedule?

-If you should meet people, would you go for face-to face interaction? Would you prefer to fix everything though terminals?

When?

Would you ask them to go to your house?

-Do you see your house as a home-office unit entirely?

-Would you like to see it as such? What physical changes would you make?

-If you work entirely at home, what kind of activities would you keep to do outside?

-Have you started different activities since you work at home?

Which?

-Do you find more leisure time?

-How do you use it?

-Would you encourage other people to work at home? Why?

-What do you feel about moving information instead of people or things?

-Has your relation to your work mates changed?

-In what way?

-Would you rather interact more?

-Would you rather interact less? less and better?

Entertainment

-Do you use the computer for entertainment?

-How much do you use it for?

-Who uses it most?

-What is the time you use it most for this purpose?

-How did you decide on this?

-Do you tend to have programs so that the whole family
 plays together?

-Other, how do you distribute yourselves?

-What kind of games do you play most?

-Do you use it for other entertainment purposes but
 games?

Education

-Do you use it for pedagogical purposes?

-Do you use it for computer graphics?

-Do you use it for learning? e.g. a language?

-Would you like to replace school activities with the
 computer?

-Would you tend to replace the whole school education?

Household Activities:

-Would you control the environment with the computer?

-What kind of activities do you have the computer pro-
 grammed for?

-Which is the most important of them?

-Why? Time saving?

 Less travel intra-city?

 Economic reasons.

-Do you take care of home accounts?

 Banking?

Mailing?

Communication sensor?

-Do you feel your house safer since all the security
alarms can be computer-controlled?

-Has the computer changed the distribution of work for
the house?

-Has it changed the time you spend in home activities?

Time

-How long have you had it?

-How many hours a day/week do you use it?

-How much time a day does every member use it?

-How did you schedule it?

-Do you use the computer mostly during the week or
weekends?

-Is there any change in the schedule of the members
during these days?

-Were there differences in your daily schedule since you
have the computer?

-Do you find the computer changed your distribution of
time sharing activities?

-Do you spend more time alone?

with the children?

with the husband/wife?

-In what kind of activities do you think the computer
helped you save time?

-If you have more spare time what do you do with it?

each member?

-Have there been differences in the time you spend
outside?

General Questions

-Have you become more gregarious?

-Have you isolated yourself more?

-If gregarious with what groups?

-If isolation within the family or the family members
individually.

-Do you find yourself interested in new issues?

-Which

-What kind of advantages do you find now in your life-
style as a whole?

-Disadvantages?

-Do you know of other people who have a home computer?

-Do you know if they have experienced changes in their
schedules? in relation to urban activities?

-Do you tend to circle your acquaintances to people
who are also 'computerized'?

-Have you broadened your fields of interest?

AN OASIS IN A SEA OF TECHNICAL JARGON

DEFINITIONS

Computer - "It is not only a computational machine but also a communication device. It can transmit data; store and retrieve information; it can be used to simulate complicated reality." (Bell).

Home Computer - "A turnkey system put together by a single manufacturer that you can unpack from its shipping crate and be able to use as you flick on the power switch." (Diltea)

Communications - Neologism coined by Anthony Oettings of Harvard, to describe the merger of computers, telephone, and television into a new kind of digital code. A single yet differentiated system that allows for the transmission of data or interaction between persons or computers 'speaking to' computers through telephone lines, cables, microwave relays, or satellites." (Bell)

C.P.U. - Central Processing Unit. A unit of a computer that includes the circuits controlling the interpretation and execution of instructions. (Diltea)

Diskette = or magnetic disk - A flat circular plate with a magnetic surface on which data can be stored. It is analogous to a long-playing record. (Davis and McCormack)

Domonetics - "Allan Kiron, a research scientist in the Patent Office, coined this word." (Bell) "A word derived from domicile, nexus, and electronics, to indicate the change in

living patterns that the decentralization of work would make possible." "Allan Kiron, a research scientist in the Patent Office coined this word." (Bell)

Keyboard - The tool for feeding commands and information to the computer. It is similar to a compact-electric typewriter keyboard; the number of keys varies from 52 to 117. It has letter characters and special keys of use in computer programming. (Desktop Computing)

Hardware - Physical equipment, mechanical, magnetic, electric or electronic device. (Nora/Minc)

Information - The meaning that human beings assign to data = facts. It is data processed, given meaning, and communicated. (Davis and McCormack)

Memory - Ability to retain information and recall it when needed. It is stored in microchips in small computers.

Modern - The acronym for modulator-demodulator, encodes and decodes information as audible tones that can be transmitted directly over a telephone. (Diltea) It is an input/output device.

Networks - "allow ultrarapid and selective data transmissions by using telephones, CATV or a simple co-axial cable connection. The personal computer acts as an access port that can be connected to the office, to another town or along the country. It can support interactive games to investment strategies or

news reports or databanks." (Desen)

Printer - A hardware piece that produces a printed copy of the computer output. There are either matrix or daisywheel printers.

Programs - Series of instructions stored in a main memory that tell the computer step by step what to do.

Programming Language - Consists of all the actions that may be performed when a program is executed. It contains instructions providing for the transmission of information from the input (data) to the output (printed text, diagrams, visual displays, etc.). (Nora/Minc)

Software - The entire set of programs, procedures, rules and eventually documents related to the operation of data-processing system output. (Nora/Minc)

Storage - On mass storage devices like magnetic tape, magnetic disk, videodisks. Pertaining to a device in which data can be entered in which they can be held, and from which they can be retrieved at a later time. (Davis and McCormack)

Telecommunications
- "Sizable segment of all communications which embraces the acquisition, transmission and processing of information by electronic means." Definition given by the National Academy of Engineering, Committee on Telecommunications in Telecommunications for Enhanced Metropolitan Function and Form.,

Washington, D.C., 1969, pg. 2.

- ..."Any transmission, emission or reception of signs, signals, written images and sound of intelligence of any nature by wire, radio, visual or other electro-magnetic system including any intervening processing and storage." (Dr. Peter C. Goldmark)

- Telecommunications is a very, encompassing term. It includes many devices which are brought together into a system by telecommunication links. (Michael Herrero)

- Teleinformatics = Telematics - Term used by Simon Nora and Alain Minc to describe the growing interconnection between computers and telecommuniations.

Terminal - Input and/or output station connected to a computer by any data transmission and allowing the transmission and/or reception of messages.

Video Display Monitor - The most common home computer device to retrieve information or show the program. Most video displays offer 16 to 32 lines of type containing up to 64 characters each. It resembles or may be an ordinary T.V. screen--either by modifying some of the set's internal electronics or by using an external matchbox-sized RF modulator, which allows output information to be received on an unoccupied channel. (Diltee)

Word Processor - Physically in Home Computers it is generally a small box that houses a microcomputer attached to the type-writer along with a magnetic recording device such as a cassette or diskette circuit. Letters, reports, papers are typed to a paper and stored in the computer memory. It does corrections to mispelt word, takes out or inserts new para-graphs, sentences or words.

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FOOTNOTES

1. Alvin Toffler, <u>The Third Wave</u>. Bantam Books, 1981, p. 194

2. Ibid, p. 196

3. Robert Cowen, as quoted in Eric Hulteen, <u>The Human Interface with Personal</u> Computers, MIT Thesis, 1982, p. 9

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5. Ibid, p. 50

6. Steve Diltea, <u>A Simple Guide for Home Computers</u>, New York, 1979, p. 18-19

7. Seymour Papert, <u>Mindstorms</u>, Basic Books, 1980, p. 25

8. Niles Orwell, "The Screen Revolution," <u>Technology Review</u>, vol 5, 1982, p. 41

9. Leo Marx as quoted by Samuel Florman, "Trade-offs in Paradise," <u>Technology Review</u>, vol 83, 1981, p. 29

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11. Michael Herrero, <u>New Communities and Telecommunications</u>, University of North Carolina, 1973, p. 32

12. Aldous Huxley, <u>Brave New World</u>, New York, 1946, p. 42

13. Amos Rapaport, <u>Human Aspects of Urban Form</u>, New York, 1977, p. 10

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