HEALTH, HOUSING AND ASSISTIVE TECHNOLOGY
THEIR ROLES IN BRITISH COLUMBIA'S
ELDERLY INDEPENDENCE

by

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ABSTRACT

Health, housing and much more recently, assistive technology, are key determinants of elderly independence in British Columbia. This thesis discusses these three determinants in some detail, and also stresses their interrelationship with each other. Throughout the entire thesis, the elderly's preference to age-in-place (Blackie, 1986; Wheeler, 1982) is stressed.

In the issue of health, the current community-based health care delivery system of the British Columbia Ministry of Health's Continuing Care Division is compared and contrasted with a "counterpart" in the United States: the On Lok Health Services System in San Francisco, California. On Lok is discussed to highlight its effectiveness in delivering a community-based holistic health care system for a group of aging-in-place elderly in need of long term care with relatively low cost.

In the issue of housing, the thesis investigates three avenues in which architects can apply their skills to maximize aging-in-place possibilities for our elderly in the context of British Columbia. Constraints by building codes, health care regulations, real estate market expectations and the aging characteristics of British Columbia's elderly are also highlighted to bring context to the discussion.

In the issue of assistive technology, given the huge range of product
development, the thesis focuses on one particularly interesting communication device - the Videophone. The Videophone is discussed to explore its potential impact for elderly independence, especially for the future.
# HEALTH, HOUSING AND ASSISTIVE TECHNOLOGY: THEIR ROLE IN ELDERLY INDEPENDENCE

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INTRODUCTION

Canada's elderly are potentially on the eve of a major challenge in regard to their health and well being. This forecast may be attributed to a number of social, demographic, health and political factors that potentially threaten the well-being and vitality of Canada's elderly as they age independently:

First, there is an unprecedented increase in the number of elderly in Canada's demographic profile: in British Columbia, for instance, the older population (defined as aged 65 and above) has grown consistently from over 4,000 persons in 1901 to almost 300,000 in 1981, a growth rate of over five times that of the total population in the province in the same period. Furthermore, the increase in elderly aged 80 and above was more than double that of the elderly aged 65 and above (Gutman et. al., 1986). The reality of an aging society has numerous implications, not the least being economic. For instance, society may find it increasingly challenging to continue the traditional supports for the elderly if the ratio of the elderly to the work force continues to climb [from 1:7 to 1:3 by 2031, (Statistics Canada, 1978)].

Second, the cost of health care in North America is growing at what may potentially be increasingly unsustainable rates. It has been estimated in
America, for instance, that the inflation rate of health care costs in the last ten years outpaced the general inflation rate. Furthermore, there is concern regarding the added impact of increasing numbers of elderly. For instance, the Economic Council of Canada (1979) reported that the public expenditures per capita are three times greater for the elderly than for the young.

Third, gerontological research has determined that the elderly prefer to age-in-place for as long as possible (Blackie, 1986). This is so even if their physical dwellings may be less than conducive for their lifestyle and needs in later years. The preference by the elderly to age-in-place is complemented by society's concurrent questioning of the need to have costly and dehumanizing institutional arrangements for the frail and sick elderly (Regnier, 1992). Nevertheless, the numbers of elderly in need of institutional care of some kind exceeds the current supply of such institutions. While this need isn't new, the gravity of the problem, given the increasing numbers of such elderly, has increased. As a result, increasingly more frail and sick elderly are being forced to age-in-place in the community for longer than anticipated. This means that there are increasing numbers of the not-so-well elderly living independently in their own homes despite their failing mental and/or physical capacities. As a result, the need to focus on the design of the elderly's home and its potential in enhancing therapeutic and orthopedic functions has assumed a greater urgency.

Finally, these troubled economic times in Canada has resulted in an erosion of revenues collected by provincial and federal governments. There has
thus been an increasing need to seek ways to cut costs in all aspects of government. In this climate of fiscal restraint, the traditional social programs of Canada's health care and old age payments for the elderly are being seriously scrutinized at all levels of government.

Fortunately, there have also been positive developments that are emerging to counteract the negative factors described above. To begin with, the recognition of the close interrelationship between health and housing toward the elderly's well-being has resulted in the emergence of new and innovative community based health care programs for the elderly. Secondly, assistive technologies to aid elderly independence continues to improve and increase the options available to them, and promises a whole gamut of exciting possibilities in the future.

This thesis is focused on these two positive developments. In general terms, it discusses the three distinct yet interrelated issues of health, housing and assistive technologies.

Regarding the issue of health, I will discuss a relatively recent development in health care delivery in the United States called the ON LOK Health Services Program, which is an excellent case study of a community-based health service program for a group of aging-in-place elderly in San Francisco, California. I will then briefly compare and contrast this model with what is interpreted to be the its "counterpart" in British Columbia: The BC Continuing Care Program.

In the issue of housing, within the context of BC's model, I discuss three
types of applications in which architects can apply their skills to enhance the aging-in-place elderly's health and well-being. These three applications are in the area of existing housing modifications, custom designed and built single family dwellings, and purpose-built multi-residential projects for assisted living.

In the issue of assistive technologies, given the tremendous range and complexity of such devices on the market, I will focus on one particularly interesting device: the videophone, and a discussion on the potential impact this type of device can have on the future design of the elderly's home.

I will conclude by making some interpretive judgments on possible pros and cons of future technology trends. In addition, I stress the importance of the interrelationship of health, housing and assistive technology, and how we as architects should reexamine our roles in future in light of such interrelationships.
CHAPTER ONE
CANADA'S ELDERLY AND INDEPENDENT LIVING

This chapter gives a general overview of the elderly in Canada and the basic characteristics of the current cohort. It is important to describe Canada's elderly first so that the reader will have a proper understanding for the rest of the thesis. I will then discuss the established criteria for elderly independence. This introductory chapter concludes by summarizing several key guidelines for maximizing elderly independence.

- Basic Demographic Characteristics of Canada's Elderly

The last few years have seen attention focused on older Canadians. This is primarily because we are experiencing a rapid increase in the number of elderly Canadians, statistically defined as those aged 65 years old and above (Havens, 1985). The terms 'elderly', 'senior' and 'older' will be used interchangeably to refer to those aged 65 years or older unless noted otherwise. The following are key demographic trends:

- Canada's population is aging. A nation's population is considered 'aged' when those 65 years and over exceed 7% of the population (Havens, 1981). According to the 1991 Canada Census, the proportion of the population aged less than 15 years dropped from 23% to 21% between 1981 and 1991, while proportion of the population aged 65 years and above increased from 10% to 12%. It is projected that by the year 2030,
approximately 20% of all Canadians will be over the age of 65 years (Baldwin, 1993). This projection assumes that Canada’s birth rate, which has dropped since the Baby Boom years, will maintain a fertility rate of 1.8.

• 78% of elderly Canadians live in urban centers (Brink, 1985). There are indications that this percentage will increase in future as the rural communities in Canada go into relative decline, and as increasing numbers of Canadians continue to migrate to urban centers in search of employment. The relative difficulty of accessing medical care, transportation and other amenities of rural areas is also a motivating factor toward urban migration of seniors.

• The majority (91.2%) of elderly Canadians live in private households (Gutman et. al., 1986). There is a strong preference of Canadians to live independently (also known as ‘staying put’ or aging-in-place) versus living in an institutional care home (Blackie, 1986; Wheeler, 1982). It is important to recognize the strong preference of the elderly to live in their own private residences for as long as possible. The majority (75.3%) of older men live in families with a spouse and/or with never-married children. Among older women, the percentage living in family arrangements decreases with age (60.4% in the 65-74 age group, 32.5% over the age of 74). There is an increase in the proportion living in non-family households, many of whom are alone in private households (31.5% of women aged 65-74, 40.98% of women over the age of 75).

It is important to stress that living independently requires a supportive
community and physical infrastructure that will offer services to compensate for the elderly's frailty. As Blackie's (:1986) notes the option of "staying put":

...involves more than just strongly advocating that older persons be allowed to remain in their homes. It requires services which help elderly homeowners with repairs, improvements, modifications and adaptations to their homes. It requires organization and coordination of tradesmen and the appropriate mix of financial assistance. It also needs to extend to providing the families of older persons with advice on retrofitting their homes for aging parents. (p. 1).

- Two thirds of older Canadians own their own home (Brink, 1985). According to the 1991 Canada Census (Statistics Canada, 1992), this figure was 75% in British Columbia.

- Currently, 60% of older Canadians live in single family detached homes, while 12% live in multiple dwelling units (Brink, 1985). There is apparently still a clear preference for the independence and privacy associated with single detached homes. The elderly who are renting generally live in one or two bedroom dwellings that are suitably sized for their needs. The elderly who own their dwellings tend to live in two or three bedroom units that are too big for their needs.

- 50% of elderly homeowners live in homes built in the 1940's (Brink, 1985). Out of this group, 72% of the dwellings needed only regular
maintenance, 15% needed minor repairs and 13% needed major repairs (Statistics Canada, 1982).

- In 1981, 50% of elderly households had an annual income under $15,000. 57% of single elderly individuals, the majority of whom are women, had an income below $7000 (Brink, 1985). By 1985, the income for the average male and female over 65 years was $17,114; and $10,780 respectively (Statistics Canada, 1991).

- According to the 1991 Canada Census, the ratio of elderly women to elderly men was 138:100 respectively. In the 85 years and above category, the ratio of elderly women to elderly men is over 2:1 respectively (Baldwin, 1993). While there are more widows than widowers in every age category, the proportion of widows among the elderly is dramatically higher. Nearly 80% of women aged 85 and over are widows (Havens, 1981). Over the lost several decades there is an increasing tendency for this group to live alone.

- The 'old elderly' female sub-group (aged 85 and above) is generally viewed as being 'less healthy' than men of the same age as reflected by a number of indicators: they have more days per year of restricted activity, more days of bed-disability, more doctor's visits, higher expenditures for health care are more likely to experience depression, and are more likely to be institutionalized than men (Havens, 1981).

- It is a myth that older people as a group are high consumers of health care (Novak, 1988). Different groups of older people use different amounts
of health care. (Eg. women 85 and above use more health care than men of the same age as explained in the above paragraph.) From the Manitoba Longitudinal Study on Aging (MLSA), Roos and Shapiro (1981) offered the following data:

1) The MLSA showed that older people do not form a single group. Some groups use more health care than others. Most elderly use a small amount of formal health care, or none at all. The patterns of this use was found to be stable. (Mossey et al.1981, 557)

2) Less than 25% of Manitoba's elderly stay in a hospital in any given year. Out of this group, 5% of the elderly used up to 59% of all the hospital days.

3) Older people as a group do not make large numbers of visits to doctors; this cohort makes only 1.7 more visits to the doctor per year than the 15-44 age group.

It was concluded from the MLSA that most elderly do not need or use excessive institutional or medical health care. Furthermore, the health care that is needed can often be delivered in the community (Novak, 1988).

There is concern as to the impact of our increasing numbers of elderly on our health care costs. While the contributory factors to increases in health care costs are numerous and often interrelated, it has been suggested by Douglas E. Angus (1984) in his paper entitled 'Health-Care Costs: A Review of Past Experience and Potential Impact of the Aging Phenomenon' that:

"...perhaps one of the most important determinants of the increase in health-care costs...have been a reduction in mortality and an increase in life expectancy. Conventional
wise suggests that the increasing number of elderly people have increased the demand for routine medical care, especially for chronic conditions, and this produces greater than proportionate increases in health costs.”

In light of Canada's changing age structure, the ratio of the elderly to the work force (persons aged 18-64) will climb from 1:7 to 1:3 by 2031, while the youth dependency ratio will fall significantly (Statistics Canada, 1978). The Economic Council of Canada (1979) reports that public expenditures per capita are three times greater for the elderly than for the young. In addition, Gross and Schwenger (1981) further concluded that by 2001, the elderly will consume 46.5% of health care services and by the year 2026, 56.6%.

- The Elderly and Independence

How do the elderly perceive independence? The term "independence" has few explicit definitions. However, there are three major criteria implicit in the research of elderly independence (Keating, 1991):

The first is the ability of the elderly to maintain control over their near environment; their ability to meet personal needs (Alberta Senior Citizen's Secretariat, 1986) and to maintain responsibility for decisions in these areas (McClelland and Miles, 1987). Maintaining "control" includes the ability to carry out Activities of Daily Living (ADL), and the ability to live in a home environment with enough facilities to enable the elderly to
manage their ADL.

The second criteria of independence is the ability of the elderly to remain part of the community (Keating, 1991). The preference of elderly to "stay-put" versus staying in an institutional setting is a good example of them remaining part of the community. Beyond just living in their own homes however, remaining in the community also includes the integration of the elderly into the community (Ontario Advisory Council for Disabled Persons, 1988). Community integration would include maintaining separate households as opposed to living with children (Kivet and Learner, 1980); not being homebound (Fritz and Orlowski, 1983); and not living in an institutional setting (Neufeldt, 1974). Other issues of community integration include the ability to do work and leisure activities, and having the adequate mental and physical health to participate in the community (Keating, 1991).

The third criteria of independent living involves the ease of use to services, such as groceries stores, banking, health care etc. (Keating, 1991). Havens (1980) argues that accessible services are seen to be the biggest need of independent living elderly. While there is disagreement over what factors best measure this access (e.g., distance, cultural barriers, cost), research suggest that lack of transportation is one of main obstacles to services, and hence elderly independence (Keating, 1991). Given the closer proximity and greater abundance of services in urban areas, coupled with better public transportation facilities, it would appear that urban dwelling elderly are more likely to have easier access to services that rural dwelling elderly.
Conclusions

From the demographic characteristics of the elderly in Canada, three useful conclusions can be drawn. One, the rising numbers of elderly in our country mandate that careful attention be focused on understanding and providing for their needs. Two, given the desire for independent living of the elderly, effective social policies for the elderly must maximize aging-in-place possibilities (National Advisory Council on Aging, 1983:84). Three, the increase in health care costs mandate that society help the elderly to remain healthy and independent for as long as possible. Institutionalized health care should be utilized only when it is no longer feasible for the elderly to live independently.

In summary, to maximize elderly independence, we can thus deduce four key guidelines:

First, the elderly must be allowed to age-in-place in their own homes for as long as possible. Institutionalization should be used only when it is no longer feasible for the elderly to live independently.

Secondly, the independent elderly must have access to medical and social support to maintain health and well being while living in their homes. In other words, the health care they receive must be community-based.
Third, the nature of health care they receive should always be geared towards maximizing their independence as much as possible. For instance, if an older person can remain independent with a motorized wheelchair and subsequent minor home renovations, then giving this elderly person the wheelchair to prolong the person's independence is a more economical and preferable solution to institutionalization. In this regard, the use of assistive technology to help maximize their potential for independence may be very helpful.

Fourth, the home of the elderly will have significant impact on their ability to remain independent, especially as they start to lose mental and physical capabilities. Thus, the design of the home to accommodate and support the elderly's needs becomes increasingly critical as the person ages, especially in light of the elderly's preference to age-in-place.
CHAPTER TWO

HEALTH CARE FOR THE INDEPENDENT ELDERLY

This chapter begins with a general historical overview of the health care system in Canada, from which the socialized health care delivery system in British Columbia draws its origins. It will then discuss the ON LOK Senior Health Services, a revolutionary community-based private health care delivery system for some frail but independent elderly living in San Francisco. It will be followed by a discussion of this health care delivery model's "counterpart" in British Columbia: that of the BC Continuing Care Division. The chapter concludes by highlighting some comparisons and contrasts between the two.

Health Care in Canada: A Brief Historical Overview

The provision of social services, of which health care is a prime component, was not an important issue during the time of Canada's confederation in 1867. It did not become an important issue until the early part of the twentieth century (Chappell, 1985). The British North America Act (BNA) enacted during confederation did not include provisions for welfare measures, and limited the government's minimal contribution to locally administered relief funds for the poor. Essentially, people were expected to fend for themselves. In 1927, the federal government initiated the Old Age Pensions Act, which established a 'national non-contributory, means-tested plan for providing some income' for the retired. This plan represented the first major attempt by the Canadian federal government
in social welfare. After the enactment of this Act, welfare legislation began to develop regularly, and the federal government's share of contribution to such welfare plans began to increase as well because many of the poorer provinces were unable to contribute, especially during the Depression years (Chappell, 1985).

Old age security payments to retired elderly increased with the enactment of the Guaranteed Income Supplement (GIS) program in 1960. Further legislation followed, and the welfare legislation today is essentially a conglomeration of all the different pieces of legislation added to the Old Age Pensions Act enacted in 1927. Currently, Canada has a three-tiered pension system consisting of private income/investments/savings (e.g. RRSPs), public pension plans (Canada/Quebec Pension Plan CPP/QPP) and government transfers (Old Age Security i.e. OAS, GIS, and Spouse Allowance i.e. SA) (Novak, 1988). Without these government transfers, more than 50% of Canada's elderly would live in poverty.

As the movement to provide income security was in progress, the federal government also took steps to implement health care for everyone, including the elderly. It is important to stress that the development of the formal socialized health care system in Canada is closely related to the development of the medical profession (Chappell, 1985). Prior to the Depression, health care was the domain of private schemes, and the services provided varied widely in quality and availability. The Depression forced many of these schemes to fail, even as large numbers of people became unable to afford the care. In his book titled 'Canada's War: The Politics of the Mackenzie Government, 1943-1945', Granatstein (1975)
argues that Mackenzie King was instrumental in making health care universally available to all Canadians. His political intentions included avoiding massive unemployment and popular unrest after the war, using social welfare legislation to create work for many government civil service employees who feared dislocation in returning to peacetime, and the desire to use health insurance as a tool to help the Liberals get re-elected. Mackenzie King created a Committee on Reconstruction which argued for universal social security on the merits of the costs being carried by the whole of society. The work of this committee, and others after it, ultimately resulted in the Medical Care Act passed in 1965/66 which provided a national insurance scheme for physician services (Chappell, 1985). The process toward socialized medicine culminated with the Canada Health Act of 1984 that defined the five principles of Medicare: comprehensiveness, universality, portability, accessibility and public administration (Seaton et.al., 1991).

The Medical Care Act insured that health care in Canada would be based on physician-centered services, i.e. the Medical Model of health. While this plan is administered provincially and is thus open to some inter provincial variations, it remains that access and use are controlled by physicians. The treatment under Medicare focuses on cure and acute care, and less

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1 In everyday use, the word ‘health’ is synonymous with physical and mental well-being, a healthy person being assumed to be of sound mind and body. However, the scientifically accepted definition of health, and its consequent scope of research and implications, has changed over the years to encompass many different but related issues. The traditional definition is the Medical Model, defined as an absence of disease, both mental and physical. The focus, and consequently the responsibility, is on the individual who succumbs to disease. This traditional view treats diseases only when the symptoms appear, and little or no attention is given to promoting healthy lifestyles or health promotion/disease prevention (HP/DP) activities (Health Education Unit, 1986). Still in wide acceptance in medical circles, the Medical Model thus gives the primary role of health care to doctors and nurses.
emphasis is placed on chronic conditions, health promotion, disease prevention, or lifestyles. The primary role of physicians in the Medicare system is evidenced by the exclusive control they have on the provision of hospital utilization, drug prescriptions, lab tests etc. (Chappell, 1985). This control has contributed in part to the dominance of hospitals in providing health care services in Canada. The relatively abundant provisions of hospital building programs in both Canada and the United States is in sharp contrast to the lack of development of community services. Chappell (1985) further argues that the provision of community-based programs have tended to develop as "add-ons" to existing institutional and medical care.

The dominance of physician-centered health care is clearly reflected in the health care budget. For instance, in 1992, British Columbia spent 5.4 billion dollars on health care, of which 2.54 billion was allocated to run hospitals. The Medical Services Commission (from which doctors and paramedical salaries are taken) took up an additional 1.4 billion, (second highest expense) while community based efforts such as health promotion had only 389 million in comparison (Staff, 1993). The physician-centered nature of Canadian health care has numerous benefits for us all, but one unfortunate aspect of its continued development and emphasis has been, and continues to be, its consistent cost increases that outpace the cost increases of other social services. The current health crisis in both America and Canada is a testament to the growing cost increases of health care in the last 20 years. While the physician-centered nature of health care in these two countries have played a primary role in the cost increases, it is naive to blame the doctors alone. The problem is enormous
and complex, and other contributory factors include the litigious nature of both countries (resulting in high malpractice insurance rates and wealthy lawyers as opposed to better health care), the conflict-of-interest associated with doctors and hospitals sometimes having to 'recruit' patients or requiring unnecessary visits to increase their billings, and the selfish nature of western society as a whole that demands many sophisticated and oftentimes unnecessary or questionable treatments and tests. It is cynically argued that current government initiatives on both sides of the border toward socialized medicine in the United States, and toward community based medicine in Canada, have been mandated not by progressive attitudes and knowledge of health care or health care delivery systems, but by increasing financial difficulties.

• The Continuum of Care during the Aging Process

A key concept associated with providing adequate health care for the elderly concerns the varying levels of care required by older people as they age. The Ministry of Health defines five levels of long term health care: Personal Care (PC), three levels of Intermediate Care (IC) and Extended Care (EC). Generally speaking, the elderly progress from Personal Care to Intermediate Care to Extended Care as they age and lose their physical and/or mental capabilities. Inevitably, as one progresses from one stage of care to another, there are overlaps in the levels of care required in the aging process.
Personal Care involves assistance with Activities of Daily Living (ADL). The elder in Personal Care is usually independently mobile and needs minimal assistance (about thirty minutes of lay help per 24 hours) with ADL. Personal Care is now increasingly being phased out of institutional care settings. Intermediate Care is categorized into three progressive levels of care. In Intermediate Care One, for example, elderly may have difficulties expressing needs, require some supervision (approx. 60 min. lay help, 15 min. professional help per 24 hours) with ADL, and may be mildly depressed. They also need daily supervision of medication and other medical care. Intermediate Care Two elderly may in addition have severe disability/ medical problems, incontinence and have an indwelling catheter. The level of supervision required increases to about 70 minutes of lay help and 30 minutes of professional help per 24 hour period. In Intermediate Care Three, the elderly may show antisocial habits (e.g., spitting, voiding, and defecating in public), destructive behaviors (shouting, screaming) and wandering in addition to the medical conditions described in IC One and Two. Extended Care applies to the most frail and chronically ill elderly, and describes the formal health and care services available in nursing homes and chronic care facilities. In Extended Care, 24 hour lay and skilled professional care is required. Patients require some assistance with mobility, and total assistance with ADLs. They also need planned social stimulation, protective atmospheres (institutional settings) and a staff ratio of one professional to every four lay aides. Most of those

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2Activities of Daily Living refer to the basic activities we are required to do everyday to sustain health and wellbeing to our bodies. Examples thus include activities involving eating, cleaning our bodies and sleeping. Instrumental Activities of Daily Living (IADL) describe those activities that we do in order to enhance our ability to carry out ADLs. Examples of IADL would include shopping, going to the bank, and driving.
elderly in need of Extended Care can only be adequately cared for in institutional care settings like nursing homes.

Within the above context, we will next briefly study two "models" of health care delivery: the On Lok Senior Health Services system, followed by British Columbia Ministry of Health's Long Term Care Division. We will discuss these two models not because they are equal counterparts of each other across the border, but because the two models do currently serve comparable patients: that of aging-in-place elderly in long term care.

**· ON LOK Senior Health Services**

On Lok is a free-standing community based long term care program serving the frail elderly in the Chinatown-North Beach community of San Francisco (Ansak & Lindheim, 1983). The name "On Lok" is Cantonese for "happy and peaceful". On Lok represents a revolutionary alternative to the traditional means of caring for frail elderly in the United States: that of the nursing home.

On Lok delivers its senior health services in two basic ways. The first is through its Adult Day Health Centers. The second is through its housing for the frail elderly, also associated with Adult Day Health Centers.

*On Lok Adult Day Health Centers*

On Lok's Adult Day Health Centers (ADHCs) offer adult day health care to
eligible seniors in their neighborhood. These seniors are eligible for On Lok once they become State certified as eligible for nursing home. This care comes in the form of an organized day program of therapeutic, social, and health activities and services provided to elderly with physical and/or functional impairments. The overriding intent of the care is to restore and/or maintain the elderly's optimal capacity to live independently. When provided on a short term basis, On Lok's adult day health care serves as a transition from an acute health care facility e.g., hospital to independent living. When provided on a long term basis, the same care serves as a viable alternative to institutionalization in nursing homes - where 24 hour supervision is not medically necessary or desirable (Ansak & Lindheim, 1983).

There are currently four On Lok ADHCs in the Chinatown-North Beach community of San Francisco. They serve the frail elderly who qualify to live in long term care nursing homes, but have decided to remain in their own homes while being cared for by On Lok located in a densely populated community area with many elderly, these health centers are truly community based, and are within walking distance for many of their patients. For those seniors that may live too far away, On Lok vans pick them up at set times in the mornings and drive them home in the afternoon. The drivers of these vans get to know their elderly patients, referred to as "participants" on a personal basis, and physically carry them in wheel chairs if they have mobility problems. The elderly are encouraged to be as independent as possible, so the amount of help the driver gives is determined by how much the elderly wants (Steenberg et. al., 1993).
The day health centers are open seven days a week, from 8.00 a.m. to 4.30 p.m. Most On Lok seniors attend their center about 5 hours a day, and about 14 days a month (Ansak & Lindheim, 1983). What happens at the centers? A comprehensive, multidisciplinary program of personal care, reality therapy, crafts, exercises and other recreational activities is provided. Patients also receive personal and regular monitoring by the On Lok staff physicians, nurse practitioners, nurses, therapists and other health professionals dedicated to individual therapy and counseling. Nutritional services, including meals and snacks designed to meet dietary requirements, are served three times a day. In short, what the seniors at these day health care centers get is personalized, high quality care of a medical and social nature during the day. At the end of the day's activities, they are driven back to their own homes to live their private lives. Should they need medical attention at night, On Lok's doctors and nurses are available on call.

It is important to stress the variety of social and therapeutic activities in these centers, and the freedom the seniors have in choosing what activities they would like to participate in. They sit where they want to, and space gets filled up on a first come, first serve basis. Activities vary daily, and from center to center. Examples of activities include story telling, dancing and bingo. The seniors can choose to be active participants or passive observers. In short, these seniors, although state certified to long term care in nursing homes, are encouraged to have active, involved lifestyles at the center.
The adult day health care centers are also equipped with facilities for providing medical care. For instance, the Bush Street Center has separate areas for physical therapy, social work, rest/treatment, nurse's office, dental room and dining/occupational therapy. Rooms that require relative isolation and privacy like the dental office and rest/treatments are carefully designed as distinct, private rooms. Other spaces function better if they are adjacent to people and activity. For instance, dining/occupational therapy is located adjacent to the main activity room.

The main activity room is the hub of senior activity in the center. The majority of group activities are conducted in this space, which is ideally centrally located, with a bright, high ceiling, natural light, and an open, airy feeling. The designs of the four On Lok day health centers have been studied to evaluate their strength and weaknesses. For further information, please refer to Ansak & Lindheim (1983).

The adult day health care (ADHC) centers are designed to accommodate 40-60 people each. For planning considerations, this translates to approximately 70-85 s.f./person, if dining is not a separate space. It is argued in Ansak & Lindheim (1983) that if the number of participants per center gets larger than the recommended range, the personal relationships between staff and participants suffer. Furthermore, if the area of the center gets too big, then the ideal spatial relationships suffer, and the center begins to lose its intimate scale. This concept is crucial, because one of the key reasons why On Lok's health care delivery system is so successful is simply because the participants like to come to the centers. For most of them, the activities at the center are what makes their day. In short, the center has to function as a home away from home for these
participants.

The activities of On Lok are funded though Medicare and Medicaid and private pay and private insurance. On Lok participants are required to sign over their Medicare and Medicaid coverage. In return, On Lok assumes complete control and responsibility for their total health and social needs, as long as the participant agrees to use On Lok's multidisciplinary health care team, made up of doctors, nurses, therapists, and other paramedical staff (Lewin, 1994). On Lok gets paid the same amount per participant regardless of their actual health care costs for that participant. This amount is set by Medicare and Medicaid, and is based on averaged costs per elderly in the area's nursing homes. Because the amount On Lok receives per participant is the same regardless of actual care costs, there is an incentive to maximize senior independence and preventive health care measures. Furthermore, On Lok assumes full financial risk for the care of its participants. As a result, it has also assumed full responsibility for the participant's care, which means that it has the mandate and resources to cater to other health care related issues for the elderly: their housing and social/community support. The result is thus a holistic approach to the participant's well-being.

This holistic approach is in the hands of On Lok's multidisciplinary health care team, made up of doctors, nurses, therapists, nutritionists, and other paramedical staff. Not only are they responsible for assessing the needs of a participant, they are also responsible for implementing the subsequent required services. In contrast to traditional approaches where multidisciplinary teams are physician-led, On Lok's team is truly an
integrated team of collaboration (Zawadski & Eng, 1988). Each professional individually assesses the participant according to a defined protocol. Weekly team meetings are held to discuss and monitor the participant's progress, with complete assessments made of each participant every three months. The same assessment team also decides on the treatment plan, and is thus able to make necessary changes very efficiently. The dual role of the multidisciplinary team in both assessment and implementation of treatment plan is unique among community based long term care programs.

What happens if for some reason, the On Lok participant becomes unwilling to come to the Adult Day Health Centers? On Lok classifies cases like this as home care cases, and assigns members of its multidisciplinary team to visit the participant to provide reassessment and to give some counseling and encouragement. Every case of this sort is unique depending on the individual and his or her circumstances. If efforts at persuading the participant to come back willingly to the Adult Day Health Centers fail, On Lok will not force the issue, but instead assigns a home care team for the participant for as long as it is effective.

The needs of On Lok participants may change to the point where they no longer benefit from attending the Adult Day Health Centers. In terms of the B.C. system, the elderly participants in this category are those whose needs have progressed from Intermediate Care to Extended Care. These elderly need to be institutionalized. To meet this need, On Lok has contracts with some of the nursing homes in the area, and admits its participants to these nursing homes when there is no other viable
alternative of care within the On Lok system. Generally speaking, the elderly by this time are usually so frail physically or mentally, that the average stay at nursing homes is about a year. On Lok pays for the costs of keeping the participant at the nursing home.

On Lok also has contracts with some of the hospitals in the area to allow it to admit its participants during after-center hours or for emergency acute cases. If a participant requires surgery, for instance, On Lok will arrange for the participant to be admitted to the suitable medical institution to carry out the procedure. This is because it is not cost-effective nor pragmatic to equip the Adult Day Health Centers to deal with such intensive acute care facilities. Like the case of nursing homes, On Lok also pays for the whole cost of hospitalization for the participant.

On Lok Housing and Adult Day Health Centers

The other way in which On Lok provides care for its participants is in the area of housing. This development occurred after On Lok's multidisciplinary team faced numerous obstacles in arranging suitable housing for some of its frail elderly in the neighborhood. Problems encountered included unsuitable rental accommodations and fearful landlords unwilling to assume risks associated with old, frail people. On Lok House was opened in 1980 as a community based purpose-built housing for its frail elderly.

Located in the same neighborhood as the day health centers, the important concept to stress about On Lok House is that it is designed basically as a

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3 The average On Lok participant is 82 years old and has 5 medical conditions.
hotel. A six story building, the top four floors are dedicated residential floors with studio and one bedroom apartments. On Lok initially wanted to design each residential floor as a family unit with a common sitting area, kitchen and laundry. The residential units would each have small Pullman-type kitchens for those who preferred to cook alone, designed for the needs of one person only. The common area would thus be a gathering place for the residents of that floor, providing an opportunity for socializing, games, and entertainment of families and friends. In return, the individual residential units would be smaller, meaning that more units could be built from the same floor footprint.

Unfortunately, On Lok was not allowed to build On Lok House with this concept. Instead the Federal department of Housing & Urban Development (HUD), which was the principal funding agent for the project, insisted upon its own minimum multi-residential design standards, which included each unit to be designed as an independent dwelling with a functional kitchen. This caused the individual residential units to become much larger, the result being that the common areas in each floor had to be almost eliminated to allow the cost ratios to work. In short, the typical residential floor plans became basically apartment-type designs linked only by circulation corridors. It was most unfortunate that a crucial concept in independent living supplemented by generous environmental opportunities for social and communal interaction was not realized. The insistence of HUD on those minimum standards is even more difficult to understand when one considers that not only were the residents frail seniors with various mental and physical incapacities, but that the majority of them were likely to have their meals in the accompanying
adult day health center located on the first floor of the building! On Lok had designed the residential component not as a separate endeavor to its health care delivery system, but as a supplement to the adult day health center concept. In other words, the On Lok House was built to cater to the housing needs of the participants, but the primary vehicle for delivering the health care is still through the centers. The only difference here is that both operations are located in the same building for obvious reasons.

In summary, the characteristics of On Lok's health care delivery system through its adult day health centers is unique and revolutionary for the following reasons:

1) It encourages the elderly to continue living in their own homes, even though many of them are old and frail, and are state-certified to be eligible for nursing homes. The average On Lok participant is aged 82 years, and has more than five serious medical conditions (Ansak, 1990).

2) The care provided is holistic. The medical model of health is discarded in favor of a preventive and progressive one that recognizes coexisting needs such as housing, psycho-social supports and in-home supports. With such comprehensive medical, restorative, social and supportive services provided, all acute and long term care options are thus utilized to create a much broader service range than conventional community based services and nursing homes.

3) The integrated multidisciplinary teamwork approach that is not physician-led and is dual-roped in formulation and implementation of treatment plans is clearly progressive and
quite unique.

4) Funding is integrated. All payments from Medicare, Medicaid or other private insurance sources are pooled together to provide services. Not only is this collective pool larger, it also is free from restrictions of individual health plans that complicate administration and reduce efficiency and uniformity.

5) On Lok assumes financial risk as a provider of care. As a result, it assumes full responsibility for the complete care of its participants. The financial risk provides a powerful incentive for it to increase its service system's efficiency and effectiveness. Obviously, the participants are the primary beneficiaries in this endeavor.

The perceived strength of the On Lok method of health care delivery is evidenced by many pilot projects across America that are replicating On Lok's model. On Lok is currently the prototype for PACE, the Program of All-inclusive Care for the Elderly, which also purports to offer a solution to the sharply rising health care costs in America. It is estimated that both federal and state governments achieve savings through On Lok's program, with Medicare saving about 6%, while the State of California saves up to 30 %. Through PACE, the On Lok model is now being replicated in Colorado, Illinois, Massachusetts, New York, Oregon, South Carolina, Texas and Wisconsin. Additional PACE sites are also being developed in Oakland and Sacramento in California, in Illinois and in Hawaii.

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4The numbers are obtained from On Lok's "A Celebration of Life - The Campaign for the Dr. William L. Gee House" Brochure.
• The British Columbia Ministry of Health's Continuing Care Program

Under the BC Medical Act, the provincial government carries out its mandate of universal health care for all residents of BC through the Ministry of Health. Community-based care under this Ministry is served at the municipal level by local health departments. We will use the Vancouver Health Department as our model for discussion. While there are minor variations between all municipal health departments, discussing the Vancouver Health Department will give the reader a good overall understanding of how the other municipal health departments operate.

The Vancouver Health Department is made up of two major departments: The Continuing Care Division and the Prevention Division. Under Continuing Care are found two services: Home Care and Case Management (which used to be called the Long Term Care Division).

The majority of BC's aging-in-place elderly in need of continuing care are under the British Columbia Continuing Care Division (BCD). The BCD provides a variety of in-home support services, residential care services and special support services to assist people whose ability to function independently is affected by health-related problems. A simple, straightforward comparison of On Lok and BC's Continuing Care Division (BCD) is not possible. There are a few important reasons. First, On Lok is a private, non-profit organization, while the BCD is a government agency. While the former is smaller and easier to describe and categorize, the
latter is not. Second, the resources available to aging-in-place elderly in BC extend beyond that offered by BCD, which we will discuss later. Third, the health care rules in the United States are different from those in Canada. While health care in the United States has largely been funded by the individual and/or private medical insurance (and is thus prone to free market forces and variability in services paid for), Canadians have had the good fortune of universal, socialized medicine which provides uniform services to all. Medicare and Medicaid provides selected services to specific population, disabled, poor and elderly.

Two qualifying statement are in order. First, given the size and complexity of the health care delivery system for seniors in BC, the ensuing discussion is not intended to be comprehensive or definitive. Rather, it represents the information and subsequent conclusions drawn from numerous conversations and interviews with selected health care professionals, government bureaucrats, volunteers, lay aides, and seniors from the different governmental and private agencies and departments that all play some role in the delivery of health care to the elderly in BC. Secondly, the entire BC health care system is currently in a state of reorganization, and many decisions on how the system will be structured in future are yet to be made (see discussion on BC's community based health care delivery below). Consequently, the following discussion is of a system in flux.

In recognition of the elderly's preference to age in place (Wheeler, 1982; Priest, 1985), the Continuing Care Program was set up to help the province's elderly with chronic health problems by bringing the necessary support to their homes or providing care in a residential facility as close to
their home as possible (Ministry of Health, 1985). Elderly residents in the province are eligible for program benefits if they are unable to cope or function independently because of health-related problems, and includes adults from the age of 19 and up. To initially get services from the BCD, the elderly must first contact their municipal health department. For instance, an elder living in Vancouver would contact the Vancouver Health Department's Continuing Care Division.

Upon referral, either by the elderly themselves or their families, a Case Manager (formerly called the Long Term Care Assessor) will then visit the person to evaluate their condition and make the necessary recommendations. The assessor acts as the elderly's case manager, and is responsible for setting up the right support agencies to help the elderly. Some of these support services, like respite care, adult day care and facility care, are Ministry of Health funded and bear no cost to the elderly. Other support services, like Meals-on-Wheels, Lifeline, and Red Cross equipment (e.g., wheelchairs) are available only on a paid-by-elderly basis. Thus, many poorer elderly may not be able to take advantage of some of the paid-by-patient services provided by the BCD.

As mentioned above, the BCD provides a variety of in-home support services, residential care services and special support services to assist people whose ability to function independently is affected by a health related problem. In-home support services include home maker services\(^5\),

\(^5\)homemakers provide personal assistance with ADL.
meal programs⁶ and clinical services⁷. Residential care services include nursing homes⁸, family care homes⁹ and group homes¹⁰. Special support services include adult day care centers, respite care¹¹ and assessment and treatment centers (SSATC) to be discussed further below. (Health, 1994). These services are thus targeted to help people who want to age-in-place without constant professional care. Examples of home care services include nursing care, occupational therapy, physiotherapy, speech therapy (for children only) and nutrition. Community services include Meals on Wheels programs, Telephone Contact Services, and Red Cross Loan services for sickroom equipment etc. Some telephone contact services allow an elderly to easily access an emergency response center of a nearby hospital by pressing an emergency call button usually worn around the neck (MERL, 1993; Lifeline, 1993). Others offer counseling support services e.g. Careline. Homemakers visit the home of an elderly and do day to day chores to help the person remain independent in their home (Para-Med 1993). This care team is usually headed by a nursing supervisor who does the initial assessment of the elderly's needs based on the Case Manager's (CM) plan of care.

It is important to stress that many of the above programs are stand-alone services that may be run by different for-profit, non-profit private, semi-

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⁶Meals-On-Wheels is available on a paid by patient basis and delivers hot, nutritious meals to the elder’s home.
⁷Clinical services include nursing, physiotherapy and occupational therapy.
⁸Nursing homes provide institutionalised 24-hour care.
⁹Homes that provide care and supervision in a family atmosphere.
¹⁰For young adults with disabilities to maintain their independence by living in a private residence and pooling resources to save on expenses like rent and groceries.
¹¹Temporary substitute for primary non-professional caregivers (e.g. family member) either through home respite service or by admitting the client to a care home for a short period.
private or government agencies. Furthermore, because they provide their services as per the instructions and recommendations of the CM, these different services may not know or understand the entire range of services that is being provided for the elderly. Generally speaking, there is potential for lack of coordination between these separate services, thus impacting their collective efficiency or effectiveness for the elderly. Nevertheless, these different, distinct services together form a community-based pool of community supports that the Continuing Care Division CM accesses to customize a suitable program of home-based care for the elderly. Thus, strictly speaking, the CM is the primary conduit of community-based supports, i.e. the specialized centers designed to do quick assessment and treatment of individuals experiencing a change in their health status with the intent to provide early and appropriate interventions and potentially avoid hospitalization.

As varied as the programs described above are, their primary function tends to be more of social and community support for the elderly. Health care services for the independent elderly as defined by the Medical Model is still primarily in the hands of the elderly's family physician (FP).

The elderly's family physician (FP) is a vital contributor to health care needs. We can conceive of the FP as the gatekeeper to health care in this province. For instance, if an aging-in-place elderly woman feels in need of medical attention, she usually will first visit her personal doctor. The doctor then decides if further care is required, and if so, a referral is made to the appropriate source. FP's continue to play an active role even after institutionalization. For instance, the Burquitlam Lion's Care Center in
Coquitlam allows its residents to retain their own FP even though the nursing home provides 24-hour supervised Intermediate Care. The role of the FP is an excellent example of how the BCD uses existing resources form the health care delivery system to fulfill its mandate. Yet it is important to stress that the role of the FP is somewhat determined by the willingness of the elderly to visit. Thus, if a sick elderly chooses to be reclusive, there is no systematic way for the FP to be kept abreast of the development.

In complicated cases the FP may refer the patient to a hospital-based Short Stay Assessment and Treatment Center (SSATC), especially if the patient has a change in their health status that is more chronic than acute in nature. The SSATC can be conceived of as an emergency pit stop in a car race. The intent is to fix up the patient as quick as possible so that they can then be discharged to go back to their individual, independent lives.

To further understand the central role played by the SSATC, let us further examine a good example of one: the Mount St Joseph's Short Stay Assessment and Treatment Center, Vancouver.

**MOUNT ST JOSEPH'S SHORT STAY ASSESSMENT AND TREATMENT CENTER, VANCOUVER.**

This center is a specialized health unit offering assessment and treatment services to older adults experiencing health changes that interfere with their functioning and independence. The center is staffed by a

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1 2Family physicians are paid according to fees charged to BC's Ministry of Health as part of the province's system of socialized health care, as opposed to the privatized health care in the United States where doctors bill their patients or their private health care insurance companies directly.
multidisciplinary health care delivery team, and is further supplemented by the range of medical and diagnostic services available at Mount St. Joseph. (MSJ, 91) The goal of the SSATC is to allow community living elderly in the Lower Mainland to maximize their functioning and independence.

The geographic location of Mount St. Joseph Hospital means that it serves a large proportion of elderly ethnic groups not necessarily proficient in English. To overcome possible communication barriers, SSATC provides interpreter services, as well as literature printed in Chinese. Mount St. Joseph's SSATC is one of the few SSATCs in BC that offer translation services in Chinese.

Like On Lok, the SSATC has been moving away from the traditional physician-dominated health care approach in favor of a multidisciplinary team approach. The team consists of doctors, nurses, occupational therapists, physiotherapists, social workers, and other paramedical staff. The intent, like On Lok's, is to allow these different yet overlapping disciplines to complement each other's expertise and thus deliver the most holistic and comprehensive health care possible to the elderly patient. The staff meet regularly to discuss patients at the SSATC, assess their needs, and determine the appropriate course of action.

Another feature to note about the SSATC is its community orientation, which is also in keeping with the BC Government's new health care strategy. Most of the patients at the SSATC are community living elderly. Often, the friends and relatives of these elderly contact the SSATC to visit
the elderly to assess their needs. This is because the elderly may not be aware or be willing to seek medical counsel themselves. The SSATC's community assessment staff will visit the elderly to go through a prepared list of questions to develop a comprehensive assessment of the patient's social, financial, emotional, physical environment, mental environment and medical needs. Depending on the elderly's condition, relatives may be present to aid the assessment process. This assessment will then be shared with the multidisciplinary team at SSATC, who collectively decide the appropriate course of action.

The Mount St Joseph's SSATC offers a In-Patient Program, and a Day Hospital Program. The In-Patient Program is for those that need to be hospitalized for short stays. The intent is diagnose and treat and return the patient back to health as soon as possible, after which the patient is discharged back to his/her home. The care given is predominantly for patients with chronic problems. Acute cases are admitted to the Acute Care Division of the Hospital. The Day Hospital Program is similar, but patients do not spend the night. This program has two streams. The Physical Stream is held on Mondays and Wednesdays, and is focused on treating patients with physiological problems. The Cognitive Stream is held on Tuesdays and Thursdays, and caters to patients with mental or psychiatric disorders.

Although there are many similarities between On Lok and MSJ's SSATC, there are crucial differences that need to be noted. To begin with, the care provided by the SSATC is primarily medical in nature. Even though the Day Hospital Program has some social and therapeutic activities, it differs
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from On Lok's program in important ways: First, the patients are admitted to the Day Hospital Program only if they are assessed to be in need of medical treatment by the SSATC. Thus, patient visits may be frequent enough to treat medical problems, but not frequent enough to provide social and community relationships of significance. Second, the setting is still geared toward treating the problem. It is not as focused on health promotion, preventive measures or social supports. Given that the SSATC is not solely responsible for the elderly patient, treatment is given on an as-required basis, and only if the patient qualifies for BC's Continuing Care Program\(^{13}\). Furthermore, the treatment of the patient stops after discharge. The patient is then referred back to their FP, who is then expected to carry through on the recommendations of the SSATC. However, this passing of responsibility may mean breaks in the continuity of care. For instance, if the patient is in need of community support, the social worker assigned will try to organize the necessary supports, but there again is no mandate to track the progress of the patient until there is another medical problem.

Why are recommendations by the SSATC a discharged patient generally given to the patient's FP and not the patient's CM? In my opinion, one reason may be the nature of the recommendation, i.e. medical. Given the medical role of both FP and SSATC, it seems reasonable that the recommendations are passed onto the FP for carry through. Unfortunately, there seems to be no centralized system in place to ensure a continuity of

\[^{13}\text{Elderly are considered as Continuing Care eligible only if they have been resident in the province of British Columbia for at least ten years prior. The current policy strictly requires non-eligible seniors to receive Day Hospital Program treatment only, with the In-Unit Program offered only if beds are available. This has been a controversial issue highlighted recently due to funding cuts.}\]
care. However, there may be a much more important reason for this discontinuity of information flow, which I believe is a great inherent weakness of the existing system of care under the BCD - the case load of the CM.

Many CM's in BC have huge caseloads. For instance, in the City of Vancouver, some CMs may have as many as 1000 cases at one time. It is impossible for anyone to keep consistent, effective tabs on the well being of 1000 elderly in continuing care even on an infrequent basis. It is not infrequent for CMs to contact their individual cases only once a year, and these cases tend to be the ones that are deemed to be at risk. We described above how the CM is the primary conduit of community-based supports, i.e. the case manager for the elderly patient. Well, in many cases, once the CM sets up the required services for the elderly, there may be no further contact between the two until another referral or request is made, either by the elderly, their family and/or the people providing the community supports described above. In other words, the impetus for feedback and monitoring of health and well-being lies not on the CM but the elderly and their family.

In short, there is no individual or organization fully informed about all aspects of the elderly's well-being at any one time. The lack of a consistent follow-through on the discharged patient's progress is a fundamental weakness in many SSATCs, yet is reflective of the same lack of follow-through by the elderly's FP or CM. The basic reason is that unlike On Lok, none of these agents are singularly responsible for the continuing health and well-being of the aging-in-place
elderly patient.

The above discussion on the role of the FP and SSATC further illustrates a fundamental difference between On Lok and the BCD. While On Lok centralizes its health care delivery to its Adult Day Health Centers, the BCCCD has no centralized systems and health care is fragmented among FPs, SSATCs, and health departments. This makes the system much more complicated. Not only are the FPs, SSATCs and health departments located in different geographic locations, they are also separate financial, legal and administrative entities. Just because they all bill BC Medical does not mean that they are all of one collective agenda or purpose. Not all of the FPs and SSATCs provide similar types of medical services, or with comparable expertise or capacity. For instance, St. Vincent's Hospital has a comprehensive psychiatric medical team of over 20 Psychiatrists, while Mount St Joseph's SSATC has only one psychiatrist on duty during the Day Hospital Cognitive Stream on Tuesdays and Thursdays.

The above condition reflects one central point about the BC Continuing Care Division: there are so many different, separate agents involved in the health care and community support of BC elderly in long term care that there is no organization singularly responsible or effective in keeping track of it all. One can argue that this should be the case, that the primary responsibility for caring for the elderly lies within themselves. After all, the freedom to seek and choose medical care and community support is an inherent, personal right. However, how can the elderly be expected to adequately seek the right services if the overall model of health care is so complicated? How can we expect them to
understand what to do when many of the professional health care people interviewed admitted being confused or overwhelmed by the complexity of the overall system themselves?

The above condition clearly brings up the next issue: efficiency. There is an underlying urgency to discharge a SSATC patient as soon as possible, primarily for cost reasons. One way in which On Lok day health centers have been successful in keeping their costs in control is their daytime hours of operation. With physicians on call at night, they are able to ensure that their participants have access to care at night, but are still able to save on the costs of 24-hour care operations at hospitals like Mount St. Joseph. As a simplistic, crude comparison of cost, care at the SSATC's In-Unit Program costs Cdn. $540.00 U.S./day/bed\(^4\) (Ram-Ditta, 1994) compared to $37.68 U.S./participant for On Lok's adult day health program\(^5\) in 1981 (Shen & Zawadski, 1981). Some may say that the comparison is unfair because the types of patients in both programs are not comparable. For instance, one cannot do surgery in On Lok's day health center like one would in a hospital. This however is a false argument. It must be clearly understood that the SSATC is not set up to do acute cases. Like On Lok, if an elderly is in need of acute care, e.g. surgery, the SSATC transfers the elderly to the Acute Care department of a hospital.

\(^4\)This amount is what BC Medical pays per bed in the SSATC's In-Unit program. The care afforded here is usually for chronic cases.

\(^5\)This comparison is simplistic ($540 U.S. or $724 Cdn. approx.), but the degree of difference is significant. On Lok's cost figures are based on a study of its long term care costs conducted during a six month period from January 1 to June 30, 1981. During this period, a total of 295 participants were served, of which a sample of 269 participants in the program for over a month were selected for this cost study. In this study period, On Lok spent a total of U.S. $1,628,432 for medical, social and supportive services for the 269 participants. This translated to an average of $1,143/month/participant or $37.68/participant/day. (Shen & Zawadski, 1981).
Thus, it is our contention that the patients in both the SSATC and On Lok's Adult Day Health Centers are comparable. Thus, even accounting for inflation, the cost difference is significant.

To further complicate the overall picture of the resources available to aging-in-place elderly, the municipality's Parks and Recreation Board also organizes programs for them. Many of BC's well elderly go to elderly community centers. These centers are run by the municipality's Parks and Recreation Board. These centers have a mandate to provide programs that cater to the social and recreational needs of the elderly. Numerous programs are carried out at these centers, which are planned by the center's staff and steering committees. Steering committees are usually made up of informed volunteers who provide leadership and guidance to the center's programs. Volunteers also play a big role in staffing many of the community outreach programs. Elderly community centers play a vital role in the social lives of many well elderly who attend such centers.

There are some community centers that go beyond their typical mandate of social and recreational activities for elderly. Ray-Cam Co-operative Center is an excellent example of a community organization that demonstrates innovation in its policies and programs for the elderly in its catchment area. Located in 920 Hastings, Vancouver, the population mix and density of the area makes Ray-Cam comparable to On Lok's location in North Beach, San Francisco. Like On Lok, Ray-Cam is in a high density area. The majority of people in the neighborhood tend to be lower-income. There are a few senior housing buildings nearby, and an Adult Day Care Center and doctors office down the street. Some of the people working
with seniors at Ray-Cam are highly dedicated to their tasks. For instance, Bob Wong, a long-time social worker at Ray-Cam, tries his best to help some of the elderly in need of money by finding out how they can get legitimate government funding for some of their needs. Bob may do this by calling up different governmental agencies (e.g., Ministry of Social Services, Ministry of Health, British Columbia Housing Management Commission) to see which of them may be responsible and willing to provide funding, and then coordinates the required paperwork. Some of the social and community supports provided by Ray-Cam include the Tag Program, which describes a systematic method of keeping track daily of seniors living in independent senior housing. Their well-being is monitored by volunteers who visit the elderly daily. The Tag Program was started after some seniors died in their apartments and were not discovered until a few days later. There are also attempts to bring medical care to the center. For instance, the staff has a Podiatrist visit the center once every six months to see patients. At first glance, it appears that Ray-Cam is somewhat comparable to the On Lok model of health care delivery. However, this comparison is not appropriate. While having some medical services, Ray-Cam is not a center to deliver comprehensive health care. A Podiatrist visit once every six months, while undoubtedly very useful and desirable, does not qualify Ray Cam as a health care facility comparable to On Lok. Furthermore, it is important to realize that many medical

\[1] It should be noted that such medical clinics at Ray-Cam are possible only due to the deliberate efforts of Ray-Cam's Staff who submit written proposals to the appropriate governmental agencies. However, these proposals for are granted on a case-by-case basis, and usually only for a limited time only, regardless of the program's success. Ray-Cam tries to tailor the clinics to meet the unique needs of the elderly in the area. However, the time taken to review these proposals, plus the approval required by all appropriate government and health care administrative boards complicates the process, and makes it difficult for Ray-Cam to provide the services regularly or
facilities are nearby (e.g. the adult day care center and the doctor's office) because of the high density of the area, not because of some prior administrative imperative. In other words, the doctor moved into the neighborhood to tap into the local market, not because Ray-Cam paid for him to come to the neighborhood.

While the service and care of the workers at Ray-Cam toward their seniors is highly commendable, it brings up another important point - that the Ray-Cam system is not easily replicable, unlike On Lok's. Some of the reasons are geographic and demographic in nature. If another community center like Ray-Cam was set up in a less dense suburban setting in Maple Ridge, for instance, the locations of medical services, senior housing and community services may not be so closely clustered. As a result, it may be impossible for the staff at this community center to keep track of the elderly in their area the way Ray-Cam is able to, or for the elderly to even attend the community center conveniently. Furthermore, if the area has very few seniors, the community center may have less of a mandate to provide for their needs. Another reason is the center's staff. Bob Wong's care, dedication and experience is not necessarily shared by the person who replaces him, or by the other people at other community centers.

• Conclusion

In summary, the current health care system for the elderly in British Columbia is still predominantly institutional. Most frail
elderly in need of medical care are sent to nursing homes, space permitting, where they are supervised on a 24-hour basis in an institutional environment. For those elderly living independently, their options of community-based support services are quite extensive, but these supports tend to be more social than medical in nature. Strictly speaking, medical care of any significance is still dominated by personal doctors, hospitals and nursing homes.

In view of the above constraints, and coupled with the urgent need to control spiraling institutional health care costs, the Government of British Columbia recently announced a new community approach to health care. (Then) Provincial Health Minister Elizabeth Cull proclaimed the government’s desire to downsize hospitals and remove unnecessary beds. In addition, British Columbia’s health care is to become “...less hospital oriented and more community based, with community health councils taking over the roles now played by health boards, hospital boards, and regional districts. Extended-care beds will be built for elderly patients now occupying acute beds, and less unnecessary surgery will be done...” (Baldry and Wigod, 1993). This concept is further elaborated in the Report of The British Columbia Royal Commission on Health Care and Costs which declares that "...Medically necessary services must be provided in, or as near to, the patient's place of residence as is consistent with quality and cost-effective health care..."(Seaton et. al., 1991:A-6). The shortfall of funding, followed by the above direction of BC's government are two major reasons why the health care system in British Columbia is currently in a state of flux.
In the above state of flux, there is potential for some of On Lok's strengths to be perhaps incorporated into the model in BC. The above health directive of the provincial government has resulted in the call for the creation of community health councils. These councils are to be made up of individuals elected by the public and individuals appointed by the Minister of Health. The intent is eventually to allow the council to assume responsibility for integration and management of services now delivered by the Ministry of Health, hospitals and health provider organizations. At this early stage, however, the extent of the council's influence in making important decisions on health care delivery models is still unclear.

Regardless of the roles played by the councils however, the fact that they are only just being formed opens up opportunities to introduce progressive ideas and concepts. Central to progress for BC's model of health care delivery is the need to consolidate health care, community support and housing services. Because all three areas play a crucial role in the well being and health of the independent living elderly, it is only sensible for all three to be managed and administered by one source. This way, the central source of administration can look at the aging-in-place elderly's holistic well being, and take the appropriate action.

17 The formulation of the community health council is briefly described as one of the reforms recommended by the BC Government's : "New Directions for a Healthy British Columbia", a paper that sets out a plan for a renewed health system for British Columbia. The paper was issued in part as a response to the Royal Commission of Health Care and Costs's "Closer to Home" (Seaton et. al., 1991) report which reported, among other things, that not all British Columbians are equally healthy, and not all have reasonable access to the health system. Furthermore, Closer to Home also noted that within the BC health system, there has never been an overall plan, and that the structure that has evolved lacks coherence, (and sometimes) logic, and the ability to objectively assess itself for efficiency and effectiveness in providing health care.
model of consolidated services in health care, community supports and housing is in sharp contrast to the comparable yet fragmented services in health care, community support and housing in British Columbia.

Clearly, the aging-in-place elderly residents of BC are tremendously blessed with an abundance of medical and community resources to aid them in the process of living independently. It is not the contention of this discussion that BC compares unfavorably to On Lok in terms of the range or types of services available to its elderly. Rather, the point made is that there are too many different, separate agents involved in the health care and community support of BC elderly in long term care that there is no organization singularly responsible or effective in keeping track of it all. As a result, there are inherent overlaps and gray areas of responsibility, creating confusion and inefficiency. In this milieu, the inherent importance of the aging-in-place elderly's housing to their health and well being is often overlooked, ignored or regretfully passed over due to the above pressing issues.

If BC is to adopt the strengths of On Lok, it is clear that changes have to be made in the management and administration of its health care programs. Central to this change is the need to restructure the annual health care budget to include housing concerns. Currently, the health care budget is dominated by institutional care costs, with many community-based health promotion support initiatives competing for a much smaller piece of the pie. There is thus inadequate emphasis on health promotion/disease prevention measures, even though it is commonly accepted that prevention is always better than cure. Furthermore, the non-inclusion of
housing needs in the health care budget is a fundamental weakness because it fails to link the importance of the aging-in-place elderly's physical home environment to their overall health and well being\textsuperscript{18}. Because of this lack of a housing component, many aging-in-place elderly continue to either live in inappropriate housing that further deteriorate and/or endanger their health, simply due to lack of funding. Until very recently, this sad situation led to premature institutionalization in nursing homes, which is ironically much more expensive. Currently, the lack of funding for new institutional beds has reduced the number of cases of premature institutionalization, but the problem of inappropriate housing for aging-in-place remains.

In the above context of health care delivery in BC, what is the responsibility of the architect with regards to housing for the aging-in-place elderly? There are three clear areas of application, which we will discuss in the next chapter.

\textsuperscript{18}"New Directions for a Healthy British Columbia" further argues that one way of bringing health care closer to home (a key initiative of the Royal Commission on Health Care and Cost's "Closer to Home" \{Seaton et. al., 1991\} report) is by the creation of "community health centers", described as one-stop centers for a wide range of community health services, with links with other services such as housing and income support. These community health centers are thus intended to consolidate services like On Lok's model, and include not only housing, but income as critical determinants of a person's total health.
CHAPTER THREE
HOUSING FOR THE INDEPENDENT ELDERLY

This chapter describes the three areas in which architects can apply their skills in designing appropriate housing sensitive to the needs of aging-in-place elderly. These three areas are in the modification of existing housing for the independent elderly, designing customized single family dwellings, and designing new purpose-built multiple housing types for the independent elderly.

- Modification of existing housing to prolong elderly independence

Home modifications to prolong their independence are extremely important to independent elderly because they allow them to age-in-place. It is unfortunate that many independent elderly are asset rich yet cash poor, and are thus unable to finance required home modifications on their own without financial aid from other source. The majority of seniors in BC own their residences and are free of mortgage debt (Scholen, 1985). Their residence now represents their single most important financial asset.

However, it is also true that most seniors are on fixed incomes, and that many will experience affordability problems. For instance, in 1981, half of all families with senior heads had incomes under $15,000. Single elderly (particularly single senior women) were also concentrated in the lower income group, with 57% of them having incomes below $7,000 (Brink, 1984). According to projections form the BC Research Council (Forrester
and Hamanea, 1983) and from Statistics Canada (September, 1984), as many as 49,692 seniors in 1985, 55,117 seniors in 1990 and 64,312 seniors in 1996 will experience such a problem, defined as families having to spend 62% or more of their income on food, shelter and clothing (Evans and Purdie, 1985).

Some seniors aging independently in their own homes suffer from physical dwellings in need of repair and/or adaptations. Yet, while the homes they own are valuable equities, many of these senior homeowners do not have adequate incomes to allow them to carry out the work. Architects choosing to provide design services for renovations of existing elderly housing may find it necessary to help educate the elderly on possible sources of funds. Some of such sources are briefly explained in the following chapters. They include government and private funds.

**FUNDING SOURCES FOR HOME MODIFICATIONS**

Government funds are generally in great demand but short supply for independent elderly in need of home renovations. Part of the frustration faced by aging-in-place elderly under the BC Continuing Care Program is that the program does not have a mandate to provide resources to make necessary alterations to the elderly's existing physical dwelling. This is the case despite strong research evidence linking the elderly's housing and their well-being (Regnier & Pynoos, 1987; Regnier et. al., 1992; Calkins, 1988; Cohen et. al., 1991). As a result, if an elderly's home is assessed (eg by a BCCCD Occupational Therapist) to be in need of some modifications, the family or the elderly is usually expected to provide the funding. The relatively low income levels of many aging-in-place elderly as described in
Chapter One makes this an onerous task. The British Columbia Housing and Management Commission (BCHMC) previously had a home renovations program called HASI (Home Adaptations for Seniors in Independence) but it received its last application for funding in December, 1993. HASI was discontinued after its funding was stopped.

Currently, the only source of government funding an aging-in-place elderly can apply for is the Canadian Mortgage and Housing Corporation (CMHC) Residential Rehabilitation Assistance Program (RRAP) and the RRAP for the Disabled. This federal government program provides low-income homeowners (including seniors) loans to repair residences, including mobile homes and condominiums. These loans, which may not have to be paid back, cannot be used for repairing rental units. Both the RRAP and the RRAP for the Disabled are given based on the gross income and geographic location of the applicant. The amount loaned ranges up to $25,000 in rural areas for the RRAP to $10,000 in urban areas. RRAP for the disabled has a maximum loan amount of $10,000.

In order to qualify for CMHC's RRAP, the elderly's home must first be deemed to be substandard or deficient and in need of major repairs or lacking in basic facilities in the following categories: structural, electrical, plumbing, heating and fire safety. Normal maintenance or modernization work like painting or replacing old carpets would not qualify for RRAP funding.

In order to qualify for CMHC's RRAP for the Disabled, the elderly must demonstrate their disability and the subsequent special modifications
required to improve the accessibility of their residence. In this program, the disabled is defined as "any person who, because of one or more persistent physical, psychiatric, learning or sensory disability is unable to ensure by himself/herself the necessities and social life of a person without a disability." ¹ Under this program, most special modifications that make it easier for disabled persons to live independently in their homes are eligible. Such modifications however do not include therapeutic or supportive care-related items like whirlpools, baths, and swimming pools. Furthermore, items designed to facilitate housekeeping such as central vacuum systems or dishwashers are also not eligible.

Private sources of funding for elderly usually involve some sort of loan with the elderly's house used as collateral. Several innovative financing alternatives have been developed, of which the Home Equity Plans is probably the most applicable for home renovations. Other financing alternatives do not create income for senior homeowners, instead, they lessen housing-related financial burdens. These options include the Land Tax Deferment Act and Shared Appreciated Mortgage.

Home Equity Plans (HEP) are designed primarily for seniors who own their homes free and clear. A lending institution appraises the home and determines a loan amount. This loan amount is then paid out to the senior in monthly payments (and/or a lump sum) over a loan period of 5, 7 or 10 years or a lifetime (Evans and Purdie, 1985, Rogers, 1993). At the end of the payout period, the total loan has been paid to the senior, and now,

¹This definition of disability is obtained from CMHC's "The Residential Rehabilitation Assistance Program (RRAP) for Disabled Persons (Homeowner)" Information Bulletin.
repayment of the loan commences. If a lifetime term is chosen, the loan is repaid out of the proceeds of the home when the senior dies, or in the case of a couple, when the second person dies. The balance of the value of the home, including any increase in the value of the home, is retained by the senior or the beneficiaries. HEPs are also referred to as Reverse Annuity Mortgages.

HEPs allow a person who own their homes to spend some of their home equity while still living in it. They are most appropriate for seniors who: 1) own their property and have little or no debt against it; 2) wish to remain living in their home, and 3) like to unlock some of their home equity either in the form of a lump sum or regular payment.

Despite the options above to raise income levels while staying put, many seniors end up selling their homes to move into smaller ones. Reasons for moving include increased difficulty in maintaining their existing homes, the desire to cash in on their existing home and buy into a smaller, less expensive home, and the reluctance to incur more debt. In addition, many municipal by-laws do not permit legalized in-house suites or granny flats (Evans and Purdie, 1985), and thus make it very difficult for seniors to live in their existing homes while adapting part of it for rental purposes.

The Land Tax Deferment Act in British Columbia allows seniors to defer paying their property taxes until the death of the senior or conveyance of the property. The Ministry of Finance pays the amount required to reimburse the municipality, and registers an encumbrance on the property in favor of the Crown to the value of the deferred tax and interest.
Shared Appreciation Mortgages (SAM) give a reduced interest rate to the senior’s mortgage. In exchange, the lender is given an interest in the property (Evans and Purdie, 1985). When the property is sold, the lender shares in any appreciation in the value of the home.

HOME MODIFICATIONS TO REMOVE PHYSICAL BARRIERS

With financing in place, what are worthwhile home modifications? Modifications to this built environment fall into two basic categories: adaptations involving removing physical barriers to counteract physical impairment, and adaptations to account for cognitive impairments of the person. Design adaptations to remove physical barriers are applicable to all senior aging-in-place dwellings. Design adaptations to account for cognitive impairments fall into two basic categories: those for the elderly suffering from changes in their sensory perceptions, and those suffering from dementia. Because most seniors suffering from dementia also suffer from changes in their sensory perceptions, solutions for these two categories overlap, the difference is the degree to which the solution is applied.

Any home adaptation must begin with basic hygienic requirements. For instance, if the elderly’s home is filthy, any modifications to the built environment is likely to have limited impact on the health or well being of the person. At a minimum, the elderly’s home should be clean, well ventilated, and serviced with heat, treated (hot and cold) water and sanitation. The lack of any of these necessary services pose a grave threat to the health of the elderly. Fortunately in Canada, most elderly homes are
adequately built and serviced. Thus, the first step is to maintain and repair the dwelling of the senior

Removing physical barriers goes beyond designing handicap-accessible spaces: a key intent is to minimize potentially preventable falls that have an environment component (Pynoos et al, 1987). Most accidents among the elderly occur at home, and home accidents are the fifth leading cause of death for persons aged 65 and above (National Safety Council, 1980). Because falls are a major source of accidents among older people, related research (Sheldon, 1960; Clark, 1968; Gray, 1966; Rubenstein, 1983) has suggested that the identification and elimination of environmental risks at home could reduce fall-related accidents in the home by 25-50%. The following is a partial list of suggested design adaptations to all spaces in the elderly’s home:

- Remove all floor items that could cause falls, (e.g. throw rugs, low stools); store unnecessary objects (e.g. brooms, shoes, clothes). Remove all loose wires.
- Place furniture against the walls to create more open spaces for easier movement (this allows for dementia wandering as well).
- Install rubber treads on inside and outside stairs to improve traction (Gnaedinger, 1988)
- Add safety railings on inside and outside stairs and verandahs (Gnaedinger, 1988)
- Widen existing corridors to a minimum of 4’-0” to allow walker use. If
1. **BEFORE**

   Scale: $1/4"=1'-0"

- Bathroom swing door replaced by pocket door.
- Closet removed to create 5'-0" turning radius for wheelchair.
- Interior partition wall removed to create one big room out of two small ones.
- Door swing reversed to take advantage of greater maneuvering room outside.

2. **AFTER**

   Scale: $1/4"=1'-0"

   Sitting nook is especially useful for allowing the bedridden elderly to welcome visitors and family.
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1 BEFORE
scale: 1/4"=1'-0"

New sealed direct vent fireplace gives warmth and visual focus for room
Add plants to give the room a more homely cozy feeling
Remove double doors to aid in free movement
Remove freestanding throw rugs, especially those with knotted or loose ends, to prevent tripping
Relocate furniture closer to perimeter walls to create more open space

2 AFTER
scale: 1/4"=1'-0"

open circulation
the person is confined to a wheelchair, use Section 3.7, 1992 BCBC as a guide.

- Remove split levels in floors. Install code standard ramps with guard rails if necessary
- In cases of dementia, use removable low partitions to prevent the elderly from accessing potentially dangerous spaces, (e.g. kitchens). Lock up these rooms if necessary.
- In cases of dementia, fence up the yard to contain wandering outside.

The following are some design adaptation guidelines pertaining to spaces in the dwelling most problematic for seniors:

- The elderly suffer from more serious falls per use of stairs than any other age group.

Accidents occur more frequently on stairs where the first few treads are different from the remainder of the flight, or when the design of stairs is visually distracting or deceptive (Archea et.al, 1979). In such cases, the stair should be redesigned if possible to eliminate the above. The tread edges should also be emphasized by using tactile and visual warning strips.

- Burns are the second most common injury among the elderly, with 93% of these accidents occurring in the home (NBIE, 1983). Cooking, smoking, the use of matches, and bathing provide the greatest risks. Provide clearly marked and visible faucet regulators and turn down hot water heaters to 120 degrees (Pynoos et. al, 1987).

- The kitchen oftentimes has the most accessibility problems. Most accidents arise due to having to bend over, or to reach too high up for things. Floor mounted ovens should be replaced by countertop models that
HEALTH, HOUSING & ASSISTIVE TECHNOLOGY: THEIR ROLES IN BRITISH COLUMBIA'S ELDERLY INDEPENDENCE

1. BEFORE
   scale: 1/4"=1'-0"

   Replace spiral stair winders with straight runs

   Remove non load-bearing interior walls if possible to create more open spaces

2. AFTER
   scale: 1/4"=1'-0"
eliminate the need to bend over. Bending over to open a hot oven is a frequent problem reported by seniors. They should also have control buttons located in the front. Overhead cabinets should also be lowered according to the ability of the elderly resident to reach up and get something without using a step stool. As a general rule, overhead storage should be avoided to prevent possible objects from falling and hurting the senior. Research (Steinfield, 1978) has failed to determine a compromise countertop height acceptable for different seniors with different levels of impairment. The preference ranges between 26” - 36”, and varies for different tasks: eg. a higher countertop for work in the sink, lower countertops for mix centers where more force from upper body strength is required: eg. mixing dough. For more detailed information on kitchen design, see Steinfield’s(1978) ‘Adapting Housing for Older Disabled People’.

• Add assistive devices in bathrooms such as grab bars, bath seats, long hoses for bathing a seated person and non-slip mats (Gnaedinger, 1988; Pynoos et.al, 1987). In cases of very frail elderly, it is better not to use the bathtub. Handicap accessible showers (48”x48” clear turning radius) without curbs are more useful with the frail elderly seated in a shower seat. Doors should swing out to create more maneuvering space in the bathroom. Generally speaking, the use of handicap toilets as per section 3.7 of the 1992 BCBC is not recommended because many physically impaired seniors have difficulty in lifting themselves onto such high toilet seats. Thus, rather than changing the existing toilet to the handicap toilet, it is better to add a booster toilet seat (to raise the height of the seat) if necessary. The placement of grab bars should also consider the physical strength of the senior. For instance, placing a grab bar on the left hand side of toilet will have limited help if the person has a weak left hand. For
more detailed information on bathroom design, see Steinfield’s (1978) ‘Adapting Housing for Older Disabled People’.

Design modifications are also important to counteract for the decreasing sensorial perceptions of elderly (Sheehan, 1992). The majority of these compensatory design changes are intended to counteract the vision and hearing impairments of the elderly. Typical vision impairments include increased sensitivity to glare and reduced sensibility to lighting, contrast and color (see Chapter III: Biology of Aging). To reduce glare, practical suggestions include not using glossy paint or shiny surfaces (e.g. on tabletops, floors); using shades, blinds or other window treatments to reduce bright sunshine reflecting through windows; indirect lighting and focused task lighting (Sheehan, 1992). Increased lighting levels should be focused on work areas without creating bright and dark spots. The use of contrasting color and textures also helps to overcome visual impairment (see next section: Adapting the Home for Elderly with Dementia).

The elderly with hearing impairments are often more susceptible to the disruptive effects of background noise (Sheehan, 1992). In modifying the home, the use of acoustical ceiling tiles, carpeting, draperies and wall hangings can absorb unwanted background noise. In addition, acoustical drywall with air spaced studs should also be used to contain particularly noisy areas (e.g. laundry room). For more detailed information, see Hiatt’s (1987) ‘Designing for the Vision and Hearing Impairments of the Elderly’.

Despite the wide abundance of guidelines for barrier free design (e.g. BCBC, 1992; CMHC, 1992, 1990, 1987; BCHMC, 1992; Calkins, 1988; Cohen and
Waisman, 1991; Sheehan, 1992 and Regnier and Pynoos, 1987), there is confusion created when these guidelines provide contradictory information. For instance, Sheehan (1992) and Calkins (1988) recommend removing throw rugs on the floor to prevent elderly falls in the home, while the CMHC (1987, 1990) diagrammatic plans show one or more such rugs per bedroom, some of which appear to have thick knotted ends. Furthermore, the CMHC bedroom design guidelines show closet corners with fin walls that would make it difficult for elderly with impaired mobility to access. Such are the types of discrepancies that one has to look out for; and guidelines that do not appear in different sources may be less reliable than those that do.

ADAPTING THE HOME FOR ELDERLY WITH DEMENTIA AND THEIR CAREGIVERS

Research has indicated that the built environment can have a significant influence on the quality of life of people with dementia and their caregivers (Cohen and Weisman, 1991). This influence is therapeutic in nature. In creating this therapeutic environment, the term 'therapeutic goals' is used to describe the desired relationships between people with dementia and their built environments. The theoretical support for the potential role of built environments includes Lawton's Environmental Docility Hypothesis, which states that 'the less competent the individual, the greater the impact of environmental factors on that individual' (Lawton, 1980). Environmental factors here include both built and social environments. As a person with progressive dementia ages, he or she becomes progressively less competent, and becomes increasingly
Install removable low partitions at all entries into the kitchen to prevent Dementia patients from endangering themselves.

Using removable partitions ensures minimum disruption to the existing dwelling, and can be stored when not needed.

Before

AFTER

1. BEFORE
   scale: 1/4"=1'-0"

2. AFTER
   scale: 1/4"=1'-0"
responsive to even modest changes in the environment (Cohen & Weisman, 1991). Consequently, as individual competence decreases, the environment assumes increasing importance in determining the person's well-being (Calkins, 1987).

In view of the elderly with dementia's increased responsiveness to the built environment, what are ideal therapeutic goals? According to research undertaken by Cohen, Kennedy and Eisdorfer (1984):... ‘the treatment objectives for the care of older persons afflicted with (dementia) are to maximize their functional effectiveness, freedom and human dignity....although the individual becomes less competent, the challenge....is to recognize residual strengths in the patient...Maintaining physical health and mobility are primary objectives...other (needs are) maintaining dignity, being accepted by others, maintain interpersonal relationships, and to establish a sense of self-control was well as control over the immediate (including built) environment.’. Calkins (1988) has further defined these therapeutic goals to include predictability of the built environment to enhance one's perceived sense of control, and maximizing the functional independence of the individual to maintain his freedom and human dignity.

In light of the above, in addition to the home adaptations to remove physical barriers for seniors with dementia as discussed in previous pages, modifications are also required to compensate for the cognitive impairments. Due to these impairments, the person with dementia will see or understand the built environment differently from people who are cognitively intact (Calkins, 1988). One way of helping these people understand the environment is to provide multiple way-
finding/orientation cues directed to their different senses to reinforce the necessary information. The key intent here is to maximize the cognitive ability of the person by providing multiple environmental stimuli to create the ideal amount of environmental press (Lawton’s Environment ProActivity Hypothesis) without confusing the person. The most important environmental stimuli are those that trigger vision, hearing and touch. Because vision impairment associated with aging include reduced sensitivity to light with increased sensitivity to glare, basic design solutions to compensate for such impairment involve increasing the lighting level 2-3 times using diffused or indirect lighting fixtures to reduce glare. Dimmer switches are useful to customize the lighting level to suit the elderly with dementia. Bright and dark spots, including sudden, high-contrast shifts in lighting levels should be removed (Sheehan, 1992). Using different colors, intensity, outlines, highlights, and textures on surfaces and objects will also increase the perceived visual contrast. This will help to compensate for the visual impairment while providing opportunities for multiple environmental cues. For instance, a possible solution for the elderly’s bathroom would be for its door to be painted a non-glossy finish whose color will contrast clearly with the adjacent wall. It should be labeled ‘toilet’ in large bold letters. The door frame should also be highlighted with a different color as well, and a consistent deodorizing scent should be used with this particular bathroom. All these stimuli would serve to reinforce in the elderly with dementia the identity and significance of this particular space - his bathroom. This approach is consistent with the therapeutic goal of maximizing the functional independence of the individual by stimulating his cognitive abilities.
As dementia progresses, the elderly also becomes increasingly sensitive to noise. Sudden noises can startle them, and provoke an unpleasant reaction. Within a home situation, design solutions include noise reducing floor finishes like carpets (as opposed to hardwood floors), insulating walls with acoustic gypsum wall board, and using heavier fabrics that absorb sound. If certain windows face noisy roads or neighbors, it may be better to keep them shut, or build a solid fence to block some sound transmission. It is important for the occupants of the home to limit their noisy activities (eg. watching TV, stereos, parties) to rooms or areas where the noise can be contained. On the other hand, chiming clocks and preprogrammed music can be used to provide therapeutic auditory stimulation (CMHC 1992).

The elderly with dementia also experience increasing difficulty in staying oriented in their environment. Purpose built housing designs attempt to reduce this problem by repetition of spatial elements, thus creating predictable spaces. While this may be difficult to do in existing homes, one possible solution is to create open spaces that flow into one another, allowing the elderly to see different spaces to orient himself/herself. Ways to achieve this visual link include removing unnecessary interior partitions, replacing some walls with interior windows or low partitions, or configuring furniture to reinforce a ‘strategic’ wandering path. It is not recommended that mirrors be used because the viewing of their own reflections may startle the elderly with dementia (CMHC, 1992). Visual links also create an opportunity to emphasize certain spaces over others. For instance, two useful spaces to reinforce include the person’s bedroom and bathroom. If these two spaces are properly design adapted, and can
be viewed consistently from different locations in the house, the orientation of the person in regard to these spaces will be reinforced.

In all design adaptations, it is important to keep the home as home-like and comfortable as possible. Excessive adaptations (e.g. redecorating rooms) may over-stimulate or produce a negative reaction from people with dementia (CMHC, 1992) rather than reinforce their previous memories or cognitive abilities. It is recommended that the advice of a professional (e.g. architect) be sought before any major adaptations are attempted. For more information on design adaptations of the built environment, please refer to Calkins (1988), Cohen and Weisman (1992), Sheehan (1992), Gutman (1992), and CMHC (1992, 1990 & 1987).

Design adaptations for the caregiver also fall into two categories: adaptations that help the task of providing care and supervision for the elderly with dementia, and adaptations that enable the caregiver to get some respite.

Monitors/alarms should be installed in the home to help the caregiver provide surveillance. The alarms may be wired to sound if the elderly attempts to wonder into potentially dangerous or problematic areas, e.g. kitchens or bathrooms. These monitors can also be set up to automatically access professional services if necessary (eg. via an Emergency Medical Alert type program). Another solution is to install interior windows in the partition walls of an existing house. A good example is the ‘open house’ concept by CMHC (1992). This will allow the caregiver to monitor the person without being in the same room. Other safety and security related
changes include installing inconspicuous locks on all doors that need to be monitored (Calkins, 1988).

It is also important to provide spaces in the existing home that the caregiver can 'escape' to. This could be a room reserved for noisy activities mentioned above. The intent is to make this room private for the caregiver, some place to '...lock oneself away and rest or read or cry when frustrated and exhausted...' (Gnaedinger, 1992)

- Custom designed single family dwellings

GOLIN'S RESIDENCE

Golin's Residence is a custom designed large single family dwelling located in Anmore, British Columbia. This project is discussed in this thesis because it reflects the real life experience of a young couple with their two pre-school children who decided to pool financial resources with their parents to build a large home for they and their parents to age-in-place together. The task of creating a custom-designed/built residence for Dr. and Mrs. Golin was uniquely challenging: that of building a single family dwelling that would be home for the changing aging-in-place needs of the grandparents, yet still be home to two precociously active pre-school boys and their busy parents, yet ultimately still be an marketable and desirable home for the mass housing market (in other words, be affordable to build, yet be attractive to sell).

A brief description of the Golins is first in order. Peter and Natalie Golin
are originally from Russia, but grew up in Australia before coming to Canada a number of years ago. Peter has a full time medical practice while Natalie is currently a homemaker. Their two boys, Matthew and Daniel, are aged four and two respectively. Natalie's father, Mr. Turka, is currently 65 years old and in excellent health. Mrs. Turka is 50 years old and also in excellent health. In anticipation of future aging-in-place needs, however, I had to design the home to feel like a large home, yet be able to easily accommodate the necessary changes in future.

One of the first ironies one learns in designing a home for the elderly is denial of aging-in-place realities. Perhaps in view of his excellent health, Peter and Natalie were very careful in making sure that their dad was not around when we discussed aging-in-place design issues. This surprised me at first. after all, one would expect the father to be the best person to provide feedback! Yet what I found out soon after was that the father had insisted that he was fine, and that nothing be done to the home to make it an "old folks home"! Furthermore, even if he was to admit that he might have difficulty in negotiating stairs in future, he was adamant that the house would have stairs like any other house until the day that he just wasn't able to walk up stairs anymore! Thus, the first lesson learned in designing a home to accommodate the aging-in-place elderly is that there is no "perfect solution", and that the best solution is ultimately one of compromise. The interplay of human emotions and sensitivities, denial of aging (and ultimately, death), and an unwillingness to deal with future needs until the need forces itself on the person all converge to make it very difficult for aging-in-place elderly, especially those still healthy and mobile, to accept well-proven and researched design solutions for their
Within the above context, there are other compounding issues. First, the home must ultimately feel like a welcoming and attractive home. For most of us who are young and healthy, a grand, winding staircase in a large foyer with high ceilings and stepped-down living rooms are synonymous with a large, prestigious, yet welcoming home. For Peter and Natalie Golin, this was precisely the case, as it would be for the majority of other health, young, able-bodied home buyers. On the other hand, the more stairs there are, the harder it is for a physically-impaired person to move around.

Second, the needs associated with raising young children very often conflict with those of progressive aging-in-place. Natalie was anxious to be able to see her children from as many areas in her house as possible, which mandated a large, open, two story foyer. However, this solution also means that sound will travel freely throughout the interior of the house, making it difficult for someone to rest in quiet. The conflicts of sight and sound transmission are one of the more difficult challenges in residential design, and are further compounded by fire separation regulations in multi-dwelling residential projects, as we will discuss later.

Third, the home has to be marketable, which means that it has to appeal to the majority of home buyers. All things being equal, this majority almost always categorizes the value of homes, among other things, according to physically definable assets such as the number of bedrooms, number of bathrooms, sizes of rooms such as bedrooms, living rooms, family rooms, kitchens, and other amenities. Most homes can only build a maximum
floor area based on the lot's Zoning, Floor Space Ratio (FSR)\(^2\) and other code and bylaw constraints. Within this fixed square footage, the designer has to decide how to "cut up the pie", i.e. how the square footage will be distributed. In this scenario, the conflicting mobility requirements of able-bodied persons verses mobility-impaired persons create a problem. "Accessibility needs"\(^3\), such as those mandated by Section 3.7 of the 1992 British Columbia Building Code (BCBC)\(^4\) require, among other things, wider hallways and bathrooms. However, if hallways and bathrooms get bigger, then the other rooms in the house will have to correspondingly get smaller to fit the total square footage within the FSR. Unfortunately, a larger bedroom or living room is generally much more marketable and desirable than a corresponding larger hallway or bathroom. As a result, the design of mass market housing is generally unwilling to adopt such accessibility guidelines because they tend to conflict with the preferences of the general housing market.

Another challenge was to keep construction costs down. Initially, the intent was to keep the portion of the home for the grandparents on ground

\(^2\)The FSR is also called Floor Area Ratio, depending on the municipality. "Floor Area Ratio" means the figure obtained when the gross floor area of all buildings on a lot less the exclusions permitted in accordance with section 6.20 as divided by the area of the lot. (as defined by the Burnaby Zoning Bylaw, September 1992)

\(^3\)In the 1992 BCBC, "accessible" means that a disabled person is, without assistance, able to approach, enter, pass to and from, and make use of an area and its facilities, to either of them. "Disabled person" means a person who has a loss, or a reduction, of functional ability and activity and includes a person in a wheel chair and a person with a sensory disability, which includes visual and hearing impairments.

\(^4\)Generally speaking, effective as of September 2, 1992, all municipalities in British Columbia conform to the requirements of the 1992 BCBC to govern the design, construction, occupancy, alteration, addition, demolition and reconstruction of any building or portion thereof, as per the Building Regulations of British Columbia pursuant to Section 740 of the Municipal Act. Any municipality that has not adopted the 1992 BCBC as its standard has typically used it, or previous versions of it, as a basis for its own building code. The Village of Anmore, in which Golin's residence is located, uses the 1992 BCBC as its standard.
level to eliminate the need for stairs. However, another part of the programmatic requirement was to provide a three car garage (two for Peter and Natalie, one for the grandparents); an enclosed mechanic's garage with a sunken service bay (grandfather likes to tinker with cars), and an enclosed storage area for a possible boat in the future. The spatial requirements of the "garage" portion of the home was like that of a five-car garage, the equivalent of a large three bedroom apartment (1400 sf approx.)!

Finally, the design had to conform to the existing slope of the site, which dropped about twenty feet over a distance of about 158 feet from the east property line to the west.

The realities of the sloping site forced the entire project to be stepped, with the suite and garage portion occupying one finished grade level, and the rest of the home another grade level. Furthermore, the amount of structural fill also required the main residence itself to be stepped into two levels, with a basement open to the lower west portion of the site (see building section).

In the final design that evolved, the grandparent's suite was located above the five-car garage to save costs. This arrangement also allowed the grandfather to easily access his mechanic's space without bothering anyone else. The stairs leading up to the suite from the garage level were designed to be a "gentle" as possible - with minimum rises and maximum runs.\(^5\) In order to

\(^5\) The stair rise is the vertical distance measured between two adjacent stair treads.
In the 1992 BCBC Part 9 for a single dwelling unit, the stair rise has to be between 125mm (5 inches) and 200mm (7 3/4 inches). The stair run is the horizontal depth of each stair tread, i.e. the portion of the stair a person steps on. Again, as per the 1992 BCBC, the stair run has to be between 230mm (9 inches) and 355mm (14 inches). The greater the rise, the steeper the stair, and the greater the run, the gentler the stair. Thus, a "gentle stair" would be one that has close-to-minimum rise and close-to-maximum runs, and a "steep stair" would have the opposite.
AXONOMETRIC OF RESIDENCE

GOLIN RESIDENCE

Golin Residence:
Site Plan and General Axonometric
scale: 1/32"=1'-0"
Golin Residence: Building Section
scale: 1/8"=1'-0"
Golin Residence:
Partial Main Floor Plan showing suite entry & future elevator
scale: 1/4"=1'-0"
Golin Residence:
Partial Second Floor Plan showing suite living & future elevator
scale: 1/4"=1'-0"
HEALTH, HOUSING & ASSISTIVE TECHNOLOGY: THEIR ROLES IN BRITISH COLUMBIA'S ELDERLY INDEPENDENCE

FRENCH GLASS PAIR DOOR TO KITCHEN

GRANDMA'S EXISTING PIANO

GAS FIREPLACE GLASS SEALED

VIEWS TO FOREST BEYOND

OPEN RAILING TO BELOW

VIEW OF THE SUITE WITH OPEN SPACE FEEL OF LIVING/DINING
allow for mobility problems in future, the house was framed to allow for easy installation of a hydraulic elevator. It was decided that the elevator would be installed only when needed. The type of elevator provided for was a 4'-0"x4'-0" elevator cab large enough to accommodate a person in a wheelchair and another person standing, such as a nurses aid (see main and second floor plan). In order to not let the elevator overwhelm the feel of the home after installation, we deliberately created an 'elevator lobby' on the garage level, and opened the elevator door into the den/bedroom on the second floor, which at the time of elevator installation would also act as an elevator lobby/storage area. That way, one cannot see the elevator in the suite unless one is in the elevator bedroom. The intent was to subtly incorporate the elevator and not overemphasize the realities of aging-in-place to the grandparents. The den also served another purpose: the grandparents had another son who they hoped would visit them more often, thus the guest bedroom.

Another design intent was to separate the grandparent's suite from the rest of the residence to allow for privacy. The site was unique in allowing the equivalent of a duplex development. By creating a fire and sound separation party wall between the two areas, it became clear for the children the areas in which they could behave with and without reserve. It also allowed for the Golins and the grandparents to easily live their private lives, yet be able to do things together at appropriate times. The grandparent's suite was designed to be as open as possible, with the living/dining space being one big room. Homely touches were incorporated, such as a sealed unit gas fireplace and grandma’s piano, which occupies a central location in the room. The master bedroom was
located to allow some privacy from the kitchen and living/dining areas. Although the walk-in closet may be too small for wheelchair access in future, it was felt that grandma, who is much younger than grandpa, would much prefer such a layout since she had been used to one all her life. An unfortunate result however, was that the master bedroom door became less accessible as I would have preferred. The dining nook was designed to be a visual draw from the living/dining room, as both grandparents anticipated spending much time there. Beyond the dining nook is a great view of mountains too, so this view also acts as a powerful draw. The rising sun from the east floods the nook and makes it an ideal breakfast corner as well. The double French door separating the kitchen and nook from the living/dining room was incorporated to allow for visual, acoustical and sensorial privacy in the kitchen in the event of a party. As suggested by the Golins during a design meeting, it also allows for "the women to talk in the kitchen without being interfered with by the men".

The bathroom was framed to allow for future grab bar additions. A shower was incorporated into the design because although they much preferred showers to baths, we felt that the bathtub was more marketable than only a shower. We agreed upon a stackable washer/dryer unit to save space. It is likely too that this unit will be more accessible for a person in a wheelchair as well. In the kitchen, ordinary cabinets as opposed to adjustable ones were decided on cost. Furthermore, it was feared that installing adjustable cabinets at the present time would only increase the stigma of the aging process, especially for the younger grandma. Perhaps as needs warrant in future, the grandparents may redo their kitchen. I suggested that they at least buy an oven with the controls
in front, yet even this suggestion was not without conflict, for the Golins did not want their two young boys to be able to touch the controls.

In summary, it is clear that the final design of the Golin's residence reflected more the current needs of the grandparents than their future aging-in-place needs. It also reflected the many different issues that impacted the design as discussed above, many of generated conflicting solutions. In the end, the design was a compromise that reflected the above realities.

The changing needs of an aging-in-place elderly person places a tremendous challenge to the designer of a largely static physical environment. This challenge is further exacerbated by the psychological impact of over-designing the environment, or of doing "too much" before needs warrant it. I believe the tendency of human nature to deny or avoid the realities of aging until the needs actually arise to be one of the biggest challenges faced by designers in the custom design of an elderly's home. Throughout the entire design process, I always had to weigh conflicting needs - how do you make a home feel like a home for a senior without the associated "reminders" of aging, yet be able to be sensitive to the changing needs of the aging process? The more I thought about the issue, the stronger I became convicted that in the final analysis, the designer should never over-design for the elderly's needs. For instance, in Golin's case, putting the elevator in before grandpa really needed it was interpreted as being insulting by the grandparents, despite the fact that it would have been cheaper to do so. Consequently, I believe that there is no real alternative to retrofitting the home of an independent
elderly person over the course of the aging process. Perhaps one of the best ways the built environment can reinforce elderly independence, and minimize the rate of aging either mentally or physically, is for the home environment to be as much like a typical home as possible, and not overcompensate for the elderly.

**SHEDBOLT RESIDENCE**

As useful as the Golin's residence is for aging-in-place, only a very select few families can afford this type of environmental solution. In the next example of a custom design, we will look at a more modest home, where the needs of aging-in-place have mandated design changes that are more affordable, yet also effective.

The Shedbolts are a retired professional couple. Doug Shedbolt, aged 69, was formerly the Dean of the University of British Columbia's School of Architecture. Sydney Shedbolt, who used to teach, is 72. In 1979, the Shedbolts bought their existing home in Vancouver because they fell in love with the location, the views the home afforded, and the quiet, restful neighborhood. Never mind the fact that the home was a three-story home with stairs that had no guardrails either inside and outside. At the time of the purchase, the home was perfect for the needs of the Shedbolts.

Recently, Sydney began to suffer from osteoarthritis, a typically elder bone condition causing pain and mobility difficulties with the limbs. She was diagnosed as needing a hip and knee replacement. Immediately, the Shedbolts were faced with problem, for Sydney could no longer climb the
Shedbolt Residence:
Existing Main Floor Plan
scale: 1/8"=1'-0"
Shedbolt Residence:
Existing Second Floor Plan
scale: 1/8"=1'-0"
Shedbolt Residence:
Proposed Elevator Addition @ Basement
scale: 1/4"=1'-0'
Shedbolt Residence:
Proposed Elevator Addition @ Main Floor
scale: 1/4"=1'-0"
Shedbolt Residence:
Proposed Elevator Addition @ Third Floor
scale: 1/4"=1'-0"
Shedbolt Residence:
Garden Elevatio showing elevator core
scale: 1/8"=1'-0"
Shedbolt Residence:
Building Section through elevator core
scale: 1/8"=1'-0"
stairs in their three-story home easily. The Shedbolts grappled with the choices of either selling their home and moving to a "retirement home" or redesigning and rebuilding their existing home to allow for Sydney's mobility problems. In the end, they decided that their preference to age-in-place was more important, and so the challenge became how to redesign their home to allow Sydney to move comfortably with a limited budget.

It was first decided that guardrails had to be installed throughout the home to allow Sydney to grab and steady herself. Although very basic, the Shedbolts had never "needed" these before, and had always wanted as little as possible (i.e. no guardrails) to get in the way of views, etc... Two inch diameter metal guardrails were installed, which only costed about $1,000 Cdn. Next, Doug designed for the addition of an electric elevator to allow Sydney to go between floors easily\(^6\). The cost of the elevator and the necessary renovations was estimated to be $9,000 Cdn. As the drawings indicate, Doug has skillfully incorporated the proposed elevator so that it does not become too imposing on the existing home, and is also relatively easy and cost efficient to install. Incidentally, the Shedbolts are waiting until they absolutely need the elevator before they install it, because they know that they will never recover this financial investment when they sell their home. Like the case of the Golins, it is interesting to note that despite his training as an architect, and his appreciation of aging-in-place issues, Doug Shedbolt did not begin to modify his home until Sydney began to suffer from osteo-arthritis. It confirms my earlier statement that in the final analysis, the designer should never over-design in anticipation of the

\(^6\)The elevator, supplied by Chimo Lifts Inc. is customised for each residential application, and is most suitable for retrofits.
elderly's future aging-in-place needs. Rather, the challenge is to design the home so that it easily incorporates the necessary changes as part of a phased construction process for future aging-in-place needs.

The Shedbolt example also indicates that on a more modest scale, skillfully designed aging-in-place components in a house are often not very expensive to build. Ideally, the intent should be incorporated into the design from the beginning to minimize disruption.

• Multi-Dwelling Projects: Purpose Built Assisted Living versus Speculative Market Designs

In the last two sections, we have looked at single family dwelling solutions to maximizing independence for aging-in-place seniors. This emphasis reflects the fact that currently, 60% of older Canadians live in single family detached homes, while only 12% live in multiple dwelling units (Brink, 1985). Furthermore, two thirds of older Canadians own their own home (Brink, 1985). According to the 1991 Canada Census (Statistics Canada, 1992), this figure was 75% in British Columbia. In addition, 50% of elderly homeowners live in homes built in the 1940's (Brink, 1985). Out of this group, 72% of the dwellings needed only regular maintenance, 15% needed

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7See Chapter One for more information on current living arrangements of Canada's seniors.
minor repairs and 13% needed major repairs (Statistics Canada, 1982). Thus, while there is preference among the aging-in-place elderly for the independence and privacy associated with single detached homes, it is clear that there is also a need to develop alternate aging-in-place solutions for renters and/or when the single family dwelling is no longer appropriate.

I believe that multi-dwelling housing arrangements\(^8\) can be an ideal alternate solution for aging-in-place seniors for a number of reasons. First, these housing projects can be custom-designed purpose built for aging-in-place. Thus, there is the potential of creating ideal physical environments that will support aging-in-place. While some may argue that there will inevitably be some loss of privacy or square footage compared to single family dwellings, many other compensatory opportunities (eg. for meeting peers or sharing better public amenities) are also created. Second, many single family homes may be unsuitable for the required home modifications discussed earlier. These dwellings may be old and non-code compliant.\(^9\) Unfortunately, the majority of these homes have been built for the mass market with little or no design considerations for the needs of the aging-in-place senior. Third, many senior home owners are asset rich but cash poor. They may find it too expensive to upkeep their own homes by themselves. Thus, they may be forced to sell their homes in order to

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\(^8\)Multi-dwelling housing arrangements refer to a building that contains more than one dwelling unit. A dwelling unit means a suite operated as a housekeeping unit, used or intended to be used as a domicile by one or more persons and usually containing cooking, eating, living, sleeping and sanitary facilities (BCBC, 1992).

\(^9\)Homes built before current building codes are usually non code compliant in many categories, including structural standards, insulation, heating, energy and plumbing. This means that if the home is being renovated, some municipalities may force the home owner to upgrade deficient portions of the dwellings to meet existing codes.
live in dwellings more appropriate to their needs. Four, many seniors living alone may find multi-dwelling housing arrangements attractive because it may be easier for them to make friends. Some of these housing arrangements may also provide support services that may be needed by the aging-in-place senior. Fifth, many seniors bought their homes in younger years as security for their retirement years. With their children grown up and gone, many of their homes are too big for their needs. Thus, many cash in on their home investment and "buy down" into purpose built multi-dwelling homes that may be much more affordable than comparable single family dwellings.

There are many different types of multi-dwelling housing arrangements available, and they meet different needs during the aging process. In general, they fall into two big categories. The first category includes care facilities, nursing homes and other institutional health care type housing arrangements for seniors in need of continuing care. These seniors are no longer able to live independently without risk. The housing and care for such seniors are the responsibility of our provincial government's Ministry of Health, which has a number of regulations in effect. These

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1. Continuing Care is defined by the B.C. Ministry of Health as the provision of health care services, designated by the minister, to a person with an acute or chronic illness or disability that does not require admission to a hospital as defined in section 1 of the Hospital Act, or to a person with a frailty.

2. Canada's Constitution gives the power to regulate health care to the provincial government, which acts through the Ministry of Health. The key regulatory statutes applicable to those delivering health care and housing to seniors in this category include the Community Care Facility Act, the Adult Care Regulations, the Continuing Care Act, the Hospital Act, and the Hospital Act Regulations. The majority of care facilities for seniors are regulated under the Community Care Facility Act and Continuing Care Act, which includes those that provide skilled care on an "occasional" basis to the seniors (Fenlon, 1993). In addition, the design and construction of such facilities need to comply to all relevant building codes and municipal bylaws.
regulations control the design, construction, management and administration of all facilities in this category. I will not focus on this category because the seniors here are no longer able to age-in-place. They thus fall beyond the mandate of this thesis.

The second category includes the aging-in-place senior who is able to live independently in a multi-dwelling housing arrangement. The housing projects in this category are not regulated by the Ministry of Health because there is no "health care" component (i.e. continuing care). Thus, these housing projects need only comply with relevant building codes and municipal bylaws, which govern the design and construction of buildings in the province (see footnote #4 in this chapter). The net result is that the code requirements for these housing projects are much less stringent than that of the first category, meaning that there is opportunity to design such projects to reflect the typical residential homes that the aging-in-place elderly much prefer. The remainder of this chapter will deal with multi-dwelling projects of the second category.

The vast majority of multi-dwelling projects being built and sold in British Columbia are townhouses and condominiums/apartments. Generally built for the mass market, such projects typically target young first time home buyer who cannot afford single family houses yet. In recent years, projects that specifically target seniors have been built, but they have

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1 Condominiums are apartments that are sold to different owners under the Condominium Act. Owners of such units own the interior of their unit, while common properties like the lobby are shared by all owners and maintained by an owner-elected Strata Council. Apartments buildings, on the other hand, are owned by one entity and individual apartments in the building can only be rented out to tenants. Tenants in apartment buildings have less control over the maintenance of their units.
A typical Speculative Market Condominium Project:
Building Elevation @ 1/8"=1'-0"
A typical Speculative Market Condominium Project:
Typical Unit Plan @ 1/8"=1'-0"
A typical Speculative Market Condominium Project:
Typical Unit Plan @ 1/8"=1'-0"
A typical Speculative Market Condominium Project:
Typical Unit Plan @ 1/8"=1'-0"
been the exception rather than the norm. The typical first time home buyer is usually seen as being a young, energetic, upwardly mobile career oriented individual, and as a result, aging-in-place design considerations are given little or no priority.

In all fairness, it is likely that a healthy, aging-in-place senior will have little or no problem living in a typical townhouse or condominium. Furthermore, from a design perspective, there need not be major changes in the design of such a project even if it was geared toward the senior market when the senior is still healthy. As discussed in the second portion of this chapter, many "young-old" senior home buyers may prefer to ignore their future aging-in-place needs, and may prefer to buy typical mass market townhouses and condominiums to ensure that they have a big market for resale. Consequently, many typical multi-dwelling projects sell well to seniors without specifically targeting them as customers. In addition, many so-called "senior community" housing projects are no different from typical housing projects from a design perspective. Many of these projects may simply be located near to some type of public or private health-service facility. The facility is then marketed as an inherent part of the services provided by the senior project. Such projects may also stipulate minimum buyer's age requirements in order to create an "retirement community". While being very attractive places to live in initially, aging-in-place elderly may find the housing arrangement to be unsuitable as they grow older. Unfortunately, many seniors buy into these projects for a number of reasons, including the impression that their future needs will be met elsewhere, poor anticipation of their needs, or simply because of a preference to deny future needs until the needs arise. For
this thesis, I will not focus on the typical multi-dwelling project because it is our belief that these projects are suitable living arrangements for the independent elderly for only a short period of time. I will assume that the aging-in-place elderly has already maximized the length of stay in their previous single family dwelling, so that when the move is made to a multi-dwelling arrangement, there must be the inherent ability to cater to their needs until the time when continuing care is absolutely necessary in a care facility. It is in this context that we will discuss a relatively recent concept in multi-dwelling housing arrangements for the independent elderly: Assisted Living.

Assisted Living is a long term care alternative which involves the delivery of professionally managed personal and health care services in a group setting that is residential in character and appearance in ways that optimize the physical and psychological independence of the residents (Regnier, 1992). While the concept itself is not new, it is only recently that projects using the Assisted Living model have now been built in several places in the United States. Simply stated, it is the belief that appropriately designed multi-dwelling housing projects can play a key role in prolonging the independence of aging-in-place seniors if they contain the right dose of personal and health care services - services that are not so health care intensive that they have to be controlled by the Ministry of Health. Assisted Living thus provides housing and care for the aging elderly in the period between independent living and institutional care. It claims its niche on the premise that many seniors who find their single family dwellings no longer suitable for their needs end up being put into
nursing homes and other institutional care homes prematurely and against their own personal preference. Proponents of Assisted Living believe that if the project is designed well, and is complemented by the right blend of management, personal and health care services, it offers its residents a much superior quality of life, and potentially prevent institutionalization until absolutely essential.

Suitable candidates for Assisted Living arrangements include seniors who need assistance with bathing, dressing, medication supervision, toileting, ambulating, eating, and grooming (Regnier, 1992). While assistance is needed regularly, the level of assistance needed stops short of 24 hour supervised nursing care.13

What differentiates Assisted Living housing projects from typical multi-dwelling projects? One important component is management. Unlike typical multi-dwelling projects where the senior home buyer is left alone after the purchase, the management of an Assisted Living project has the task of creating an ideal, therapeutic environment that will support the needs of the aging-in-place senior, yet provides an unrestrictive environment that encourages the freedom of choice, dignity, independence, privacy and individuality of the aging senior (Regnier et. al, 1991). Some key management activities involve providing residents with a sense of home and community, involving families in resident's lives, allowing residents to take an active role in decision making, providing activities that stimulate the mind and body, providing opportunities for volunteerism and interdependence. See Regnier et. al, (1991) for more information.

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13See "The Continuum of Care during the Aging Process", Chapter Two.
The personal and health services available on Assisted Living projects are also not found in typical multi-dwelling projects. These services are focused on the ADL, IADL, Health, Mental Health, Behavior and Motivation of the residents. Assisted Living provides personal and health services short of 24 hour nursing supervision found in continuing care facilities. Nevertheless, a major challenge faced by Assisted Living projects may be convincing authorities having jurisdiction like the Ministry of Health to allow them to provide personal and health services, yet not be regulated by the requirements of the Community Care Facility Act or the Continuing Care Act.

The differences between Assisted Living (AL) projects and typical continuing care facilities (CCF) such as nursing homes are as follows. First, AL projects are designed and managed from the beginning to foster maximum independence and self reliance for the elderly person. As such, the regulations for living in AL projects are much more lax and free compared to CCFs. Secondly, living in an AL is comparable to living in the elderly's own home within a community with some health and social support services provided as needed. Living in a CCF, on the other hand, is more comparable to living in a hospital with a few homely touches. While there are usually some attempts to make the elderly feel at home, (for instance, by allowing them to bring their own pictures or a few small pieces of furniture or ornaments), the overall ambiance is still predominantly institutional and relatively unfriendly, in part due to the

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14 ADL are Activities of Daily Living. IADL are Instrumental Activities of Daily Living. See footnote #2 from Chapter 2.
strict and uncompromising nature of building codes for health care institutions. Third, the services provided in an AL home are not meant to overburden the individual, or to overcompensate their ADL and IADL needs, rather to assist only if needed. The guiding philosophy of these services is to maximize the elderly's ability to remain independent. In the same vein, visiting family and friends of the elderly are encouraged to help the elderly if desired as opposed to depending on the staff. The health care services in a CCF, on the other hand, are tightly regulated by the province's Hospital Act, the Continuing Care Act, and the Community Care Facilities Act, among others. For liability reasons, there is far greater reluctance to allow the elderly to fend for themselves. In such a highly regulated care environment, the elderly's desire and preference for independence or dignity may take a secondary priority to the facility's need to ensure that no chances are taken with the elderly's health care. Not surprisingly, the support staff of an AL home is composed of fewer health care professionals compared to a CCF.

From the above paragraph, it is easy to see why Assisted Living is becoming popular among the elderly. It seems to offer an ideal compromise between the complete independence of living in one's home, and the complete "surrender" of independence in an institutional setting. However, it is crucial to stress that the very nature of Assisted Living means that it is not ideal for the severely cognitively and/or physically disabled elderly who need the 24-hour supervised health care generally available only in institutional care homes. The question is, when is that point reached? Even if an elderly's doctor is convinced of the need for institutionalization, what if the elderly refuses? Perhaps for the first time,
such issues become very important because up till now, one could argue that the elderly who were incapable of living independently had no satisfactory choices of living arrangements besides living with family, or living in a continuing care facility or a nursing home. Clearly, as Assisted Living projects become more commonplace, the range of choices available to seniors become much more attractive.

Finally, let us consider the design differences between a typical speculative market condominium project with that of an Assisted Living project. From a design perspective, assisted living projects have some important differences to typical multi-dwelling projects. I have already discussed earlier how typical multi-dwelling projects target the young, first time home buyer and thus pay little or no attention to aging-in-place design considerations in the dwelling unit. Beyond this fundamental difference however, other important differences remain. First, Assisted Living projects are usually kept as small as the minimum number of residents required for affordable management, personal and health care services. The number of dwelling units required for economies of scale may range from 25 in a small town to over 40 in typical urban settings (Regnier, 1992). In contrast, a typical multi-dwelling project may have hundreds of units. Second, the design precedent of an Assisted Living building type is the mansion house, country villa, or bed-breakfast hotel. It usually takes its character from the historic architectural heritage of its setting. This usually means more care is taken to create details and materials that reminisce past residential ambiance. Mass market multi-dwelling projects, on the other hand, are built with current housing market trends and cost cutting measures as being primary generators of design and construction.
Let us compare and contrast briefly the designs of a typical speculative market condominium project (see diagrams on pages 99-103) with an example of a well designed Assisted Living project - the Rosewood Estate in Roseville Minnesota by Arvid Elness Architects, Inc., Minneapolis, Minnesota\textsuperscript{1,5}. In comparing the two typical floor plans (pg. 99 versus pg. 111), the first major difference is that the corridor in a market condominium is typically set at close to the minimum width of 1100 mm (3'-8") required for exit widths. Unless the project is a high-end project, very little extra space is given to the corridor in order to maximize the available area for the living units. The corridor exists merely as a utilitarian and code feature. Furthermore, higher end market projects for condominiums tend to be concrete construction high-rise towers to take advantage of views, meaning that generally speaking, the vertical circulation core and corridor tends to be a higher percentage of the floor area per floor due to the less units per level. In such cases, minimum space is afforded to corridors to reduce the overall area occupied by non-saleable area.

In contrast, the typical building floor plan of Rosewood Estate shows the central "corridor" to be designed to be wider, and to "merge" into common spaces like lounges. These lounges serve a twofold function: they break up the monotony of a long, narrow corridor, and they serve as a common meeting space in between unit clusters. The corridor has also been deliberately staggered to reduce the perception of long, narrow spaces that tend to be uninviting.

\textsuperscript{1,5}For a more detailed case study of the Rosewood Estate and other comparable Assisted Living projects, please see Vic Regnier's Assisted Living for the Elderly (Regnier, 1992).
Case Study Diagram 5.6 Entry Floor Plan: Common spaces are clustered around the symmetrical entry. North and south buildings are treated as residential wings. Note how corridors have been offset and intermediary lounges located to avoid the perception of long corridors. The wide eight-foot corridors and the numerous undifferentiated lounges, however, make the building more anonymous and at times disorienting.

Excerpt from Regnier, 1992:
Rosewood Estate,
Roseville Minnesota
Typical Unit Floor Plan
(by Arvid Elness Architects, MN.)
scale: as shown
CASE STUDY DIAGRAM 5.7 Unit Clusters: Four units are typically clustered around an internal lounge. Careful planning has allowed these units to be fitted together with bedroom and living room spaces receiving perimeter lighting. The C unit uses a large cased portal opening from the bedroom to the living room to create greater identity for the bedroom in this studio unit.
The second major difference between the two plans deal with the building shape. It is clear that the market condominium plan on pg. 99 is relatively rectangular in shape - being made up of relatively similar units stacked up against a double-loaded corridor - much like kernels in a corn cob. This reduces the external wall surface area to building volume ratio, and means higher efficiencies (i.e. lower cost) in terms of total area of walls, building heating costs, ease and repetition of construction. While producing cost savings however, the building becomes monolithic and relatively boring, while individual units lack identity.

In contrast, the Rosewood Estate building floor plan shows a very staggered, "organic" organization of masses around the central corridor, which as mentioned above, was staggered and broken up. While less efficient in nature, it creates much greater design interest, and allows smaller, sub-components of the building to have individual identity. In the case of Rosewood Estate, the sub components have been designed as four-unit clusters organized around a lounge. The lounge is an important area because it allows the residents of the immediate cluster to treat it as their common extended "living room" and thus encourages more social interaction. It is also easier to make good friends with three other neighbors in one's cluster as opposed to twenty other neighbors along a long narrow corridor. Needless to say, the efficiency of the "corridor" decreases dramatically when we consider the area taken up by the lounges, and the concept of such "common interactive spaces" are an important difference between typical market condominium projects and the Assisted Living Project.
Moving on to the individual units themselves (pg. 101-103 versus pg. 112), it is clear that the Rosewood Estate unit has been designed to accommodate handicap accessibility. Note the 5'-0" turning radius in the bathroom and the double doors into bedrooms. Further differences occur in finishes and other details, but they also deal primarily with handicap accessibility. Other than handicap accessibility, typical space planning principles apply in the overall design of the residential unit. For more information, please refer to the first section of this chapter on handicap design guidelines.

In summary, it is clear that there are important differences between market condominiums and Assisted Living projects. In comparing and contrasting Rosewood Estate to the typical market condominium project, I have highlighted important design concept differences. However, it must be remembered that at this relatively early stage in the evolution of Assisted Living, there is as yet no "typical" or "prototype" project model, only good examples. Furthermore, while there are similarities between good examples of Assisted Living projects from a design standpoint, it must also be emphasized that there has been a great variety of design solutions used in attempting to achieve the goals of independent assisted living. Since I obviously cannot describe all these projects, the reader is encouraged to read Regnier 1992 for a fuller treatment of the issue.

Unless society as a whole becomes exposed to, and consequently becomes willing to, accept design solutions that involve "compromises," (such as smaller unit sizes in favor of larger corridors with lounges or units designed for handicap accessibility), it will remain a challenge for design
features associated with Assisted Living to become readily incorporated into market condominium projects. The task remains for architects in particular, and for society as a whole, to accept that such compromises are necessary, and ultimately for the good of all, in order to prolong independence for British Columbia's elderly.

In concluding this chapter, it is clear that housing plays a key role in determining the well being of aging-in-place elderly. In this context, I highlighted three key areas of housing in which architects can play a crucial role in enabling independence. Central to the role of the architect is the responsibility of setting up such an opportunity by a two-pronged approach - first, by removing obstacles to independence in an unsuitable physical environment, and secondly, by incorporating into the design from the beginning, design elements that can be constructed later to counter the effects of aging. The first approach is somewhat passive and reactive in nature, and focuses in "removing" the problem - as elaborated in the section of retrofitting the home environment to allow for prolonged independence. The second approach is more pro-active and long-term in its approach, and allows for the physical environment to "age" with the independent elderly, so to speak. While both approaches are important and applicable, it is important to emphasize that with all things being equal, the second approach is superior in concept, application and ultimately, cost. It is always easier and more successful in phasing a well designed home to have the "elements of aging", like the elevator, when it was designed for from the very beginning.

Finally, I reiterate my belief that in the final analysis, the designer must
never over compensate for the aging requirements of the independent senior. While overcompensation appears to be a safer approach on the surface, it is my belief that this approach runs contradictory to everything I have learned about British Columbia's seniors. In my opinion, the preference of British Columbia's elderly to age-in-place is proof of their preference to remain productive, and hence their expectation of being treated as being such. Consequently, the physical environment must never be over designed to become so pro-active that the elderly is deemed to be not in control. In the final analysis, the best approach is still the second phased approach discussed above.
CHAPTER FOUR

ASSISTIVE TECHNOLOGY AND ELDERLY INDEPENDENCE

In the last two chapters, I concentrated on the issue of Health and Housing. I discussed a relatively recent development in health care delivery in the United States called the ON LOK Health Services Program, an excellent case study of a community-based health delivery system for some aging-in-place elderly in San Francisco. I also briefly compared and contrasted this model with what is interpreted to be its "counterpart" in British Columbia: The BC Continuing Care Division. Within the context of BC's community-based health care model, I then discussed three types of applications in which architects could apply their skills in housing to enhance the aging-in-place elderly's health and well-being. In short, I focused on health and environmental responses to the needs of aging-in-place.

In this chapter, let's turn our attention to another type of response - that of assistive technology. Assistive technology is the term I will use in this thesis to describe the milieu of technological advances and their subsequent mass market products that have been developed to aid aging-in-place for the independent elderly. I can categorize these technologies into three basic groups:

a) health delivery assistive technologies, (e.g. diagnostic medical equipment in health care institutions.)

b) mobility related assistive technologies (e.g., wheelchairs)
and

c) communication related assistive technologies (e.g., cellular phones).

It is beyond the scope of this thesis do justice to any one of the above categories. Rather, the point raised is that in today's Information Age society, a technological response to the challenge of aging-in-place is becoming as important as any health service or housing response to the needs of the independent elderly. Important advances in all three categories have significant impact on the present and future aging-in-place potential of BC's well elderly. For instance, in the second category of mobility-related technologies, electronic products now can enable a person to control any chosen number of environmental and psychometric factors in the home including lighting, heating, security and mechanized draperies though a hand held remote-control device.

For this thesis, I have chosen to focus on a particular product in the third category, where recent advances in telecommunication technology have given birth to a whole range of communication devices that hold tremendous promise for enhancing the independence of the well elderly. I will discuss a particular communication device - the Videophone, a new, revolutionary communication device that holds tremendous promise for elderly independence. This device is so new that it has not even been mass marketed in British Columbia yet. I have chosen to focus on the videophone, and not on other comparable computer-based audio-visual communication devices, because I believe that as a technological and
logical development of the telephone, the videophone is much easier to use than other comparable audio-visual communication products and also almost everyone has access to a telephone. Consequently, I believe it to be more acceptable to the independent senior as an improved way of communicating.

This chapter has three components. First, I will discuss the concept of human communication, and how visual communication is a key, inherent part of the communication process. Second, I will discuss the current videophone product. Finally, I will speculate how the continued development of such audio-visual communication technology may aid the independence of future aging-in-place elderly.

- Audio Visual Communication and Elderly Independence

In chapter one, I defined the concept of independence and the ability of the elderly to (1) "maintain control over their near environment, their ability to meet personal needs (Alberta Senior Citizen's Secretariat, 1986) and to maintain responsibility for decisions in these areas; (2), the ability of the elderly to remain part of the community (Keating, 1991) as active participants; and (3), easily access services such as groceries, banking, health care etc. (Keating, 1991).

In all the three criteria, effective human communication plays a key role.

How is effective human communication achieved? This is a very complex multidisciplinary question, and is beyond the scope of this thesis.
However, to appreciate the potential of the videophone, I will briefly
discuss the importance of being able to see the person I am talking to in a
typical face-to-face interaction. There are two components in the message
communicated during this interaction - verbal and nonverbal. Verbal
communication refers to the spoken component, concerned with the words
that are conveyed. The ability to see the person and the messages
conveyed is part of nonverbal communication. Nonverbal communication
refers to a wide variety of 'non-word' signals which may repeat, substitute
for, contradict, or reinforce verbalizations (Carmicheal et. al, 1988). The
following are some important examples of unique nonverbal
communication functions, all of which can ideally be communicated using
an audio-visual communication device.

**Personal Identity**

Carmicheal describes how nonverbal signals are used to convey, among
other things, our identity (e.g. sex, age, personality and socioeconomic
status). For instance, studies indicate that age, sex and socioeconomic
status are often accurately judged from photographic or vocal samples
(Nerbonne, 1967 & Davis, 1949). Furthermore, whether accurate or not,
people tend to judge personality characteristics based on body shape
(Wells & Siegel, 1961; Sortes & Gatti, 1965). Thin people are perceived to
be withdrawn, tense, suspicious, and sensitive, fat people are perceived to
be sympathetic, dependent, sociable, and sluggish; muscular types are
often believed to be assertive, active, adventurous, and determined
(Carmicheal & Knapp, 1988).

**Emotional States**

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Nonverbal communication also plays a key role in the expression of emotional states (Buller, 1991). Facial expressions are our chief source of this information. Common quotes like "why do you look so downcast today" or "You look like you've just won a million dollars" clearly denote how we commonly interpret a person's emotional state by the person's facial expression. Research by Coker and Burgoon (1987) even argues that evidence suggests such interpretations to be socially universal, i.e. that there are consensually recognized meanings for such nonverbal behavior. I believe the ability of an elderly to visually communicate his/her emotional state on the videophone to be a tremendous improvement over the telephone.

Value Judgments and Attitudes

People often convey their value judgments and attitudes by how they react nonverbally while communicating (Buller, 1991). Value judgments and attitudes are often conveyed, for instance, when their nonverbal behavior communicates their level of interest. Other examples of such nonverbal behavior include turn-taking, feedback, general attentiveness and eye contact. For instance, one can determine what someone is looking at by observing their eyes (Angolillo, et. al., 1993). Constantly wandering eyes often communicate a lack of interest in the listener, or perhaps a discomfort of some sort. Furthermore, general attentiveness may also be communicated by the person's gesticulation - are the hands fidgety? Does the person's body language communicate a sense of comfort or discomfort?

The above research clearly support nonverbal communication as an integral part of human communication. Furthermore, one can conclude
that human communication is much more effective if both verbal and nonverbal communication can be achieved simultaneously, as in the case of a face-to-face interaction. I believe that the ability to communicate long distance in a face-to-face interactive manner is a tremendous improvement, plus a logical, desirable progression to existing telephone communication. Consequently, I suggest that independent elderly (especially those living alone in rural areas) will view the videophone as being an aid to their independence because it potentially allows them make "visits" they may normally not be able to make due to limits in transportation or health to their friends and relatives yet still continue to have face-to-face interactive contact through the videophone. Given that there is tremendous emphasis in the research literature on the transportation needs of aging-in-place elderly (Havens, 1980), it is conceivable that despite limitations to the device, the elderly may find the videophone an acceptable way of overcoming some of their transportation limitations.

Up until now, the only widely available means of long distance interactive communication for independent elderly was though the telephone. In wide use today, the telephone allows effective verbal communication between two callers, but does not allow callers to see each other. In recent years, tremendous progress in communication technology as a part of the Information Highway has allowed the development of products that allow

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1The information highway is a broad term that refers to the many concurrent information delivery systems that are being currently researched and tested. These systems are all based ultimately on computer technology, and are about ways of linking up different parties in order to exchange information. To the general public, this information highway has expressed itself in the form of satellite communications, fiber optics, phone lines, cable television, interactive television, video telephony, and cellular phone technology. This great variety is evidence of

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live communication between two participants through the use of either personal computers, cellular phones, satellite hookups, and advanced telephone systems. Audio-visual communication for this thesis is defined as two physically separated parties communicating verbally and visually in a live, interactive manner using an appropriate electronic device. Currently, there are several types of such devices. One type is for computer users, and includes the software and hardware that allow people to hold audio-visual communication through their personal computers and modem lines. A logical progression of this technology has been videoconferencing, which allows live two-way interactive audio visual communication between two or more parties through specially set-up video conference centers throughout world. Currently, it is still very expensive to video conference. Another such type of device is the videophone, which is a progression of the telephone, and allows callers using the device to see each other as they talk. We have chosen to focus on the videophone because we believe that as a progression of the telephone, the videophone is relatively much easier to use, and is thus more likely to be familiar and acceptable to the independent senior.

Before extrapolating on possible applications of videophone technology for elderly independence in future, let us describe in greater detail the currently available videophone.

the varied and sometimes competing fields of research involved, and also betrays a lack of consensus regarding what the "winning" technology will be. Ultimately however, the information highway is about a new, instant way of life for us all. It promises immediate and interactive communication (eg. shopping through interactive t.v.). It will mean us having more choices for services, entertainment, and information right at out fingertips. The world will become a much smaller place.
- **The videophone**

The videophone is a communication device that transmits and receives video images as well as audio signals over telephone lines to allow callers to hear each other's voice as well as see each other. It is a telephone with a built-in mini-video camera and video screen display to allow two callers using the device at both ends to see each other. Video telephony thus adds a visual dimension to ordinary audio telephone service (Angiolillo, et al 1993).

The origins of video telephony can be traced back to 1927, when a historic one-way full-motion video call was made by then Secretary of Commerce Herbert Hoover in Washington, D.C. to AT&T executives in New York City (Dorros, 1969; & Mainzer, 1984). This video call, made at 18 frames per second, became the forerunner for commercial television, which was introduced in 1936 in America.

There are two types of videophones in the world today. They are BC Tel's "Relate 2000" model made by GEC Marconi, Britain; and AT&T's VideoPhone 2500 ™, made by Compression Laboratories, San Jose, USA (Fox, 17 April, 1993). Given that both these models are very similar in function and quality, the term videophone will refer to either of these models unless noted otherwise. Both videophones plug into a normal (analog) telephone socket. In addition to typical telephone functions, they both have a color camera and a 7.5 centimeter liquid-crystal display (LCD) screen for displaying pictures. The color camera records images of the caller which are simultaneously converted into digital codes that are
transmitted through the telephone line at 14.4 kbit/s (kilobits per second). The receiving videophone decodes the signal back into an image which it displays on the LCD screen at 5 frames per second (fps). Using current compression technology, the images transmitted and displayed on the videophone show facial expressions and gestures simultaneously with the caller's speech "with a high degree of clarity and naturalness" (Hong Kong Telecom CSL). Its small screen restricts callers to seeing only the faces of each other with clarity. Any movement of the person will "appear as a series of jerks and blurs on the recipient's screen" (Fox, 6 March, 1993).

How easy is the Videophone to operate for the independent senior? Well, it works like any other telephone, except that it has a visual screen and small camera too. Thus, it takes two callers with the videophone to use the visual function. The advantage of the device is its relative simplicity: one buys the unit and plugs it into an ordinary telephone socket. If one prefers to use it as a typical telephone, one just keeps the screen in its folded position. All calls start as normal voice calls only. If both parties want to

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2 Kilobits are units that measure the amount of information transmitted per second.

3 In contrast to transmitted videophone images, regular television displays a typical clear image at 30 fps. The much narrower bandwidths of existing telephone lines in Canada forces this digital signal to be simplified to allow it to be transmitted through the telephone line, consequently reducing its image clarity and size.

4 Compression technology takes the digital image and compresses its size by "simplifying" the data contents to allow it to transmit over the phone line. The drawback is a resultant loss in image clarity.

5 How sharp and "jerkless" the image will appear will also depend on the transmission capacity of existing phone lines available. Hong Kong Telecom's claims about the visual clarity of its videophone is based on existing phone lines in Hong Kong. BC Tel has not made any public announcements of this nature because they have not begun the mass marketing for the product.
Excerpt from Singapore Telecom's Videophone Brochure:
Picture of Videophone & its screen at actual size.

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Excerpt from Hong Kong Telecom's Videophone Brochure:
View of Videophone in open screen position.
Excerpt from Hong Kong Telecom's Videophone Brochure:
View of Videophone's Functions.
ALL THE PRIVACY YOU’LL EVER NEED

What if your Nucleus Visual 2000 rings but you don’t want to be seen? It’s up to you to press the video on/off button. And as long as the screen unit is folded down, the Nucleus Visual 2000 functions as a normal phone.

You’re in the middle of a conversation and wish to consult with someone in private? Just press the secrecy button and the person at the other end won’t be able to see or hear you.

Need to check your appearance before you make your call? Use the self-view facility. This shows you the exact picture that will be received at the other end. In addition, there’s a special picture-within-picture facility that allows you to see yourself during the call.

Excerpt from Singapore Telecom's Videophone Brochure: Explanation of Videophone's privacy feature.
be seen, they activate the video function by pressing the video button. There is even a secrecy button that prevents the person at the other end from either seeing or hearing you. A Self View function allows callers to check themselves before visual transmission during the call. Other features include a brightness key and a contrast key to adjust the quality of the image transmitted.

How universal will the videophone be? A new product in the audio-visual communications market, the videophone is still lacking comprehensive, universal standards that will ensure worldwide compatibility. One existing problem is compatibility between the Relate 2000 and the VideoPhone 2500™, the only two videophones currently on the market. One cannot hook up a Relate 2000 to a VideoPhone 2500™, and see the caller on the other end. British Telecom maintains that calls from a Relate 2000 will pass through both MCI and AT&T lines, but calls from the AT&T model will only work on AT&T lines (Fox, 6 March, 1993). Due to the newness of the product, BC Tel has yet to mass market the Relate 2000. In Asian markets like Singapore or Hong Kong, however, the product has been selling very well.

Product affordability is another key issue. Currently, BC Tel sells the product for Cdn. $1300.00. It admits that the price is still too high for the mass market and is seeking ways to get GEC Marconi, the Relate 2000's manufacturer to lower the price. As with all new technologies, it expects the price of the device to come down over time as technology improves.

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In developing their product, AT&T decided to get the best picture quality possible by choosing a modem that transmits at 19.2 kbits/s. GEC Marconi choose a slightly lower quality but more robust signal at a transmission rate of 14.4 kbits/s.
and production costs come down. BC Tel has identified the independent elderly in British Columbia as a potential market segment for its videophone.

Despite the issues of cost, image quality and compatibility mentioned above, there is reason for optimism when one looks at the overall picture. Angiolillo et. al (1993) have identified the following developments since the video call in 1927 that now allow videophone technology to become a reality for the mass market;

i) Telephone cable bandwidth is now cheaper and more easily available, e.g., the Integrated Services Digital Network,

ii) Video compression technology is now vastly improved,

iii) Prices for equipment and transmission are becoming affordable,

iv) Saving time and travel expenses is more important than ever in today's global economy,

v) People are more comfortable today than ever with similar or related technologies in the home, including the VCR and personal computer,

vi) International transmission standards have been developed by the Worldwide International Telegraph and Telephone Consultative Committee (CCITT) for different types of vendor equipment to work
vii) The market for video telephony is growing: As of 1993, thousands of video conference systems will have been installed worldwide.

Many other experts in the telecommunications industry believe that audio-visual communication will become a mass market commodity. Henry Kwok of Stentor Resources Center Inc. ⁷ believes that the videophone is a key growing component in today's telecommunication/information age, while cautioning that there is still no clear "winning" technology in sight yet. However, whether or not the videophone survives and flourishes in its present form is not the issue, for if it doesn't, another comparable product will succeed it.

In projecting the potential of the device for BC's aging-in-place senior, we assume that two of their demographic characteristics will continue to be true. The first is their preference to age-in-place (Blackie, 1986; Wheeler, 1982).⁸ This includes the elderly in rural areas where access to required services for independence is more difficult. The second assumption is that the senior will continue to face difficulties in getting adequate transportation, especially for those living in rural areas. In this context,

⁷Stentor Resource Inc. was set up in 1992 by Canada's nine major telephone companies to establish a strong voice for the Canadian telecommunication industry and to meet the challenges of a fast-changing, complex, business environment. Stentor Resource Center is developing and delivering innovative products and services that will allow the telephone companies to compete effectively in this new environment while meeting the sophisticated demands of Canadian consumers (Stentor, 1992).

⁸see Chapter One for a more thorough summary of BC seniors' characteristics.
we believe that videophone technology will be seen as one possible solution (among others) to the elderly's transportation difficulties by providing easy, instant access to friends, relatives, and support services though audio-visual communication links. There are several factors that support such an assumption. First, demographic projections clearly indicate the elderly as a growing segment of society. This segment's political and economic influence will continue to impact society's decisions. It is likely that the elderly's challenge of aging-in-place will increasingly become society's challenge. Thus, society will be eager to develop and accept potential solutions, including technological solutions, to promote aging-in-place. Second, technological progress will naturally continue to produce more products for the benefit of everyone, including seniors. Third, the exponential rates of change in our Information Age will continue to increase our expected quality of life. In this context, our demands of an "instant gratification society" with more choices of services available instantly will continue to grow. As demand grows, so does supply. Television is a good example to illustrate this trend. In the seventies, television in America was dominated by the three major networks (American Broadcasting Corporation (ABC), National Broadcasting Corporation (NBC) and Corporate Broadcasting Station (CBS)). These three networks initially provided the lion's share of television programs through just three channels. The eighties saw the growth of entertainment, news and infomercial cable networks. Specialty networks catering to niche markets became commonly available. The number of channels available grew to between twenty to thirty. In the nineties, this trend continues. It

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9It is projected that by the year 2030, approximately 20% of all Canadians will be over the age of 65 years (Baldwin, 1993).
appears that we will soon have hundreds of channels available through
satellite broadcasting, thus providing us even more choices. Some of these
choices will include interactive television shopping, program selections and
access to all sorts of information through the information highway.

As interactive audio-visual communication becomes more and more
popular, increasing numbers of businesses will offer their services and
products through such a medium. The aging-in-place senior, especially
those in rural areas, would be key beneficiaries of such a development. It
is conceivable for the senior in the near future to be able to buy services
and products from their homes. Imagine them being able to select their
weekly groceries from their favorite supermarket through the videophone
and arranging for the groceries to be delivered to their homes. Imagine
them doing their banking and bill payment directly from their homes by
talking to friendly tellers over the videophone. Instead of a faceless,
amonous computer voice over the telephone, they can now feel really
connected to the shopping center or bank. Suddenly, the lack of available
transportation becomes much less significant.

Thus, instant access to services through the videophone will promote and
prolong elderly independence. Likewise, it is conceivable for them to feel
more independent, yet still feel closer to their friends and relatives simply
because of visual contact through the videophone. Furthermore, society
as a whole may be more willing to allow more progressive
assisted living arrangements¹ for ailing aging-in-place seniors
if friends, relatives and health care officials were able to

¹ See Chapter Three under "assisted living"
maintain visual contact with seniors. With regards to health care, audio-visual technology is a natural extension of the 'help hotline' services that have been used to allow the elderly to call health care centers for information, medical or social support. It is even possible that this visual link can be useful in enabling health care providers to access the immediate health care need of the person calling in. This can be crucial in screening emergency calls. Simply weeding out clearly unnecessary hospitalizations through initial videophone calls can produce tremendous health care savings.

What impact will devices such as the videophone have on the physical environment of the aging-in-place elderly? As architects, how do we incorporate such "instant" devices into the design of a home? While these devices may be very easy to add to a home technically, the spatial and psychological implications are immense, and will potentially pose a huge challenge to the way we view space and privacy in our homes.

Before considering the implications audio-visual communication devices will have on house designs, let us first think about what the home is psychologically. The house is our abode, our shelter and our protection, not just from climatic elements, but it also provides security, privacy and safety as well. Philosophically, we can say that our home is an extension of ourselves, it is where we retreat to every night to rejuvenate and recover from our daily activities. It is where we let our guard down, and for the seniors living alone, the ability to be just ourselves in private is even more

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1: The rising costs of health care in BC will likely encourage such a development. See Chapter Two for more information.
fundamental. Thus, we can say that as we retreat into the privacy and protection of our homes, we also retreat into our private selves.

The psychological functions of a house translate directly into how it is designed. Spatially, the typical flow of spaces and their functions in a home are a reflection of the layers of functions in our personality as well. For instance, the main entry and main door of a home is usually found in the front of the home, because this is where we formally meet our visitors. The entry foyer, which acts as a transition from the exterior entry area to the more private spaces of the house, is consequently located in between the main door and the living room. The living room, which function as a formal entertainment area, is usually kept clean, tidy and formal - in contrast to the family room, which is usually more cozy and informal. Homes that are well designed never allow a person who enters into the entry foyer or living room to see into the family room because the activities that occur there are more private, and should thus be visually shielded from the formal areas. For the same reason, private areas like bedrooms and bathrooms are usually located in a more private zone of the home. This gradual, progressive spatial flow from "public" to "private" in our homes is a fundamental expression of how we function as people. When we interact with other people, we are involved in "public" activities. When we are by ourselves, or with our own families, we are involved in more "private" activities.

When devices such as the videophone become incorporated into our homes, they raise a fundamental dilemma - that of the need for our home
to go from a "private" mode to a "public" mode instantly. The first key design question is where should the device be located? In the formal areas of the home like the living room where we will always show an ideal physical environment to our friends? Yes, perhaps, but the disadvantage here is that we have always strived as a society towards convenience and access. Locating the videophone in the living room may not be the most central or accessible spot in the home, especially if the home is a large one. What about the convenience of our bedrooms? Perhaps, but are we psychologically willing to allow someone to interrupt our privacy and be able to see us in our bedrooms?

Even if the design challenges of creating an ideal physical environment for the videophone can be achieved in the home, what about the greater psychological issue of losing our privacy instantly? We have allowed our lives to become interrupted anytime with the telephone. Will the same eventually be true of the videophone?

The questions posed above are important for architects and environmental psychologists to research. Clearly complex issues, they further illustrate that effective research will mandate close multidisciplinary cooperation between related professionals. It is beyond the scope of this thesis to deal with these complex questions, and much exciting work remains to be done by researchers. There remains much for us to look forward to.
The numbers show the usual sequence of spatial experience for visitors/non residents of the house:
Main entry, Foyer, Living Room, Dining Room, Kitchen to finally, the Family Room.

Conversely, the sequence can include the Foyer, the Library/Office to the Family Room, but this is less likely as the Office is usually reserved for clients who generally do not go to the Family Room.

Note that the Family Room, as the heart of the main floor, is not visible from the Main Entry and Foyer.

Similarly, the bedrooms upstairs are also visually shielded from the Foyer. The staircase thus beyond functional reasons also acts as an important spatial transitional element, as well as a privacy shield for the private spaces of bedrooms upstairs.
CHAPTER FIVE

CONCLUSION

Throughout this thesis, I have attempted to illustrate the important roles health, housing and assistive technology play in maximizing aging-in-place for the elderly, and their interrelationships to each other. If we as a society are to address the challenges faced by the aging-in-place elderly, it is clear that effective solutions must encompass all these three areas. Traditionally, the health issue has been given the most prominence, sometimes at the expense of the other two. This surely must change. Furthermore, the thesis has stressed that when effective housing is provided, many health-related problems of aging can be prevented or mitigated.

With the advent of community based health delivery systems such as On Lok Health Services in San Francisco and the British Columbia Long Term Care Program, society is now beginning to recognize the interrelation of Health and Housing for the aging-in-place senior. Nevertheless, as illustrated by this thesis, there is still room for society as a whole to improve. The medical profession, in particular, must continue its struggle to redefine and reexamine its traditional approach to health defined as being the absence of disease. Preventative health care, healthy lifestyles, adequate income levels, and adequate housing are increasingly being recognized as relevant key determinants of health, but the momentum must materialize into concrete government funding and social policy before lasting changes can be expected to occur.
It has also been stressed that many intelligent design and construction solutions for aging-in-place housing needs are not prohibitively expensive or necessarily unattractive. Choosing 3 feet wide doors over narrower doors, or the design of wider corridors in a typical house do not add significantly to the overall cost of construction, yet go a long way toward making the home suitable for wheelchair occupancy. Other key design ideas, like framing a home for a future elevator addition, only add marginally to the initial construction cost. If the pre-framing was not done however, the cost of adding the same elevator would be considerably more. Thus, architects and designers should strive to incorporate many suitable design elements into mass market housing that make them easily convertible for future aging-in-place use. Similarly, home buyers also need to be educated on the advantages if such design elements are already incorporated into their market level housing.

Another concept that deserves mention is Universal Design. It is based on the principal that certain elements of design that have been shown by research to be helpful in independence for aging-in-place elderly or those with disabilities should be incorporated into all design. In a paper presented at the International Symposium, Tokyo on 27 January 1994 Satya Brink describes the goal of Universal Design as being "..universal fit between household needs and household stock. Ideally, universal housing is valuable through out its existence to house a variety of households without major alterations." (Brink:10, 27 January, 1994). Underlying this principal is the belief that these elements of design (for instance, including wider hallways, wider doors, and more accessible cabinets in kitchens,
etc...) should also be welcomed by the general public due to their general usefulness, and should thus be incorporated into all types of designed environments. Brink describes the minimum requirements of Universal Design to include elevator access in multi-storey buildings, bedroom and full bathroom on the main floor, floor area in each story uninterrupted by changes in level and wider door widths. While there is still no general consensus on the exact extent and affordability of Universal Design, it is without dispute that many good design principals of Universal Design should be incorporated into all design.

While the interrelation of health and housing currently has some momentum and history to it, the advent of assistive technology into the equation is new and revolutionary. It is so new that society still barely understands the implications of this interrelationship. This lack of awareness is exacerbated by the exponential rate of technological change, thus creating a huge challenge for society as a whole, and the aging-in-place senior in particular, to understand and take advantage of. Professionals, academics and researchers in multidisciplinary fields related to aging-in-place seniors are only beginning to grasp the potential of new assistive technologies. Much still needs to be studied before any clear conclusions can be drawn. Given how fast things are changing, however, we are quickly losing the luxury of time, or the comfort of applied research literature, to decide such fundamental issues. Nevertheless, we know that assistive technology is as much a part of society's response to aging-in-place as health and housing. While we currently may not be sure exactly the extent assistive technology will play, it is likely that this role will continue to grow as technology progresses.
In the final analysis, stressing that health, housing and assistive technology are key components of successful aging-in-place is still not the most important issue. Ultimately, the fundamental issue that society must address is this: how far will it go to allow seniors to age-in-place? Will society strive to do our best to allow our seniors to age-in-place with the resources they will need? Or will we as a society choose to ignore the realities of aging-in-place?

The questions posed above are complex questions that offer no easy, instant answers. In attempting to deal with the issue of aging, I have gone back to first principles, where it is statistically proven that the elderly prefer to age-in-place (Blackie, 1986; Wheeler, 1982). In a country built on the principles of democracy and freedom, I stress that this preference of the elderly to age-in-place must be given the required priority by society in general, and by our government's social policies in particular. While one could argue that the BC government is now committed in this direction, it remains that the entire health care system in the province remains in a state of restructuring, and clear, concrete government policies have yet taken place. For instance, unless health care policy begins to include appropriate housing in its budget for the independent elderly, the clear interrelationship of housing and prolonging aging-in-place will not be addressed adequately. In other words, successful aging-in-place can be maximized only through the availability of the appropriate funding and other supports for reinforcing the strong interrelationships of health, housing
and to a growing extent, assistive technology. Only when there is recognition and acceptance of these interrelationships by society as a whole will we become more successful in creating a humane, caring and intelligent environment for aging.
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