Design Excellence
A National Objective

Assembly, Ottawa
February 24-25, 1975

National
Design
Council

Excellence du design
Objectif national

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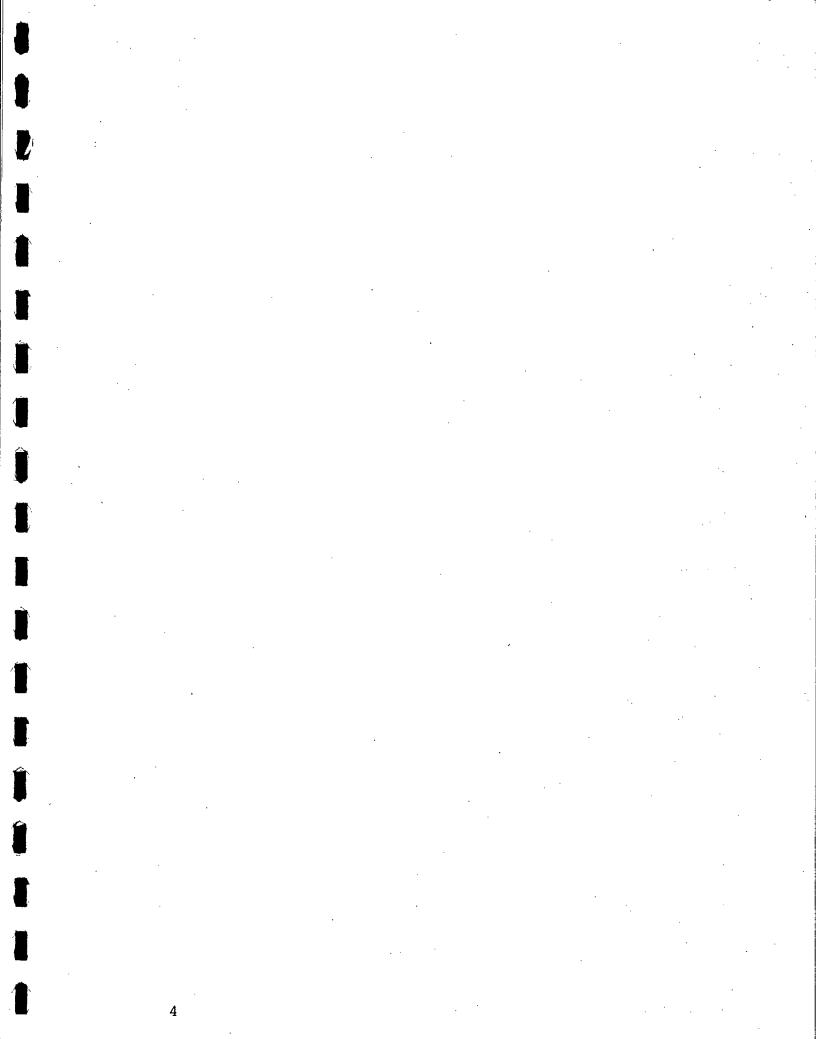
Conseil national
de l'esthétique
industrielle

This briefing book will assist participants to prepare for
the Assembly. It includes a survey of concepts and thoughts
expressed in papers and meetings of four committees which
were established in September 1974. The membership of the
committees included representatives from national associa-
tions and federal government organizations.

The content of the briefing book has been derived from some
of the material that was originally prepared for the com-
mittees. It cannot anticipate the conclusions that any
of the committees will have reached by the time the Assembly
convenes. These conclusions will be fully reflected only
in committee reports and presentations to the Assembly.

The briefing book concludes with a chapter, "Towards a
National Design Policy" in both the English and French
languages. Time has not permitted the other chapters to
be translated.

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"Every product, every system in our man-made world is designed by man; we, as a society, determine and bear the responsibility for the quality of design and for its effects on our daily lives.

We are concerned about design because it reflects the way our society feels and thinks; and because of its influence on our quality of life. Today we accept as basic common sense that education and health care should not be the privilege of the few but the right of all citizens. Equally, excellence of design of our man-made environment should become an important common right and a common concern - it should not be left to chance - it is common sense and a necessity that excellence of design becomes a national priority."

Mrs. Sonja Bata
Chairman
National Design Council

Foreword

All of us are familiar with design through the various
artifacts we use in our daily life. The clothing we wear,
the packages we open to get at the food that we cook and
the appliances that we use in the home; the graphic design
in the books and magazines and newspapers and advertising
that we read -- as well as the design incorporated in
television programs, motion pictures, and theatrical pre-
sentations; the houses we live in and the offices, factories
or stores we work in; the automobiles or public transporta-
tion we use: all of these, at some stage or other, have
been designed for our use.

Whether the design of a particular product or process
really meets our needs effectively -- whether it is "good"
design (an admittedly elusive concept) is something we
almost always sense, even if we do not express this aware-
ness in words. When we think to ourselves that a product
could function better than it does, or be safer to operate,
or be more pleasing to look at or to hold -- we are express-
ing a desire for excellence in design.

But design is more than what is reflected in the products
we use. Over the decades, basic principles of design have
emerged across a variety of disciplines. In today's society
we depend on many interactive systems. We do not simply get
into an automobile and drive to work. We and the car
function as part of a total traffic system: roads, traffic
control, other automobiles and drivers, and various forms of
public transport. How these systems function depends on how
good design is at two levels: at the level of each
component in the system; and at the level where various
disciplines, skills, and hardware are integrated in a total-
ity. Just as a shock when we use an appliance may be the
result of failure in design, so too, clogged-up traffic, and
the inconvenience and frustration this gives rise to, may
stem, in part, from design failings (or failure to use
available design knowledge), at the higher, integrated level.
At each level, whether product or system, when we say
"something should be done about this", we are recognizing
the need for excellence in design.

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Coping with an Uncertain Future

Design attempts to respond to human needs and aspirations. Good design is based on intimate knowledge of these needs and aspirations and of the way in which human beings act to translate them into reality. But human requirements are realized in the context of our environment and mainly through group activities of an economic, social and political nature.

In earlier times, the translation of needs and aspirations into reality was much simpler. We expected less, and society was able to do less. Institutions were less complex and the pace of change was less rapid. We were far less aware of, or concerned about, our impact on the environment.

Today, these conditions have changed. The pace of development, particularly as regards technology, is rapid -- some say, too rapid. We have gone from simple needs to quite complex aspirations, and some of these needs and aspirations are now widely shared by people in less-developed parts of the world. All of our concerns have become more intense as we confront the exponential growth of world populations. There are frequent warnings (and considerable empirical evidence) that we now face the greatest challenge ever faced by humankind: the difficult task of providing even the most basic essentials for the mass of human beings that press upon our finite planetary resources.

In the coming decades, domestic and international needs for food, energy and basic materials will put strains on our available resource base. Many new centers of resource-related production will be opened up and existing areas will be exploited more intensely. Through more widespread and effective application, design-related skills and principles can help us meet this challenge. We can learn to restore and enhance natural milieus that have been changed by extraction of resources. Processes of extraction and manufacturing can be re-designed to minimize negative environmental impacts that are either the direct result of existing production processes, or are associated with polluting by-products. Scarce resources can be husbanded if we can design new ways to minimize wastage, recycle materials, and

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"demanufacture" (by providing for easy break-up for re-use).
Designing products for multiple uses may also cut down waste
and help us to move forward from the "throw-away society".

The Assembly will be a two-day session which will emphasize
the transfer of knowledge and experience on the process of
design. It will provide a prototype for on-going work for
improving our human settlements both in Canada and in other
countries.

Human beings are the focus of our concern. A better under-
standing of real needs and wants, and the translating of
such understanding into better design, can contribute to
the satisfaction we gain within our environments for home-
life, work and leisure. Combining these elements in a
design system can contribute to creating more effective,
efficient, and pleasant human settlements. Thus, if we
design to fulfill human needs and to protect our environ-
ment, we can achieve design excellence.

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Design is the creative process of planning the forms, functions and means of producing all the products, structures and systems we need or want regardless of scale, be they a simple item of daily use or a complex human settlement.

Good design culminates in the creation of total physical environments and their components which contribute to the enhancement of the quality of life in terms of social, environmental and economic well being.

Simply stated good design results in physical solutions which are:

    Effective - best fulfill their intended function
    Efficient - are economical to produce or to use
    Enhancing - bring esthetic satisfaction and other
                forms of desirable gratification

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The purpose of the Assembly - Design Excellence, is to create an awareness and understanding of the process of design and to establish design excellence as a valid national objective. By bringing government and non-government people together to explore the challenges for design application, the Assembly serves as a medium for information exchange. In a trans-discipline approach, sociologists, engineers, ecologists, economists, architects, planners and designers have the opportunity to exchange ideas, clarify concepts and work together to define the dimensions of inter-related design activities.

Now and again, a situation arises when it is time to stand and speak. The Assembly is such an occasion. We cannot any longer afford poor and indifferent quality of design. Application of new technology, economic exigencies, social stability and environmental concerns require that we use our intelligence, wisdom, and common sense to design more human and more efficient houses, communities, work places, and to design better ways to manage our resources. It is our intention that the Assembly be such an occasion. We hope that the Assembly will realistically assess the situation and recommend practical programs for action.

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Through the leadership of the government of Canada to
create awareness and understanding of design's fundamental
role in shaping a better human environment.

To recommend policy and program options which will permit
the design process to evolve to a standard of excellence.

To examine government policy - administrative and operating
frameworks to identify existing constraints which impede
the emergence and development of effective design.

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Six case histories have been selected to demonstrate a variety of design concepts and issues. This presentation which will be given during the morning of February 24 includes:

Design Policy:

Presentation by:
Department of Supply & Services

Encouragement of Canadian Design through the formulation of federal procurement policies and practices.

Design Process:

Presentation by:
Department of Public Works

The development of solutions for working environments in public buildings as demonstrated in two recent government projects.

Design Management:

Presentation by:
Information Canada

The Federal Identity Program; an example of applying and implementing design policy.

Design Integration:

Presentation by:
Transport Canada

The Mirabelle airport; an integration of design solutions for phased development of a transportation system which can contract or expand according to market demand.

Environmental Design: Presentation by:
                                     Environment Canada

                                     The Peace-Athabaska Delta, an
                                     exposition encouraging conser-
                                     vation of the natural environ-
                                     ment by man-made design.

Technological Design: Presentation by:
                                     Communications Canada

                                     CTS Communication Satellite,
                                     an exploration of the use of
                                     high powered technology and
                                     design.

The Frontier Community Case Study

Human Needs and Aspirations

Environmental Concerns

Human Settlement Patterns

Elements of Home, Work and Leisure

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Introduction

The Steering Committee of the Assembly made an early decision
that general discussion might develop around a specific
(though hypothetical) project. It was decided to use the
frontier community case study as a means of challenging
Assembly participants to articulate the process of designing
desirable human settlements. Such a case also demonstrates
that design requires an interdisciplinary approach. However,
it is not the intent of the Assembly's organizers to restrict
discussion to the specifics of the frontier community. Rather,
we hope that as we go through the frontier community exercise,
general problems and opportunities relating to the pursuit
of design exercise will become easier to identify and to
analyse.

We also hope that studying Canadian frontier community design
will produce results that are transferable to similar com-
munities in other countries. Accordingly, the National
Design Council has submitted this case study for possible
further development as a project to be considered by the
United Nations Human Settlements Conference in Vancouver,
in 1976.

The Challenge of Frontier Communities

The frontier community poses in sharper form, many of the
challenges to design that are present in any settlement.
At work, we are concerned to use design to promote product-
ivity and the efficient use of resources; but we cannot
ignore fundamental human requirements -- for safety, for
comfort, for psychological satisfaction, and for better human
relationships on the job. At leisure, we seek environments
that will stimulate and refresh us. Most importantly we need
a home that offers us physical and psychological security,
that reflects our sense of ourselves, that enables us to
find privacy and at the same time can be a base for social
life. These requirements, at home, at work and at leisure,
are present in any community, whether it be metropolitan
Toronto, or a frontier settlement of a few hundred or a few
thousand individuals involved in the extraction of a neces-
ary resource.

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But beyond these basic similarities, the frontier community has its own problems and opportunities. Human settlement problematics tend to me more intense when they occur in a frontier setting. Problems -- of environment, social and psychological isolation, and the economic characteristics of resource-based towns -- are readily identified. But there are also opportunities, one of which is the possibility of making fresh starts in community design. In new towns, on the frontier, we may have a chance to apply new knowledge and technology, free of some constraints that arise because of the scale, complexity, historical tradition and regulatory networks that exist in major southern Canadian urban centers.

Basic Hypotheses About the Frontier Community

Canadian frontier communities vary greatly in size. In their early years, many Canadian frontier towns had fewer than 2,000 inhabitants; further growth does not usually go beyond 15,000 people. What is envisaged in the case we are considering is a frontier community where the initial development impetus is provided by a major resource find. We are considering a community life-cycle of 50 years, governed largely by the anticipated period during which the resource will be worth extracting. The scale of resource development would be such that, over time, those actually involved in extraction would be only a fraction of the population. As the community matures, much of the population would consist of those involved in support services for the resource activity, others involved in public and consumer services in the town, plus families. Accordingly, the hypothesis is a large community: 7000 people within the first five years, growing thereafter at a rate of 25 percent per year on average until population peaks at the 50,000 level. At its peak population, our community would be a small city rather than a typical minehead town. The community, because of its size and remoteness, will have to be self-contained and be able to provide all necessary services. It will have its own hospital, schools, social facilities, commercial structure, and sanitation systems. An airport will be needed to link the area to major cities within a range of 500-600 miles. Good communications will be required right from the start, to meet the needs of the resource industry and also to bring entertainment to workers and their families so as to overcome some of the feelings of isolation. The resource industry

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will probably be the dominant economic activity throughout the community's life cycle. Many of the problems that will have to be overcome will relate to this single-industry dominance. As part of our scenario we will try to consider whether other economic activities can be attracted to the area, or developed indigenously, so as to hedge against boom-busted cycles in resource industries and provide a base for continuing community vitality once the major resource is largely depleted.

The Life Cycle of Frontier Communities

Analysis of frontier communities has identified a typical life-cycle. The main phases of this cycle are as follows:
1 Construction phase;
2 Recruitment and initial settlement of permanent population;
3 Initial consolidation and transition;
4 The mature community;
5 What we may term a "second transition", which may or may not be characterized by decline of economic activity, community decay, and, in the end, a "ghost town."

During each of the phases situations arise where application of the design process can contribute to the anticipation and successful resolution of problems.

Construction Phase

The community may evolve around a small, pre-existing, settlement -- or, depending on the location of the resource, it may be on a totally new site. The establishment of a frontier community usually reflects a series of business decisions. To overcome the logistical and other problems stemming from remoteness, will tax the planning and organizing capacities of the enterprise. The hard core of the labour force during the construction phase consists of members of

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mobile construction teams, who have dealt with similar situations in the past. These workers have a certain amount of group cohesion and esprit de corps. They are more stable members of the work force, in contrast to the other group of workers, less skilled, less well adapted to the conditions of frontier construction, and with a much more tenuous relationship to the job. Most workers during the construction phase, will be in this second category. It consists of new immigrants to Canada, seasonal workers (e.g. students) the recently unemployed, opportunists searching for high wages (or, less frequently, adventure), and men who have failed elsewhere and are looking for a fresh start. A common denominator of the work force is the willingness, for the sake of high wages, to tolerate long hours at hard jobs under difficult conditions.

During construction, housing is crude -- bunkhouses and trailers. There are few amenities, and those services that are available for the workers have to be provided by the company as part of its logistical operation. Conflicts arise, and tension is exacerbated by absence of adequate recreation facilities. Though construction is a temporary phase, it may leave a legacy to the more permanent community.

Recruitment and Initial Settlement of Permanent Population

As the construction phase draws to an end, recruitment of the industrial labor force begins. At this point, while the production facilities will be ready for initial production, permanent housing will still be somewhat limited.

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If some community amenities have been given priority during the latter phases of construction, and are already in place when the first elements of permanent population arrive, the community has an opportunity to get off to a good start. Newcomers take their cues from the "old-timers" (in the case of life on the frontier, an old-timer may be someone with only a few months more seniority in the locality). If early residents have to put up with too much discomfort, too much of a sense that priority has been given to everything except their own needs, a sourness may become part of the fabric of community life at an early stage, and its sources may be hard to detect and overcome later.

Like the construction force, the early production work force may be divided into two groups. One group will have been recruited by transfer from other installations operated by the company. This will be the case with many managers and technicians as well as part of the skilled labour. But numerous new employees are also recruited, selected and trained.

A certain tension between competing perspectives begins to show at this stage. The company seeks to recruit workers who are likely to stay for at least a few years. The workers, on the other hand, are more tentative in their approach to the community. Many have come on a "look and see" basis -- they want to get the feel of the place and the job, and will decide after a while whether to stay or move on. Turn-over is high, and in this phase especially community life is typically unstable.

Because of this, management usually recognizes that there is a need to build a community with good housing, and adequate supply of goods and services, and community institutions and physical character that will attract and hold a superior work force. The hope is that the worker, and his family (if he has one), will begin to feel at home as soon as possible.

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This can be facilitated by physical design and community
planning to provide focal points, structurally and institu-
tionally, around which people can organize and build their
way of life.

Initial Consolidation and Transition

As resource extraction begins to settle into a more routine
operation, the community enters a new phase. It now contains
many more people; there is a higher proportion of families;
more stable social relaionships begin to emerge; certain
norms and sanctions of behaviour are recognized. If the
community is working well as it goes into this phase, shared
expectations emerge among individuals and groups. People
begin to identify with the community. In short, the community
starts to consolidate. What happens now will influence its
evolution for decades to come.

At some point during this phase, the role of the company
shifts vis-a-vis the community. The company generally
attempts to narrow its responsibility: to get out of the business
of operating the entire community and to focus more sharply
on its economic role. Initially, besides being the employer,
the company was the prime planner for the community, the
main decision-maker, the landlord, and the provider of many
of the goods and services consumed. Now it concentrates
mainly on running its plant and leaves most responsibility
for the community to its citizens.

This does not mean that the company takes no interest in community affairs. What is occurring is a reallocation of roles. Such a charge is always difficult, and more so where one company is the dominant employer. The sociologist, Rex Lucas, in his study of Canadian communities dominated by a single industry, has written (1971):

...the single industry also takes the role of institutional citizen... The policy of the company in relation to the town has wide reaching effects. Whether it plays the role of leader, follower, or nonparticipant in community affairs, it has great influence upon the attitudes and relations in a community. Such simple decisions and policies as size, frequency and extent of donations to worthy causes affect the relationships among the people in the community. Officers of the companies are usually aware of the influence that their decisions have, and must realize that they are deeply involved whether they want to be or not.

Thus the company will still remain a focal point of community life. Citizens may find it difficult to meet their responsibilities and may rely on a continuing corporate interest in community life even when the enterprise is eager to "normalize" the community decision processes. Moreover, when economic or other difficulties arise, the temptation will almost always exist for part of the citizenry to make the company into a scapegoat.

The Mature Community

In some approaches to the study of frontier communities the fourth stage "maturity" is the last one and covers the entire period from the point where population peaks through possible decay and the emergence of a ghost town. In our summary, it seemed to be worthwhile to consider two such phases: "maturity" and a "second transition".

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As the town matures, the population growth rates decline, until, finally, population peaks and remains relatively stable, with only marginal increases or decreases. While demographic composition in earlier phases is characterized by the presence of many families with young children, the age composition of both the labor force and their dependents is quite different during the new phase. Families grow up. Workers who have stayed with the company become more experienced and are integrated in their jobs. If the basic resource has enough lifespan some workers reach retirement age and decide to remain in the community which is now, in the fullest sense, their home.

A substantial amount of occupational inheritance may now emerge within the industry. If employment is stable and jobs are well-paying, children of the first generation of plant workers will tend to have a first chance at job openings. As a result, immigration to the community tends to drop off. Total population may dip (as some of the younger generation leave) and infusions of "new blood" tend to be less frequent. As in southern Canadian suburbia, a "settled community" has emerged. Highly patterned social relationships prevail, and group association tends to be heavily influenced by shared experiences.

A new stage has also been reached in relationships between citizens and the company. Now that there are many long-service employees, a strong base of loyalty to the company may exist. This is particularly true if its employment record has been good and if salaries, in-plant amenities, and the structure of supervision and discipline, etc., create a feeling that the local enterprise is "a good place to work". The handling of grievances will have become routinized and unions are well-established as buffers between the corporation and the labor force. As in other areas of life, there has emerged a folklore and recognized pattern of behaviour associated with the plant.

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But at the same time, the community has begun increasingly
to differentiate itself from the enterprise. Many citizens
are not employees of the company. The community acquires a
sense of autonomy. Vestiges of the company's influence may
be more resented than the real political power it may have
exercised earlier. The impact of the plant on the environ-
ment may now become an issue that splits the community.

Looming always in the background is the dependence of the
community and its families on the company for their economic
welfare. Particularly if there has already been much expe-
rience of a boom-bust cycle in the particular resource
industry rumors may spread throughout the community: the com-
pany is investing in new and more profitable resource areas;
"they" are considering shutting down -- what's going to be-
come of the town? Sometimes, such rumors anticipate reality.

"Second Transition" (Potential for Decay vs. Community
Regeneration)

Unless steps have been taken, even in the early years to
develop more diversified economic activity, the community will
be characterized, throughout all the phases of the life-
cycle, by dependence on the resource industry for the bulk
of its employment. Depletion of the resource, new resource
developments elsewhere, changes in technology that lead to
a shift in the economic value of the resource: all of these
constitute not only threats to prosperity, but threats to
the very survival of the frontier settlement.

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In pre-Assembly studies and discussion, one point was em-
phasized again and again: the need to guard against over-
dependence on a single resource. This will influence the
design and planning process of the community right from the
start. For example, it will affect location. If location A
is right at the site of the resource and is not suitable for
any other activities, and location B is within a reasonable
transportation distance to the work site but can also offer
a suitable locale for more diverse economic activities,
locating at the resource site may give way to a decision to
locate where greater diversity is possible in the long run.
The layout of the community may also be designed to facilitate
location of other enterprises as population and labor force
grow. It may also be possible to attract enterprises that
are not ready to locate on the frontier if they have to start
from scratch and build their own town, but that may be willing
lo locate in a frontier community that is already somewhat
stabilized and that provides existing infrastructure,
institutions and amenities. Design, by itself, will not auto-
matically attract a more diversified industrial or service
base. But foresight shown in town planning and the quality
of design used in the community will make it easier for
community groups and the primary enterprise to attract other
employers to the area.

Sometimes, however, this may not be possible. The potential
for sharply reduced activity in the later stages of the com-
munity life-cycle must be anticipated in early planning and
design. Some of the possible means of coping with this include
communities designed for ultimate partial dismantling,
as well as the creation of a settlement with many communities,
where population can regroup periodically as economic ac-
tivity diminishes.

Human Characteristics

Man is a terrestrial animal, and has evolved with certain
characteristics. Biochemically, he is composed of
combinations of the basic elements that make up the planet,
with water the principal human ingredient. Man is dependent
on the biosphere for his survival. He needs air, water,
food and a certain temperature range for a continued existence.
The presence of noxious or toxic elements in his air, food
and water affect his health and lifespan. Stimuli of his
five senses also have to fall within certain tolerable ranges.
Overstimulation and understimulation of them affect his
comfort, his well-being and his physical and mental health.

Man is a territorial animal, and has personal lifespace,
privacy and "property" requirements. While conditions of
personal lifespan, privacy and property requirements vary
by culture and by age and by individual, invasion or
intrusion into personal space by institutions or by other
people usually evokes strong defensive behaviour.

Man is a social animal; except for hermits, man requires
membership in social groupings, be they immediate family,
tribe, culture, guild or profession.

Each person is a unique individual; the sense of self and
personal dignity, the requirement for autonomy and freedom
for personal development and self-determination set man
apart from most other life forms.

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While special motivations may attract some people to the
frontier, such individuals are not set apart from the
rest of the human race. They have the same basic needs and
aspirations as those of us who live in major urban centers.
Some of these requirements will be satisfied through
individual endeavor, while others require cooperative action.

There is a constant tension between the pull of immediate
needs, and the willingness to plan and make sacrifices to
attain future benefit. Our ability to free our minds from
the immediate and to look to the future, must be nurtured
if society is to progress in the direction of individual
liberty, personal satisfaction, social well-being, and
enhance the "quality of life". Aspiration beyond the
immediate is the flame that kindles human endeavor.

There are signs of erosion of personal soverignty in
contemporary society. More and more, our daily lives are
dominated by experts and specialists. We feel cramped by
our inability to fully participate in, and significantly
influence, many decisions that affect our lives and futures.

Much of our life is characterized by what Garret Hardin has
termed "the tragedy of the commons" -- there are major
concerns that affect all of us, but which are often the
responsibility of nobody in particular. There is often no
integration of various specializations and technical
decisions into a coherent whole. Nor is there a framework
for reconciling basic human values with our regulatory,
economic and built-form systems.

Human Aspirations

While approaches to human aspirations vary, it is possible
to draw up various lists of human needs and aspirations
with which most Canadians could agree, at least in principle.
The real difficulty is to translate the desire to satisfy
human needs and aspirations and to weigh and assess competing
priorities.

Human Requirements/Traditional Division

Physiological   (air, water, food, avoidance of
                  temperature extremes, and absence
                  of noxious or toxic elements)

Psychological   (belonging, comfort, security,
                  safety, etc.)

Social   (membership, grouping, interaction,
                  social hierarchy, etc.)

Aesthetic   (art, culture, beauty, logic,
                  harmony, music, etc.

Excellence in design can make a significant contribution
to such a process. We have already demonstrated how per-
vasive design is in everyday life. Industrial design
shapes the products that we buy and use, and the processes
and systems by which these goods are produced. Graphic
design contributes to the marketing of these products and
to shaping of the images that are part of our mental make-
up. Designers, architects, engineers, town planners, and
developers create the cities and towns in which we live.
But in a complex society characterized by division of labour
and specialization of expertise, no one discipline exists
which is responsible for the shape of the whole.

In Canada, as in other developed countries, we are both
beneficiaries and the victims of mass production and of the
industrial system. Our wealth and well-being presently depend
on the functioning of an impersonal, complex, system of inter-
dependence. Many of its subsystems have evolved to a high
level of efficiency -- but, often, for very limited and
strictly defined purposes. People's behavious styles, and
their choices, are conditioned by a high technology in-
dustrial system that directs human endeavors to the promo-
tion of quantitative growth.

Part of the vulnerability of this system is that it has not
linked the talents of designers directly to the needs and
aspirations of human beings as users of products, structures,
processes and systems. Rather the linkage of designer to
user is mediated by structures and processes which have a

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There is a hierarchy of needs organized into ifve basic
classes: physiological, security of safety, social and
belonging needs, self-esteem needs and finally the need
to self-actualize. The satisfaction of the needs lower
in the hierarchy are required before one can progress to
higher needs.

(Maslow)

Man is a creature that moves through a series of develop-
ment stages from birth to death thus:

Basic trust - mistrust..........................Infant
Autonomy - shame/doubt..........................Infant
Initiative - guilt..............................Child
Industry - inferiority..........................Child
Identity - role confusion.......................Teenager
Intimacy - isolation............................Young adult
Generativity - stagnation.......................Adult
Ego integrity - despair.........................Old age

(Erickson)

logic of their own based on costs of production and markets. Longer-range social and environmental costs are, in many cases, ignored in design decisions that follow from this narrower logic.

For example: in southern Canadian communities, narrow pecuniary logic supports the conversion of good agricultural land into subdivisions. The resultant urban forms make necessary a daily oscillation of population back and forth between work (mainly in central areas) and suburban home life. City centers are fully used only for part of the day, despite the heavy capital investment (both public and private) in their infrastructure. This daily oscillation depends on high energy use in a very costly transportation system. More that that, the predominant urban forms condition patterns of social life, shape our lifestyles, and contribute to the wear and tear that the individual experiences in his daily routine.

Thus human behaviour, in our high-consumption culture has made us heavily dependent on a complex system of interaction - "industrial society". The needs of the industrial system to maintain itself by expanding the production and distribution of goods and services have in turn, led to the emergence of design specializations of various kinds.
Within this system, design is heavily influenced by the need to focus on a narrowly-defined range of considerations relating to cost and immediate market acceptability. Such constraints inevitably promote the design of systems that are highly effective and efficient in one or a few dimensions, but which ignore, or inadequately satisfy, other dimensions of human needs and aspirations. The industrial system, which may be the best one for satisfying some immediate needs at the present time, is the same system that promotes proliferation of activities, goods and services. Such proliferation leads to constant escalation of expectations and of the level of social and environmental costs that man and the biosphere will have to bear over the long run.

Social-Environmental Costs of Inadequate Design

Costing formulas used today tend to be too narrow. Inadequate
consideration is given to total life-cycle costs of products,
structures and systems. Total life-cycle costs include the
cost, not only of production and distribution (including
return on capital), but also the cost of operation, mainte-
nance and in some cases, disposal. Moreover, social and
environmental costs that do not fall directly upon either
the producer or the user, or that are difficult to quantify
in dollar terms, are often ignored. The contention that
"good design costs too much" is based on the fallacy of
ignoring both the total life-cycle of a product and the way
that the costs of its production and use impact on our society
and the environment. If we embrace this wider perspective,
the real cost to society of excellence in design may turn out
to be trivial.

All around us, we can identify costs of deficient design.
Products, structures and systems that make heavy use of scarce
resources, that require large continuing flows of energy to
operate, or that impact heavily on the environment at the
disposal stage, all add to the burden that is placed on the
biosphere. By using our environmental capital as heavily as
we do, we mortgage the future and restrict the options that
should be kept open for furure generations. We even limit
our own choices. Similarly, we must consider whether our
present systems give us the best possible social return from
human resources. Only recently have we begun to design high-
ways and vehicles to minimize accidental death and injury.

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Only now are health care systems beginning to emphasize preventing illness -- and much remains to be done. Inadequate educational and recreational structures, and poorly designed systems of work lead to monotony, boredom and the stifling of initiative. Many of our existing systems give human beings much less in social and psychological terms than they are entitled to. We kill creativity and stifle human endeavour. Our human casualties and wasted human potential are the heaviest penalties that society has to pay for its failure to design systems around human beings.

Human beings, their needs and aspirations, must be central to the design process. But it is not enough simply to state this proposition. Inadequacies in the present design system are not simply the result of indifference to human beings. Rather, a major shortcoming -- which can be remedied -- is a lack of a suitable "design mechanism" to identify and assess the social and environmental consequences of design and development of products, and systems, at all levels from single units to total communities. Such a mechanism would help us to move in the direction of a "true costs" evaluation of designs, and thus transcend our over-dependence on a narrow and distorting conventional costing system. A broader approach to design, which uses a design-assessment mechanism as its central tool, can help us eliminate many unnecessary costs to society and help create a more healthy and viable environment for Canadians.

Design and Human Needs and Aspirations in Frontier Communities

Can we design a total frontier community to meet human needs and aspirations? It is often assumed that the environment of the frontier makes this impossible and requires us to settle for "second best" solutions.

Admittedly, there are physical constraints on a frontier community. Access to and from the community is often difficult and expensive. Most goods and services have to be imported, and their cost is significantly higher. Such settlements are often dependent for their very survival on transportation and

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communications infrastructure. Again, the physical shape and built form of the community may be influenced by standards appropriate to completely different environments. The housing may often have been designed and developed for milder climates and be totally unsuited to the Canadian North.

But there are also social and institutional costs character-istic of many Canadian frontier communities. Most such com-munities in Canada today have an increased incidence of major social problems; higher rates of suicide, alcoholism, family breakdown; high rates of population turnover; boredom and the sense of isolation; lack of security, amenities, opportunities; and -- very often -- no community spirit. Moreover, all citi-zens in such settlements are affected by the fact that the community is generally far removed from the focal points of decision-making, whether governmental or economic, and that these decisions, taken thousands of miles away, can determine their daily lives and their futures. Feelings of powerlessness, alienation and resentment, common enough in the big cities of the south, may be even sharper in frontier communities.

Particular problems face the indigenous population. As new settlements appear, native people are conscious that their traditional way of life has been eroded, but they have not yet been able to find roles and identities that they can accept. We are becoming more conscious of our responsibilities for this problem, but even now we may not be moving rapidly enough towards solutions.

Isolation of frontier communities is a major influence on people's lifestyles and outlooks. Repetity and frequency of transportation in and out of frontier communities; a broadly-based and multi-faceted communications system, rich in both its technology and its content; homes that, as individual units and in relation to each other, promote social activity; and adequate multi-use leisure centers -- these are some of the ways we can use design to overcome isolation and alienation.

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Redundancies, Expectations and the Nature of Risk

Some social scientists speak of "redundancy" in a rather
special way. They mean a multi-layering of back-up systems
such that, if one fails, there is another way to keep a key
function going. In large communities there tends to be a
great deal of "redundancy"; in small communities, on the
frontier, the whole community may depend on the success or
failure of a single system.

In any community, there is a broad understanding of functional
relationships, of division of responsibilities, and of the
stratification of power and decision-making. On the basis
of such shared understanding, we plan our futures. We believe
that we know how things will get done. On this basis we share
some expectations, and establish continuities in our personal,
group, and civic lives. In large and complex urban centers,
with a great deal of redundancy, we learn to expect that some-
how or other most of our more immediate needs and some of our
aspirations can be realized over time. Indeed, the redundancy
that is built into large centers is one of the main sources
of their attractiveness to many people.

In frontier communities, human expectations and hopes are
often placed under strain. For the firm, profitability is
subject not only to the resource, but to vagaries of world
market price and demand changes. The operation is thus
subject to unexpected layoff and/or closure.

What about the individual worker? If boom turns to bust,
if the company closes down, if a person finds the work
situation intolerable, or if one's skills are no longer
needed -- in all these instances experience supports the
tendency of individuals to keep their expectations and
commitments at a low level. In the one-company town, there
is no chance to find a real employment alternative if any
of the above occur.

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The labour force, aware from past experience of these added risks and uncertainties, is somewhat reluctant to sink roots into a community of this nature. The labour force knows that there is a real danger that personal investment in housing or land will disappear, since on closure of the plant there would be no buyers for the house. For this reason many workers prefer mobile homes, so that they can remove their capital in the event of layoff. They also know that in the event of a disagreement with the employer, they will either have to leave the community or go on welfare.

There is also evidence to indicate that where the isolation and uncertainty is compounded by boring work, little responsibility, and few apparent vertical or horizontal mobility opportunities; where there are few opportunities and activities available for the spouse; and where there are less than optimum education facilities for the children – then the rate of turnover is understandably high.

Increasing dissatisfaction that workers experience on the job also affects the community environment. To quote Dr. Harman of the Stanford Research Institute:

Lack of satisfactory work role (as employee, self-employed, housewife, student, etc.) tends to result in personal disintegration. Competition for jobs exacerbates racial and intergroup conflict. Employment fears also constitute a barrier to solution of such problems as environmental pollution

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and the waste of natural resources. Welfare
payments or income maintenance plans can
provide for economic needs, but do not meet
the need for satisfying and valued social roles
and the psychological aspects of employment.
The inability of the economy to provide enough
satisfactory work roles to go around is a serious
flaw.

In the light of the above, does the frontier community
really have a function other than to provide minimum
support systems necessary to stabilize and service the
labour force? Is there any reality to the community
other than as an appendage to the structure of work?

The added degree of risk in the community directly affects
morale, the way that individuals and groups perform over
time, the degree of social stability and the overall social
climate. It also conditions the nature of the built
environment and the amenities that can be structured into
the community. Accordingly, one conclusion put forward
in pre-Assembly discussions was that wherever the level of
risk associated with the resource exploitation was very
high, and the anticipated life-cycle of the community was
less than 20-25 years, no permanent community should, in
fact, be envisaged. Rather, the design of social and
physical environment should be geared to this lack of
permanence and should be very flexible.

Specific Problems of Community Design in the North

Designers and decision-makers can begin to satisfy human
needs in northern Canada if they realize that southern
layouts and standards cannot simply be transposed to
northern situations. This proposition may seem to be
elementary common sense. But an analysis of built environ-
ments in northern communities indicates that, in most
instances, standard forms designed for milder climates
were in fact being used. Housing shapes and community
layout, windows and doors, operating systems, maintenance
design -- all have been developed under physical conditions
and for styles of activity and ways of doing things, that
had not yet been touched by contact with northern realities.

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This can be costly and even disastrous. Where subzero
temperatures prevail, having to walk long distances in
the open air could be injurious to people who are not
fully acclimatized. Some covered walkways will make sense
under these circumstances. Another example: a southern-
designed house in Inuvik costs $3,000 a winter to heat.
If better design of insulation, layout and heating systems
could bring heating costs down, even by $1,000 a year,
the savings over a 20-year span (at current rates of interest)
could equal a substantial portion of the cost of construct-
ion. To meet higher costs of this sort, individuals must
press for higher salaries. To equal $1,000 a year saved
in heating would require higher individual salaries,
adjusted for the marginal rate of tax, in the amount of
approximately $30,000 per individual over a 20-year period.
The cost of building a thousand badly insulated houses will
cost somebody $30 million over a 20-year span.

To summarize:

1   There often seems to be a total disregard of human aspira-
tions when it comes to designing and developing frontier
communities. More fundamentally, there has been no develop-
ment of a systematic procedure for incorporating the analysis
of life-needs and life-styles into the design process for
such settlements.

2   Many social-environmental problems that arise when communi-
ties are built in northern Canada result from failure to
base performance standards and requirements on specific
knowledge of man-environment interactions in these settings.

3   In the study and planning of the frontier community, there
has been insufficient emphasis on the role of the community
as a community and on the need to establish the most appro-
priate distribution of social and economic responsibilities
among individuals, community institutions and the principal
employer.

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4   Many problems of built environments in northern frontier
    communities arise from the imposition on these communities
    of designs, rules and standards that prevail in southern
    communities. In a hostile (or deprivatory) environment,
    any such deficiencies in design, or mismatch with the
    specific milieu, will have intensified consequences.

5   There are factors of alienation intrinsic to the frontier
    community. Some of these relate to the isolation from
    other centers. Others stem from the over-dependence on a
    principal employer. Still others relate to remoteness
    from the sources of food, energy, entertainment, salary,
    capital flows, government policy, etc., on which the
    community depends. Specific features of design can help
    alleviate this alienation, but the fundamental causes
    will, admittedly, remain.

    In general, the Committee on Human Needs and Aspirations
    conclude that a design process to meet human aspirations
    in frontier areas must begin (as it should begin elsewhere)
    with people. It must look closely at the local (pre-
    expansion) population, manpower requirements and hiring
    practices, the anticipated rate of population build-up
    and the profile of the expected population. Ages, family
    size, ethnic origins, educational levels, lifestyles and
    aspirations must be considered: these are basic parameters
    for effective community design. It is not possible or

desirable to dictate, out of hand, just what the frontier
community should be like. Different rates of build-up of
population, different population profiles of population
and differences in the spectrum of lifestyles, needs and
aspirations - such variations require attention when we
design communities.

If each of these considerations can be reflected in the
design process, communities may arise that can satisfy a
wide range of needs and aspirations: for greater security,
greater potential to save and build up resources, and greater
potential for a variety of learning and other experiences
that help us meet our need for diversity and for a sense of
growth. We could then expect that frontier settlements would
be real communities, rather than spots on the map of economic
activity.

Environmental Concerns

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"Environment is defined as the 'continually' changing
complex of all conditions and influences interacting with
an organism." * It is the air we breathe, the water we
drink, the soil and atmosphere within which our food is
raised; it is the earth we live on and the resources we
use. We can live in harmony with it or be at conflict
with its natural order. We can despoil our environment,
thus squandering our environmental capital or we can
work with it and benefit from its abundance and beauty.

Today, the real issue is no longer to articulate our
environmental concerns. It is whether we act on these
concerns and use our knowledge to reconcile natural and
man-made elements.

What we need to help us achieve this reconciliation are
integrated design processes based on an interdisciplinary
arrays of skills and knowledge, including our understanding
of the natural environment. We can use design systems
to assess information in relation to aspirations and programs.
Such systems (which are discussed in the next chapter) can
help us to translate environmental concern into effective
action. Some of the ways these concerns may be reflected
in design activities will be illustrated at the Assembly.

* Paul Sarnoff, The New York Times Encyclopedic Dictionary
of the Environment (New York: Quadrangle Books, 1971),
pp. 103-104.

Environment as a Framework for Action

All environments require a greater or lesser degree of
human adaptation. Through biological evolution, techno-
logical innovation, applying intelligence to understand
the environment, and adaptation of social systems and
culture, human beings, though physically vulnerable to
the forces of nature, have learned to live in almost every
kind of natural setting that occurs on this planet. We
have adapted ourselves so well (at least at the basic level
of survival) that sometimes we almost forget how dependent
we are on the phenomena of nature.

But on the frontier we directly face challenges of environ-
ment. And if we can use frontier experience as a perspective
for understanding the lives we lead even in the cities of
southern Canada, we can become more aware of environmental
challenges -- whether they apply to a single home in a
Northern settlement or to the complex problems of keeping a
very large city going under Canadian winter conditions.

We can look at environmental challenges in three ways:

1   We can stress the constraints imposed by environment
    -- the limits imposed by climate and weather, for
    example.

2   We can also look at the opportunities embedded in
    environment. The presence of good building stone in
    certain areas has conditioned the kind of building
    technologies that have emerged; more generally, the
    presence of a given extractable resource often provides,
    at least, an initial impetus to settlement (for example,
    in the case of a renewable resource, the 19th Century
    timber stands in the Ottawa valley).

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3   Finally, as very many people are doing today - we can look
     at environment in terms of interactions -- of consequences.
     An environmental constraint has many consequences, and if
     the need is sufficiently urgent, we may do a great deal to
     try to overcome or mitigate these effects. But of even
     greater concern are the consequences for the environment of
     our own actions.   These days, most resource extracting
     companies and all concerned governments are forced to pay
     attention to the environmental impacts of resource-related
     activity in all its phases.

     Technological capacities, ignorance of ecological systems,
     and carry-overs from a North American frontier tradition
     which considers nature and man as antagonists, are ingredients
     that come together to pose a serious threat to our frontier
     areas.   Until recently there were no budgetary and timetable
     allowances made for environmental factors when physical
     structures, engineering works and operational logistics were
     designed and planned. Rivers, mountains, vegetation and
     animals had no value by themselves. This may have been
     tolerable in the past when there were fewer major projects
     on the frontier. Now the very scale of these activities
     poses a threat to the natural environment. Cycles in the
     natural environment systems are lengthy and most of them
     are not completely understood. For example, it takes about
     18 years under some conditions to regenerate lichens.

     Design, particularly when systematized and integrated on
     a multidisciplinal base, can be a cutting edge to effective
     action, whichever of the above concerns is paramount in a
     given situation. Through applying effective design we can
     cope more effectively with environmental constraints, make
     responsible use of environmental opportunities, and act
     intelligently to balance the consequences of man/milieu
     interaction.

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Frontier Environments

A general and common view of northern frontier areas is
that they are not only harsh, but are often hostile settings
for human activity. There seems, however, to be good
reason to modify this view without going to the opposite
extreme of romanticizing the North. Our Canadian frontiers,
it has been suggested, are better described as "depriving
environments", rather than hostile ones.

Three forms of deprivation confront individuals and groups
that come to the Canadian frontier. These people will face
various kinds and degrees of physical deprivation, of social
deprivation, and of sensory deprivation. Such deprivations
have to be understood as relative to what new settlers have
been accustomed to in their previous experience. These
deprivations act together to constitute the basic environ-
mental constraints faced by the inhabitants of any new
Canadian frontier community.

We are most aware of physical and social deprivation. The
fact that particular types of clothing, shelter and transport
are necessary to sustain southern Canadians in northern
climates highlights the need to overcome physical constraints
by complex arrangements for technological adaptation.
Social deprivation (by the standardof the South) is also
readily understood. Distances to be travelled, sparseness
of settlement, interference of climate and landforms with
various types of customary activity, and the fact that in
the past the environment has been an obstacle which impeded
major population flows to the North -- all these illustrate
the kind of constraints that have contributed to social
deprivation.

It should be pointed out that the concepts of frontier
environment, deprivation and hostility are relative. Romans
who established Londinium saw it as a frontier settlement
set in a depriving and hostile environment; a similar view
probably prevailed among the early settlers in the environs

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of present-day New York. Attitudes to climate are also relative: there are few areas on earth where extremes of climate do not have to be coped with by man. What is hostile and depriving for one style of life may be quite acceptable and even enjoyable if lifestyles are adjusted.

In frontier communities, based on resource extraction, the environmental opportunities and environmental consequences may be regarded as complementary parts of a single process. A leading authority in the field of environmental geology has presented both sides of the case:

"The occurrence of a high-value mineral deposit within a planning area can be both a blessing and a nuisance. If the deposit has already been discovered and has a long history of production, the economy of the area is in some degree oriented to the mineral industry. The industry produces a useful product for society, meets payrolls, pays taxes, and supports satellite industries in the form of truck and rail lines, water, fuel and electricity, unless it generates or manufactures its own. As a resource-based industry, it is digging or pumping "wealth" out of the ground... On the debit side, its installations may not be esthetically pleasing, it may emit noise and smoke, and it may be a source of air and water pollution. Citizens who become aware of the disagreeable aspects of the mineral industry and are not informed about or do not care about the beneficial contributions of the industry, may attempt to attack it through changes in zoning laws, court injunctions, punitive taxes or excessively harsh pollution-control statutes. Policymakers and planners, better informed on the regional economic importance of the industry seek remedies based on economic reality. If they are successful, the happy result is an economically sound industry with good community relations...

*Peter T. Flawn (Bureau of Economic Geology, University of Texas at Austin), Environmental Geology: Conservation Land-Use Planning, and Resource Management. New York: Harper and Row, 1970, pp.94-95

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If the high-value mineral resource is a newly-discovered
one, the governmental agency with authority for planning
has the opportunity to design the legal and environmental
framework in which the industry can operate. If require-
ments are too harsh, the deposit will not be brought into
production...."*

Through all phases of the development of the resource-
based frontier community, the tension manifests itself
between the built-in imperative to maximize exploitation
of an environmental opportunity and the need to cope with
the consequences of our impact on the environment. In
the construction phase, the laying out of transport and
communication routes, the building of the resource-extracting
infrastructure, and the construction of the settlement will,
in significant ways, disrupt the existing ecological balance.
Moreover, in most places, it is hard to assert with convic-
tion that a thing of beauty will eventually arise in place
of the natural setting that has been intruded upon. Where
esthetic and environmental considerations are taken into
account, planned for in advance, designed and implemented,
what occurs is not rooted in the activity itself. It is
introduced as a consequence of vision and persuasiveness;
somebody or other (whether as a producer or customer, or
taxpayer) will have to pay for ecologically sound design.
But, as suggested earlier, cost is a relative concept: the
question is what monetary costs are we prepared to assume
now for the sake of other values (including environmental
values) that we wish to promote in the long run.

In our scenario, we are acting on the assumption that a
decision has been made to extract a valued resource: that
organization has resulted in the initial construction; and
that the natural environment has irrevocably been altered
from what it has been in the past. The construction phase
is the birth trauma of the community. Initially high envi-
ronmental costs have probably been tolerated for the sake
of gains associated with the economic activity. But once
the community begins to fill in, and resource and supporting

activities become the routines of everyday life, environmental opportunities and consequences continue to manifest themselves. A tract of land on the edge of town may be cleared to establish a motel and a restaurant. If the community is booming, small entrepreneurs may set up a strip of stores, restaurants and lounges. These will, indeed, add to the variety of stimuli in the community, but at the cost of replicating a typical North American neon jungle. The point of this example is a basic one: environmental impacts will occur, as in any community throughout the life cycle. To plan for environment at the start in the design phase, without following up through each phase as the community grows to maturity, is to gut the very purpose of environmental design.

Environmental Factors and Frontier Design

Many specifics of design, as it relates to environment, will be presented in other chapters of this briefing book. At this point, it may be useful to anticipate, and to list a number of general considerations which bear on the relationship between design, community and environment in the Canadian north:

1   Climatic conditions, (i.e., permafrost, etc.), obviously require specific adaptation of structures to environment. Structural design, appropriate insulation and well-chosen mechanical systems adequately protected against the environment -- these are requirements that reflect the most elementary common sense in planning structures for the frontier.

2   If we wish to promote maximum human interaction, then special provision will have to be taken to meet challenges of the environment as they relate to public places. Enclosed or protected environments are required. But how extensive should these be? At one extreme, there might be domed cities or megastructures, where everything is shielded from direct exposure to the outside milieu. However, while such concepts are often discussed, a variety of considerations led us to a preference for a more disaggregated community (see below). In such a community, what will be required will be some enclosed walkways, public squares, sportsgrounds, greenplaces, etc. The technology used to shield them from the hazards of

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climate and weather would enable such facilities to be used for more than a few months of the year. Just how far this will extend depends on tradeoffs involving financing, local characteristics, specific design considerations in a given community.

3   Slopes should be used, where possible, for siting of housing and other facilities. In this way, gravity systems can be used for water supply and sewage; houses can be situated so that each gets the optimal share of winter sunlight; esthetic stimulation can be enhanced by orienting houses to vistas of the surrounding territory.

4   Closed systems of wastewater and solid-waste disposal and recycling should be used where possible.

5   The local character of the community, its rootedness in its natural setting and the sense of permanence that this gives inhabitants can be promoted through careful use of environmental opportunities. The community (or at least parts of it) might be oriented to particular features of the landscape where these provide a natural focal point. Where there are materials that could be locally extracted and used for housing exteriors, these should be used, providing that environmental costs are carefully assessed.

6   In general, extra care should be taken about unnecessary impact on the environment. In the north, ecolological disruption has more serious consequences than in many other places; in some cases, disruption of local flora may take decades to overcome by natural processes.

7   Environmental education and awareness should be carefully fostered, with detailed attention being given to the local situation. This can be done in school curricula, at all levels; in a variety of informal ways; and through special courses that would provide environmental, and social, orientation for newcomers. The design of the community itself should provide an example of the environmental attitude that is being promoted. Its inhabitants should strive to evolve a lifestyle which would be based on a natural and harmonious relationship to environment, with full use being made of the opportunities provided by nature for recreation.

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8   The most significant factor will be the nature of the
     installations for the dominant economic activity. As else-
     where, pollution will be a concern. There will be a need
     to guard against it by appropriate technologies and safe-
     guards. In larger communities, some individuals can live
     at a distance from major industrial sources of air, water,
     visual and noise pollution. In the frontier settlement,
     most inhabitants will be in close proximity to the industrial
     center. The effect that the dominant facility has on its
     environment will be felt by all. Aside from appropriate
     design of the industrial facility and its processes, so
     as to cut down the various kinds of pollution to the attain-
     able minimum levels, there are other design techniques that
     can be used. Total community design (as regards siting
     and orientation of houses and other structures, and through
     creation of buffers and intermediate zones of various kinds)
     should be carried out in such a way as to shield inhabitants
     where possible, from the negative physical and perceptual
     side-effects of the industrial facility.

Conclusion

Excellence of design in the natural environment will not be
achieved by generalizations and exhortations, but by
application of our practical knowledge of the natural systems:
land forms and geological features, water, climate, etc.
Excellence of environmental design requires technical
competence, ingenuity and a sense of balance oriented to
positive reconciliation of diverse factors. Environments
are so diverse there can be no standard set of answers,
nor can we expect "magic wand" solutions. But we can develop
operational procedures for generating specific answers from
appropriate data.

Ultimately, the ingredients of good environmental design for
the frontier can help us generate better design solutions
for other settings. The ingredients for such solutions are:
attention to the setting, and to what is going to take place
in the setting; care in developing appropriate sequences of
operations; multidimensional awareness of consequences; the

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marshalling of appropriate technical knowledge and its
examination by cross-disciplinal panels of experts; and a
realistic and action-oriented concern to meet human needs
and aspirations. The frontier community can be used to
learn much about more appropriate policies for application
in other settings. Moreover, where appropriate, frontier
communities might be the places for trying terrestial
applications of some of the frontier technologies being
developed in the areas of space and oceans explorations,
etc. Frontier environments can thus be seen as frontiers
for learning and for new applications, as well as the
frontiers for living.

Application of Design Knowledge and Technology

The previous material provides a context for the appli-
cation of design. But to develop and apply appropriate
designs and to do so effectively and efficiently, will
require that we systematize our work. What is necessary,
above all, is an integrated and systematized total design
system, drawing upon knowledge, skills and technologies
from a variety of sources, and applied in a way that not
only meets specialized requirements but also has due
regard for the integration of functions in society.

Much of the work of the Preparatory Committee on Human
Settlements focused on the need to develop and apply such
a design system. We will focus on two aspects of the
problem of systematic design for human settlements:
firstly, a discussion of general characteristics of such
a system; secondly, some suggestions of key areas where
such a system might be useful for design of better commu-
nuties in frontier settings.

Elements of a Design System for Human Settlements

Much discussion of design focuses on two terms:
"design process" and "design function". "Design function"
is more readily understood; this is the working applica-
tion of design skills, whether by individuals or by groups,
to the solution of identified problems. For example, we
speak of the design function as an aspect of development of
corporate identity programs, or with respect to the planning
of structures.

"Design process" is more elusive and is a shorthand term
for the creative and organizational principles used by
designers to identify and define problems; to gather,
analyse, organize and evaluate relevant information,
concepts and technologies; to choose the appropriate design
tools for solution of a problem; and to apply these tools
systematically to achieve desired objectives. The design
process is what enables the designer to find solutions
that seek harmony between the product, process, structure
or system that is the physical result of his creative
thinking, and the social and/or environmental context
within which the product, etc., is to be utilized.

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When the design process successfully promotes harmonious
interaction of the physical object with its social and
environmental contexts, we say that what has resulted
represents "good" design. All this must, however, be
achieved within a set of constraints: e.g. costs acceptable
both to the sponsor of the project and to society; codes,
regulations and other legislation; time constraints and
the "pressure of the job"; prevailing esthetic sensiti-
vities; and (perhaps most difficult) the need to reconcile
criteria in the "here and now" (i.e., the short term view)
with what we anticipate to be likely long-term shifts in
user and community values.

While design professionals can understand the concept
"design process" on the basis of their own experience,
it is a difficult process to explain to others. In can
tend to be fuzzy even in professional practice: the
practitioner develops a "sixth sense" for what he is doing,
but may neglect the need to rigorously re-examine his
accumulated experience as he moves from project to project.

Many have anticipated what the Human Settlements Committee
has concluded: that a systematization of the design process
is urgently required. Desirability of such systematization
arises out of at least six emerging needs:

1   The need to evaluate our experience and the results of
    investigations and applications, so as to be able to apply
    this cumulated knowledge-base to new situations.

2   The need to communicate more effectively with other members
    of multi-disciplinal teams, and thereby to improve decision-
    making in design situations.

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3　The need to identify gaps or soft-spots in existing design approaches, so that we can use human talents and our material resources in research and development efforts to make good these deficiencies.

4　The need to identify and resolve impediments to excellence in design, whether these are in design itself, in government or in the private sphere.

5　The need to communicate more effectively with the media and the general public, so as to promote better design through design awareness.

6　The need to develop standardized procedures, wherever possible, to handle information, aid in evaluating situations, and help us make and implement design decision -- all with the aim of cutting out unnecessary "handwork", and increasing cost efficiency in the use of our talents.

One point that should be made clear is that no amount of advanced technology or new information will remove the need for thought in the design process. For example, the committee concluded that, in the case of design of frontier settlements, "we are not in need of new information or further research.......". What is needed, rather, is the integration of available information, research and techno- logy into a unified approach that can be analyzed and evaluated from a variety of "hard" and "soft" disciplinal perspectives. Such appraisal is Janus-headed: in one direction, it poses the question whether undue emphasis has been given to a particular disciplinal orientation, with a resultant distortion leading to excellence in one area at the cost of undesirable spillovers in other dimentions of settlement life; on the other hand, it asks whether anything has been left out, or underplayed, that is necessary to the furthering of design excellence, as measured by the degree to which the total design is in harmony with the environment and fully meets reasonable human needs and aspirations.

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Some of the features of the present situation that impede
the development of a workable design system were identified
by the Human Settlements Committee. Many of these are
internal to the current practice of design, while others
stem from the relationship of design to the broader society.

We can identify some impediments that are internal to
the design-oriented professions. There is no unified
"design profession". Rather, we have a congeries of
specialties, each of which places emphasis on particular
compartments of attention. At first glance, such specia-
lization seems to be in accord with the basic principle
for organizing professional activity: the work is divided
to make it manageable, and when this is done each part
can get the undivided attention of the most relevant and
competent professional specialists. In practice, however,
this approach often fosters blinkered vision and constrains
the ability to see a design problem in its broader context.

Compartmentalization leads to dealing with total community
design as if individual compartments, rather than the
totality, were the dominant consideration. Specialists are
able to demonstrate the significance of their own area of
consideration (e.g., interiors; pedestrian movement;
communications; etc.) when it is taken in isolation. But
when we deal with the subject matter more comprehensively,
the principles underlying any particular compartmental
solution tend to have a diminished impact.

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It is necessary to supplement professional approaches that
have been compartmentalized by seeking linkages among areas.
Design failures may be due almost entirely to a lack of
proper attention being given to such linkages. Attention
to linkages can promote "bonding" and "spin-offs".
"Bonding" is the inherent strengthening effect: by linking
components, we strengthen the whole system to a degree
impossible by simply adding up components.

For example, the economic life of a community may be
strengthened by bonding (given the exactly same kind and
number of constituent elements -- industrial plants, shops,
supermarkets, service centers, offices, etc.). Here, the
degree of bonding possible would depend on variations in
physical layout relationships among the various units.

"Spin-off" refers to second-order consequences that can
result where there are appropriate social and physical
linkages among facilities. An example might be the
presence of good recreational facilities in the most
appropriate relationship to both workplace and home, and
open at convenient hours. Such forethought may promote
spin-offs such as better relationships among work groups,
less tension on the part of factory workers (all of
which contribute to increased productivity) and, a more easy
homelife (with further spin-offs, at a third order, in
terms of community stability, permanence of work force, etc.).

Linkages will in themselves help to integrate the design
system. Attention might also be given to combining or
clustering various design areas that are now considered
compartmentally. Thus, rather than deal with home
interiors, conventional architecture, and the design of
interior and exterior landscape as separate areas of
concern, it is common sense to view them as complementary
(i.e. as a cluster) at the level of the resolution of
the home design problem. This approach could expand from
level to level, from the micro-scale of home, work or
leisure units, to the macro-scale of total community and
regional multi-faceted design.

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Some core problems arise out of the present stage in the evolution of design-related professions. Other impediments are aspects of the relationship between design and society. Two of these social system impediments are: the kind of economic criteria that have been used to evaluate design approaches; and the role of the decision-making process (particularly in government).

A somewhat restricted definition of what constitutes "economic benefit" has been the customary criterion for assessing the feasibility of design. We have already discussed this point. An example of how such a perspective can lead to distortion in assessing design proposals might be taken from the field of urban transportation. We are often told that subways are simply too expensive a type of public transportation. But in London, the "tube" system has been in operation since before the turn of the century. Investment costs are thus amortized over almost a century of operation, and the basic subway system is likely to continue to be the backbone of transportation in the greater London area well into the 21st century and even beyond. The basic pattern of London's development is a spin-off from the presence of the subway system and its potential for expansion into new areas. Thus, in a case such as this, a limited approach to costing is likely to have little value.

The public policy process may also offer impediments. Legal and political wisdom tend to have a built-in bias against innovation. Constraints arise when we try to

apply legal and political approaches designed for an earlier, simpler period. Study after study has pointed out that the British North America Act, with its division of jurisdictions and of functions, tends to create significant problems in the development of settlements: this point was also raised in the Human Settlements Committee. Controls and regulations often stand in the way of applying the most appropriate technologies. Gaps exist in existing government structures -- for example, the absence of a Federal "New and Expanded Settlements Act". Underlying the institutional aspects of impediments to design excellence are the relics of the laissez-faire philosophy. Decisions on the location and development of settlements appear, at the present time, to be the result of the actions of specific interests, rather than of coordinated efforts to promote the best interests of the total society.

While the Committee on Human Settlements identified the need for an integrated design system, at this stage it is possible only to suggest to the Assembly some of the elements necessary for such a system:

1   The need to know what information is available and relevant re community design and its components. Any system should foster easy and full access to such information.

2   A process for interpreting information to facilitate cross-disciplinary applications in a wide range of problem areas. Often, information is so specific that interpretation is needed to see whether it has more general validity (e.g., if we know a lot about design, in cities A, B and C, is the knowledge broadly applicable to the requirements of most cities of the same type?). There is also a "level-of-sophistication" aspect to the problem. Some research findings, and even some technologies may be too sophisticated to be easily applied in a wide possible range of applications. We may need stripped-down models and techniques.

3   What information is appropriate is also a key question. Generalizations sometimes do not apply to specific cases. Conversely, some types of specific approaches to problems do not lend themselves to general application. There is

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a need to clearly assess the level of applicability of various kinds of information. We might ask what the likely consequences could be of any misapplication of particular information or techniques. Cross-examination of community design proposals by panels with a wide range of expertise would help to spot gaps, mismatches, misapplications, and failure to consider relevant factors or side effects.

4   Much of the needed information base could be machine-stored and processed by electronic means. This could help cut down on the time that is sometimes wasted in dealing with routine information in non-routine ways. An added benefit would be that machine storage and processing would require routine design to be sufficiently standardized to make electronic processing a worthwhile technique.

In particular, design of human settlements seems to be notorious for the proliferation of varient techniques, the non-comparability of data used from case to case, and the resultant unnecessary duplication of effort.

5   It is necessary, further, to develop generally agreed categories and concepts for classifying information, so that data and concepts that differ greatly in content and character can be adequately compared and assessed. At the present time, much confusion is created by the disparate nature of the information.

6   Because of time constraints, lack of appropriate multi-disciplinary expertise, manpower or budgetary constraints, much information is not adequately evaluated. Present methods of evaluation are compartmentalized and rely heavily on routine functions and methods that make little use of modern data processing. They tend to insure that only a fraction of the necessary information base is ever properly assessed resulting in too many cases of arbitrary decision-making.

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7   The techniques that are used to build up a more systematic and integrated design process should be subject to ongoing re-evaluation. The significance of different methodologies in statistics and quantitative methods should be evaluated for each major case. Weighting systems and matrixes should similarly be subjects of continuing reassessment, refinement and appropriate modification.

8   In general, all areas of settlement design should be subjected to more rigorous application of design methodologies that integrate skills across a wide range of disciplines. In the short-run, this would add to a workload which is already heavily burdened. But in the long-run, it would improve the state of the art, promote excellence in settlement design, and eventually ease the load on designers and decision-makers by routinizing and standardizing procedures where such routinization and standardization is possible. The aim is not to abolish creativity in design, but to eliminate waste of time and talent.

The Committee on Human Settlements' proposal is that "in addition to the use of modified, tested, settlements programs" based on past experience, there be adopted -- in relation to the frontier community case, and as an entry into the systematization of design in general -- approaches to settlement design in which systems like those used in manned space programs be introduced to promote individual safety and well being." It is suggested that this could yield the following range of immediate benefits:

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1 Use of known methodologies.

2 Feedback as required.

3 Protection of the individual against adverse situations.

4 Rapid warning of situations that had not been predicted earlier.

5 Rapid development of available design options.

6 The possibility to undertake experiments within the settlement or system, and to evaluate results.

7 In such a system, such items as community well-being, costs of the project, the need for changes in the settlement role, etc., could be readily and continuously monitored.

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Some Preliminary Findings and Suggestions Appropriate to
the Total Design of Frontier Settlements

What follows are a few of the more comprehensive
suggestions that have been made about principles that
should be followed in design of the total frontier
community. Specific aspects of community design are
discussed in the section that follows dealing with home,
work and leisure.

1   Management of Design and Development:

At the request of the Committee on Human Settlements,
the Canadian Construction Association assessed a variety
of possible contractual arrangements and management
structures for the design and development of a large-
scale frontier community. Because of the impossibility
of getting accurate enough predictions of cost, both the
"fixed-cost" contract approach and the cost-plus approach
were ruled out. The general approach for implementation
recommended was the establishment by the developer
(whether government, private industry, or a joint venture)
of a Development Commission, which could then make use of
Project Management contracts for supervision of particular
phases or areas of community design and development.

2   Settlement Pattern:

At least six different possible shapes of the settlement
were identified and assessed. These were: (1) permitting
urban sprawl; (2) linear form; (3) disaggregated form;
(4) radial form;   (5) star form; (6) nucleated city. Of
these, the <u>linear</u> and the <u>disaggregated</u> schemes appear
to offer particular benefits. Linear form would enable
us to concentrate services and public transportation
systems in a utility corridor. In addition, linear form,
through its compactness, promotes a sense of community.
The other favoured option is disaggregated form - a group
of cluster communities linked to each other and to a

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community core area. A disaggregated community would
be easier to build in stages, with the necessary infra-
structure being provided module by module. Variety
would be facilitated in the physical appearance of the
community, and identification with neighbourhoods and
clusters would be promoted, thus helping to overcome
social isolation and identity problems.

In both settlement forms, if the community as a whole
were, at some point in the future, to go into a phase of
decay and diminished economic activity, remaining inhabi-
tants could regroup and carry on community life on a
diminished scale without feeling dwarfed by the empty
buildings of a large ghost town.

3   Planning Processes:

Traditional planning processes have often been ctiticized
as overly-hierarchical, regulatory, oriented toward
negative prohibitions, inflexible, and anti-participatory.
While a need exists to apply the most appropriate metho-
dology, equipment and human skills from previous practice,
an orientation of the planning process to human needs and
aspirations will require flexibility of community design
to allow for actual participation by the people who are
coming to live in the emerging community.

4   Indigenous People:

The native people of the area must be encouraged to
involve themselves in the community design process.
Beyond the basic fact that the natives of the area have
a right to become part of the decision-process, there
are also a number of pragmatic considerations. These
local people have their own life style and life philosophy
that can enrich the community as a whole; they are the ones
who are most experienced in living with the prevailing
environment, and hence can be a source of valuable infor-
mation to designers; finally, any effort or unintended
effect, to shut out the native people from the planning
and design process is bound to sharpen local tensions and
to create additional political and legal complications in
an already complex situation.

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5   Urban Character and Esthetics:

This is often neglected or left to chance in new
communities. Character and esthetics of the community
have to be planned -- not in a closed fashion, but to
give initial impetus to an ongoing process. To meet a
human need for variety and for a relationship to a place,
great attention should be paid to using such techniques
as visual fixes (points of visual and sensory orienta-
tion, e.g. a particular building, a park or square); the
orientation of features of the built environment so as to
direct attention to any attractive vistas in the natural
environment; provision of green areas (under domes or
other protective technology, if necessary); scale of
physical structures so as to meet sensory needs of
pedestrians; physical designs that would give some sense
of the familiar, and of the permanence of the community.

6   The Metro Center:

Application, in modified terms, of metro centers was
recommended. Though we are more familiar with these
places for shopping, recreation and human interaction
from the experience of southern Canadian cities, (e.g.
Place Ville Marie in Montreal), the concept seems to be
worth considering for frontier communities. By bringing
together possibilities for a wide range of human acti-
vities in a complex of shops, indoor squares, walkways,
entertainment and leisure facilities, the metro center
would promote social interaction and a sense of community
identity.

7   Transportation and Pedestrian Walkways:

In addition to adequate consideration to the kind of
vehicular transportation system appropriate to a parti-
cular frontier community, provision might be made for
a series of enclosed, or otherwise protected, pedestrian
walkways. While "foot power" will initially prevail, some
of these walkways should be designed for easy conversion
to moving sidewalks for longer distances, once the
community warrants this.

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8   Communications:

The existing range of communications technologies
(landlines, microwave, satellite with ground receiver
station) should be more than adequate to provide options
for meeting the needs of the settlement. The real
problems will be jurisdictional. What kind of nego-
tiations will be required to set up an appropriate
communications system, and in what form should communi-
cations be operated (unitary or fragmented)? We need
to plan at an early stage for the kind of communications
that the mature community would require. We can then
implement early communications decisions in a way that is
consistent with the longer-range plan. Technologies
should be chosen to enable communications systems to be
integrated (i.e., the system used to bring telephone
service to the community should be also capable of carrying
television and radio).

9   Alternatives to Piped Services in the Community:

Conventional systems of piped services may not be econo-
mically feasible or environmentally desirable. Conside-
ration should be given to wastewater and solid waste
management and treatment systems that enable maximum
benefit to be derived from recycling and secondary appli-
cations.   Spin-offs from such treatment of solid wastes
include production of fertilizers for market gardening.

10   Interior Design:

As a general principle, effective multi-disciplinary
design of interiors, which allows for flexibility and
variability, can do much (through innovation in
texture, colour, area furnishings, interior landscape
and provision of indoor green areas, etc.) to help people
cope with perceptual, environmental and social depriva-
tions in the frontier community context. Interiors will
be dealt with more specifically in the following section.

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Our lives center around home, work and leisure activities.
The design of environments for these activities affects
how efficiently they are carried our and the satisfaction
we get out of them. Bad, uncomfortable and unsuitable
designs help promote frustration, anger, alienation, and
degeneration of the quality of life.

The way we live, the expression of ourselves through our
behaviour at home, at work and at play; the kind of persons
we are and would like to become; how we use a variety of
goods and services -- all of these, taken together, con-
stitute our life styles.

These life styles reflect our needs and aspirations.
"Quality of life" is a subjective assessment of how well
our life styles match our needs and aspirations. Proper
design of the things we use can contribute to a total
milieu for living which will be more than the mere sum
of its parts.

The viability of Canadian communities, including those
in frontier areas, depends on the kind of opportunities
and support they can provide for the life styles chosen
by their inhabitants. Strong leadership is needed,
therefore, to promote excellence of design in all com-
munities, whether in southern Canada or in frontier areas.

Exhortations about the perils of bad design and recommen-
dations that people recognize advantages inherent in
good design, will not in themselves resolve any problems.
However, they can provide stimuli for changes to be
achieved through actions by government, private enterprise,
and social institutions.

The present jumble of government rules, regulations and legislation affecting design in its various manifestations is widely seen as one of the most formidable barriers to change. Therefore, public authorities have a primary responsibility to recognize the need for excellence in design, and to facilitate this by well-defined programs of action aimed at a systematic removal of public sector impediments, and their replacement by more flexible, performance-oriented regulatory frameworks. Such action requires creation of an integrated design policy and promotion of operational design systems.

Design for Neighborhoods and Communities

In physical and spatial terms, the total set of milieux for homelife, work and leisure come together in the form of our neighborhoods and communities. The "view from the heights" -- the overview taken by community planners, engineers, economists, governmental and private decision-makers -- is one which emphasizes process: communities are the sum total of interacting factors that reflect technological capabilities and economic dynamism. From our own doorsteps, and in our daily routines, we each view the community at ground level. We see it as a mass of specific events that take place in a variety of social and physical settings -- the last cup of breakfast coffee with our families, the traffic jam on the way to work, the staff meeting in the new conference room, the physical relationship between ourselves and the machines we operate (whether these be typewriters or a drill press), the strain we sometimes feel, the relief that comes when we can exchange a bit of pleasant conversation in the middle of a shared task...on and on through each day's events. For each of us, perception of the community, most of the time, is not a "view from the heights" but rather a view of ourselves as we relate to our surroundings.

Design is a mediating factor in all of these aspects of our daily round. But at present, design is not being used in the most effective way to aid the individual in relating to the world around him. At least four problem areas can be identified:

1   the technical, decision-making, and regulatory contexts within which design solutions are determined;

2   lack of efficient and comprehensive evaluation of longterm effects of community design and of other design applications;

3   compartmentalization and fragmentation of design decisions;

4   the institutionalized legitimation of certain design preferences which sometimes means that even inferior design tends to be repeated, from one situation to another, despite its identified deficiencies.

The last point is of special concern when we look at frontier communities. Design deficiencies which may not be critical in southern Canadian cities could be disastrous in frontier settlements, where climate is more rigorous and regular maintenance is more difficult to come by.

Functional and spatial relationships that have become customary in southern communities may be most inappropriate in more isolated northern areas. The type of approach characterized by the two poles of bungalow subdivision and shopping-center, based on extensive use of the automobile, may be a most inefficient and expensive design for a new town in the north. Rows of houses on private lots, defining the 'apartness' of neighbors from each other, may accentuate feelings of loneliness in a setting where wilderness starts where the backyard leaves off.

The psychological needs of individuals in frontier communities require promotion of a sense of solidarity and common cause in the face of the environmental deprivations we mentioned earlier.

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Yet there are elements of the big city that should be
reflected in the neighborhood and overall design of
frontier communities. It is necessary that the people who
come to the frontier have some sense of the familiar, and
this can be achieved through perceptual echoes of the
settings that they left behind. People will respond to a
setting that offers the look and feel of a city, where they
have access to urban amenities, even though the scale is
reduced. To implement a metro center design in a frontier
settlement may be costly, and return on investment may be
much slower than is normally the case in larger urban centers.
But such aspects of urban form may be necessary if the tie
to the familiar is to be established and sustained.

Similarly, ownership of real estate can be important for
most people; it gives them some feeling of permanence. In
the frontier community means should be sought to satisfy
this desire while at the same time protecting against the
risks of property ownership in communities that are
dependent on single, dominant, industries.

In other areas of activity, there needs to be a break with
many existing urban approaches. A transportation system
based on the present Canadian norm of one car per three
persons whould be uneconomical and unsuitable in most local
conditions. Good public transportation will have to be
planned for and provided even in the early stages of com-
munity life. Another consideration is the need to provide
for variation and flexibility in neighborhood design.
Since some areas of choice will be constrained by necessary
environmental and social characteristics of the community,
it is important that the possibilities for choice should
be built into community design wherever possible. Real
differences in the way in which neighborhoods meet the
basic challenges to good frontier community design can be
one of the ways of enabling people to avoid feeling that
they are trapped in a standard company town.

Community esthetic is even more important than in the south.
It is a principal way of overcoming some of the environ-
mentally-linked sensory deprivations. Colours, textures
shapes and sounds, provision for greenhouses or other
protected green-space environments -- all these are ways
of keeping the senses alive. But community esthetic does
not arise spontaneously. Nor can it be bought off the
shelf at some sort of design supermarket. It must be
planned for and implemented in the light of local conside-
rations. Those who have to bear the immediate monetary
costs of including a community esthetic in the development
of the frontier settlement should realize that they are
making a long-term investment with social and environmen-
tal payoffs.

Design at Home

The importance of the home as a primary setting for human
activity is described by Barbara Ward in her recent book:
Human Settlements: Crisis and Opportunity:

The environment in human settlements is determined
by a variety of factors -- social, functional,
spatial -- but the most immediate, inescapable and
profound influences are social influences exercised
in the first instance in the home. Here the family
survives as a biological unit, with the hope of
adequate income, diet, shelter and privacy in accor-
dance with the world's vast variety of climates and
cultures. Here citizens receive their first educa-
tional formation. Here they learn -- or do not
learn -- security, in the sense of how to live with
other human beings. The house is the source, the
central place, the starting point of all life in
human settlement; in short, all human life itself.
The tragedy that follows from the world's records of
blighted housing and the decaying slums is that it
can deprive the citizens of the very foundations of
security and self-respect.

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In the frontier community, as elsewhere, design of the home reflects physical needs, social interaction needs and the needs of its individual members and of the family as a group for self-expression and identity. These needs cannot be dealt with as isolates; rather, they interact with each other in constantly shifting patterns.

The primary needs that are reflected in the home, as elsewhere, are the physical ones. The phrase "a good roof over our heads" reflects the way human beings actually order their priorities. A good roof, secure and well-insulated walls, adequate space, reliable mechanical systems -- once these and other physical requirements can be satisfied, then within this setting other needs can begin to be reflected and (in some cases) satisfied. Beyond this, the way in which the physical design of the house is conceived and implemented can shape the social interactions that are possible for its inhabitants and widen or constrain the options for individual expression and development.

On the physical side, the frontier home has some special requirements. Reliability and ease of maintenance of mechanical systems, and their insulation from possible environmental disruption, is a fundamental concern. It may be desirable to provide for some sort of fail-safe system in a house or cluster of houses to be used whenever there is disruption of community-wide service (e.g., auxiliary heating that does not depend on whether the electric power supply is on). Environmental factors specific to the local situation will influence the design of foundations, roofing, etc. Local conditions will also heavily influence the decision as to the type of water supply, and waste removal (or recycling) system to be adopted. The way in which the house is situated and oriented, the possibility of taking advantage of slopes, the type of windows and their location and elevation: all of these should be guided by the desire to take maximum advantage of whatever sunlight is available.

Physical design of the home shades into it design for
social use. Since perceived isolation is a major concern
that has to be overcome, design within the home, and
design of homes in relation to each other, should
promote good social interaction. It has been suggested,
for example, that a townhouse (high quality row house)
arrangement may help resolve many physical and social
design problems in such a community, while achieving a
desirable balance between family definition and privacy,
on the one hand, and broader social interaction on the
other. A well designed fourplex would typically enable
some sixteen people to interact and give each other
mutual support, while enabling them still to function
as four distinct families, each with their own privacy
and property. Three or four such structures, varying
somewhat in design and grouped around a green or other
common facility, would provide an interactive potential
(at the next level) of 50-75 people. Within a relatively
small spatial area, the individual would have relation-
ship options ranging all the way from the primary unit
through to the whole set of people in the townhouse
grouping.

A similar concern to achieve a balance between privacy
and social interaction should be reflected in the interior
layout of each home unit. Wide halls and stairwyas, a
variety of settings for social activity (a kitchen with
enough space to allow for sitting down around a table; a
living room; an activity room on the same level; easy flow
among these areas) -- all of these can help promote social
activity and integration. Whoever prepares the food should
not feel that they are being ignored by other members of
the family and imprisoned in a kitchen that is not designed
to accommodate more than one person working on a particular
task.

At the same time, the sense of privacy and individual identity can only be maintained if it is possible to separate oneself from the group. The individual must have ways to differentiate himself from others, even from his family. In order to facilitate this, a home must have areas where privacy is possible and is respected. Here again, the two-storey townhouse configuration offers a good mix of trade offs; it facilitates a demarcation of those areas of the home where privacy is reinforced, and other areas where maximum social interaction is promoted.

The kind of approach reflected in some of the proposals that have been made about design of the home illustrates our general contention: that proper design, in the home as elsewhere, can promote the social and individual realization, at the highest possible level, of human requirements even in environments that impose some constraints on the way we conventionally try to realize our needs and aspirations.

The work environment

While the home tends to be the primary focus of our life, the largest single span of our waking hours is likely to be spent in the work environment. Moreover, the social and physical environment of the workplace, and particularly the pressures and satisfactions of the job, leave an imprint that carries over into the way we feel and behave in other settings and relationships.

Design of the workplace can be looked at in a three-fold perspective:

1   the requirements for promoting productivity and efficient performance of specific tasks;

2   requirements for promoting the physical and psychological well-being of the individual worker, and for facilitating effective interaction with workmates, managers, etc.;

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3   the flows and spillovers between the workplace and the
    other parts of the total community, and the requirements
    for achieving positive linkages and countering negative
    side-effects.

    Viewed solely from the perspective of the requirements for
    efficient operation, the physical design of the workplace
    should promote the logical flow of materials to and from
    various work stations, and their most efficient and
    profitable processing or fabrication. This will require
    attention to the general layout of the facility, to the
    design of work stations, to natural and artificial light-
    ing, etc. All of this is generally known. And all of this
    is, or should be, the most routine of routines in the
    design of any workplace, whether in Toronto or Vancouver,
    or in a northern frontier community.

    But beyond this, there are specific considerations that
    may be overlooked in the design of the workplace in the
    frontier community. We tend to accept that because of
    their location and the costs of logistical support, from a
    distance many of these frontier work environments will
    necessarily have to be design-deficient compared to the
    best work settings in the south. But does this really
    make sense?

    If there are already significant environmental and social
    strains attendant on living on the frontier, is it really
    a good business proposition to disregard the importance of
    design of the workplace and thereby increase the burden
    on the worker? Apparent savings in cost may be more than
    offset by diminished productivity, higher rates of staff
    turnover, increased worker dissatisfaction and a greater
    incidence of absenteeism, slowdowns, etc. These will take
    their toll over the whole lifespan of the facility.

    We sometimes use human factors engineering, and other
    related design skills in planning factories in our major
    centers. It may pay handsomely to rely even more on such
    approaches when it comes to developing major installations
    in the north.

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The actual design of the work process, insofar as methods and human factors engineering can be brought to bear in a particular situation, can contribute not only to efficiency but also to worker comfort and satisfaction. But there are other aspects of design that can be applied to meet similar objectives. Some principles of interior design could be applied with reference to the workers' surroundings. Sensory stimuli such as colour, visual perspectives, acoustics, etc., can be used to render the work environment more interesting and stimulating. Similarly, ancillary facilities (lunchrooms, washrooms, locker rooms, corridors, approaches and exteriors) should be designed to give support to the individual's need to be able to identify with his environment. Design of work and of work surroundings to promote small team functions, and rotation of jobs, is likely to be more effective from a variety of considerations (e.g. efficiency, individual satisfactions, and group interaction) than work systems where individuals are involved in repetitive and narrowly-focused activities, and where the layout does not permit much social interchange. But in the absence of specific knowledge of the particular type of activity around which the economic life of a given frontier community would be oriented, it is not possible to prejudge just how much innovation in work arrangements would be possible.

It is important to remember that what happens on the job has spillovers into other areas of life. Friendships formed on the job, and intensified by the need to depend on others to get one's own task accomplished, carry over into the community as a whole. In a frontier setting, with only one or a few dominant economic activities, it is likely that many of the prime bonds will be those that are formed on the job. An economic process that promotes isolation on the job, is likely to be paralleled by a community life where the tendency to social fragmentation is strong.

Similarly, a job situation that sends the working adult back into the home overly tired, strained, and tense is likely to promote feedback into the factory and the community in the form of family tensions, general dissatisfaction, and a high turnover rate of families moving out of the community. The work situation is part of a closed system in which all parts relate to the others, and if it creates unnecessary pressures on other parts of the system, then its own inner strains will become even more intense.

Design for Leisure Activities

"Man does not live by bread alone". While the design of settings for immediate physical needs, secure and enjoyable home environments, and economic activities, goes some distance towards meeting human needs and aspirations, these will not be fully met unless we devote equal care to the development of places, structures and systems for leisure and recreation.

The word "recreation" is precisely to the point: in our leisure time, we can "re-create" ourselves, compensating for the wear and tear on our bodies and minds, inherent in many of our necessary activities. In our leisure time, we can pursue physical, mental and creative explorations necessary to self-expression and the forming of personal identities. Moreover, interaction with our fellows in leisure activities can promote social integration in the community, and alienation can be reduced. A wise community recognizes that leisure facilities are essential.

In frontier environments, where the work situation, isolation and the range of environmental deprivations can naturally exacerbate human feelings of isolation, social cleavage, and alienation, appropriate leisure facilities are an urgent requirements. Right from the start, the frontier community should be planned with this in mind.

The basic parameters for design of leisure facilities in the frontier community stem from the life cycle characteristics that we discussed earlier.

At the start, such facilities will have to be oriented more immediately to the needs of a predominantly male work-force. High consumption of alcoholic beverages is part of the lifestyle of the community. If the community does not contain adequate facilities for social get-togethers over drinks, then beer and whiskey will simply be bootlegged.

The local beerparlor, under proper management and with appropriate design can be a cheerful place for drinking, social activity, and general relaxation.

It is essential that in the early phases of community development, physical and social recreation facilities be available. Integrated leisure centers, including gyms, a swimming pool, a place for movies and live entertainment, a library and discussion center, are needed. Such facilities could be prefabricated and erected quickly on site. The purpose should be to design a small-scale facility which lends itself to expansion into the first indoor recreation center of the post-construction-phase community.

Another early provision for leisure has to do with the community communications infrastructure. It should be possible to bring television and radio programmes of considerable variety into the community, even during the construction phase. This would help to establish a general realization that careful attention is being given to meeting human needs and aspirations. Moreover, whether good provision for leisure needs are or are not being made at this stage influences the decisions of individuals especially those with families as to the desirability of coming to live and work in a particular frontier settlement.

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These specifics lead us into a consideration of the general
principles that should apply to the development of leisure
facilities in a community. Some of these are the following:

1 Consideration of leisure needs should begin just as soon
as planners start to consider community form and character,
and should be an ongoing process, adapting to changes in the
situation as the community develops.

2 The costing approach to design and development of leisure
facilities should be based on a realization of the various
spin-offs and side-effects that occur, i.e., the potential
benefit to the community as a whole and to other activity
areas, and these benefits should weigh heavily in assessing
the level of capital and operating costs that can be accepted.

3 Facilities should be designed for ease of maintenance and
repair; for multiple use where possible; and for flexibility
to meet emerging needs at various stages of community
development.

4 Facilities should be easily accessible to the widest range
of the population, as regards both location and the schedule
of activities.

5 Outdoor recreation should be promoted. Where possible maximum
use should be made of natural facilities (consistent with
protection of environment).

6 Facilities should promote social integration of the
community. This can be done if provision is made for a
wide range of interests.

Application of such leisure criteria to frontier community
design and planning must take into account specific local
situations. But we can elaborate on the criteria in the
light of the hypotheses presented earlier about the frontier
community case-study that will be used at the Assembly.

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To begin with, since we anticipate that the community will grow rapidly to a critical mass of about 7000 people within a short period of time, and will rise eventually to a peak of 50,000 we can establish two basic premises for leisure planning; first, the population will be large enough to warrant fairly extensive leisure and recreational facilities; secondly, that in populations of this size the range of variation of individual needs and aspirations for leisure and of the types of activities that people engage in will be considerable.

Thus, in the frontier community, the fullest possible participation of potential users in the earliest stages of leisure planning is necessary. This may require going to existing frontier settlements and interviewing people about leisure needs. Once there is an actual community, and a population profile begins to develop, more people can be consulted systematically, through leisure interviews, inventories, etc., and by informal means. The initial leisure plan should be modified by feedback from newcomers to the town.

As the community fills in, and in the light of anticipated changes in population, the focus of leisure provisions will change. Whereas, initially, the facilities will have had to be geared almost exclusively to the work force, it will now become necessary to anticipate and to meet the needs of families with young children. Leisure facilities are now required for housewives, toddlers, pre-schoolers and school children. By about the tenth year in the life cycle of the community, provision will begin to be made for the leisure needs of adolescents and from about the quarter-century mark, for older people and retirees. Flexible, anticipatory planning for leisure, involving participation in each set of decisions, will help to promote a community that seeks to integrate the full range of its age groups into a harmonious society.

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We have already stressed the various kinds of social costs
that are endemic to a frontier settlement. If there is
little thought or action taken to provide for the needs
of individuals to find themselves, to express themselves,
and to establish bonds with their fellowmen, we can expect
that individual and social maladjustment and conflict will
be more prevalent and intense. Hence, in approaching design
of leisure and recreational facilities, it is necessary to
consider real costs.

We have to ask what is likely to happen if facilities are
poor or non-existent; conversely, what such facilities
achieve if well-designed and well-used to help promote
individual and social well-being.

The physical and operating costs of equivalent leisure
facilities are likely to be higher in the frontier setting
than in southern communities. Some monetary cost reductions
can be effected by combining facilities and structures. For
example, the recreational provisions of the school system
can be on a scale that will accommodate not only the school
children but also, at appropriate times, mothers and pre-
schoolers from the neighborhood. Some leisure facilities
might be built right into the workplace: for example, a
small gym and swimming pool adjacent to the lockers and
shower facilities. Workers coming on or off shift might
find it convenient, satisfactory and morale-building to use
such facilities. Locating leisure facilities at or near
workplaces, where possible, can produce benefits as regards
productivity and good labour-management relations.

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Costs can also be reduced through creating a system of facilities -- basic facilities in the neighborhood (e.g., adventure playgrounds and some partially protected areas for group play in the winter); more elaborate facilities serving each sector of the community; and finally some central facilities which are easy to reach by available means of transportation. Costs can also be spread out over time (though not reduced) by proper planning to phase leisure modules into the total plan at appropriate intervals.

As in other aspects of community life, ease and maintenance of repairs, and flexibility for addition or adaptation is required. The possibility that a much-used facility would have to be closed down for weeks or months till a part can be replaced, or a key system repaired, could itself become a focal point of community discontent. Here is a potential focus for technical design expertise. If leisure facilities can be designed in a way that promotes repair by locally available tradesmen, rather than requiring an outside specialist to be flown in, this in itself would be a gain. If facilities can easily be modified (at least in internal physical arrangements, possibly through the interchange of sub-system modules) then their utility can be further enhanced.

Socially, the two most important points about leisure facilities for the frontier community are the ease and range of access to them, and the degree to which they promote social integration. Let us consider a small family in a frontier settlement. The father may be assigned to a shift whose hours would restrict his access to leisure facilities if the conventional scheduling common in southern communities is followed. Therefore, it is desirable that most leisure facilities be open for up to three-quarters of each 24-hour period and also throughout the weekend. For the housewife, particularly with small children, what is required is a range and accessibility of activities and

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facilities such that she can conveniently get out of the
isolation of the home and into group leisure activities
for short periods of time, but at frequent intervals.

The home itself should be designed so as to provide space
for various activities associated with family leisure and
creative experiences. Perhaps this could also be promoted
through the availability of various types of equipment
on loan or at low-cost rental (as in the case of book
libraries). If neighborhood design is based on clusters
of townhouses, then certain leisure facilities could be
common to them -- e.g., game rooms, rooms that can be
booked for larger scale entertainment, workshop areas and
so forth.

On a larger scale, we should also consider this question of
social integration in relation to community-wide facilities.
Given the ethnic mix of the population, and possible
fragmentation of groups in workplaces and by social stratifi-
cation etc., there are many chances that the community will
be split, rather than integrated.

Community-wide facilities should be designed and located to
foster inter-group cooperation and mutual awareness.
Churches, for example, might share some facilities or, at
least, be grouped in close proximity to each other.

Since work, leisure and homelife are the primary focal
points for almost all human activity, each properly deserves
detailed analysis. We have attempted in the space available
to indicate the strong links between design and the satis-
faction of the needs of people at home, at work and at

leisure. Unless these linkages are strengthened, communities on the frontier or in more settled areas, will be characterized by many barriers to human development, rather than by effective promotion of the human search for physical comfort, for identity, and for a meaningful life. To bring design excellence to bear on these dimensions of our human needs and aspirations will require not only good design techniques but policy to promote overall excellence in the development and application of design.

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Canada is entering a period of major social, demographic, economic and technological re-adjustment. How we handle these transitions will depend, in part, on our willingness and ability to create and to use high quality designs for new frontier communities, for urban development and in relating to our natural environment. We cannot rely solely on marketplace mechanisms and institutions to undertake these tasks. The market systems are not designed to meet these non-market needs. The responsibility for coordination and leadership for Design Excellence has to rest with the federal government and other public institutions. The industrial and commercial sectors require such leadership and support so that they can turn to the immediate tasks of specific development, promotion and use of high quality design.

The federal and other levels of government can promote Excellence of Design in a number of ways:

1   They can give this issue the necessary attention and publicity, and promote the kind of public education for design awareness, that would be required to establish Excellence of Design as a National priority.

2   A wide range of policies and programs should incorporate concern for Excellence of Design, whatever their specific focus might be.

3   Governments can reduce impediments and barriers to good design by periodic review of standards, and by shifting, where possible, to standards based on performance criteria.

4   Governments can undertake programs and institute policies in support of Excellence of Design (e.g. development of design systems).

5   Governments can systematically review the role of design in achieving economic, social, environmental, technological and cultural objectives and provide the necessary policy and guidelines, where appropriate.

6   The federal government should make an early decision to
     support the application for developing a project on
     Excellence of Design in frontier communities, as a Canadian
     contribution to the U.N. Conference on Human Settlements.

7   Governments are large purchasers of equipment and services
     and they operate large and highly visible organizations
     where the use of high quality design would be beneficial,
     as regards their own activities and as an example to
     others.

8   Governments at all levels can ensure that factors such as
     long-term costs to society, esthetics and human comfort
     are reflected in the design aspects of all projects which
     they directly undertake or indirectly support.

These are a few of the ways that governments can demonstrate
their willingness to provide leadership in a national effort
for design excellence.   The success of the Assembly will be
measured by the tangible responses that it triggers: public
support, enhanced design awareness, actions to promote excel-
lence in design, and the development of needed technical
competence and systems.   The fact that some seventy senior
business and government leaders have already demonstrated
interest and support for the Assembly's objectives indicates
that it is not unrealistic to expect the public, at all
levels, to grasp the central issues and support our efforts
to translate concern into actions.   The Design Assembly is
only one phase in a continuing endeavor.   The end is nowhere
in sight, but the foundations for this endeavor are - we
hope - already well established.

Le Canada inaugure une période d'importants rajustements sociaux, démographiques, économiques et technologiques. La façon dont nous effectuerons ces transitions dépendra, en partie, de notre volonté et de notre aptitude à créer et à utiliser des "designs" de haute qualité quand il s'agira d'aménager de nouvelles collectivités et de faire de l'urbanisme en tenant compte de l'environnement naturel. Pour entreprendre ces tâches, nous ne pouvons nous fier uniquement aux mécanismes du marché et à nos institutions. Les systèmes de l'offre et de la demande ne sont pas conçus pour faire face à ces nécessités. La coordination visant à l'excellence du design et la direction des initiatives doivent être l'affaire du gouvernement fédéral et des autres institutions publiques. Les secteurs industriels et commerciaux ont besoin de cette direction et de cet appui pour leur permettre de s'attaquer aux tâches pressantes de mise au point, de promotion et d'utilisation de design de haute qualité.

Le gouvernement fédéral et les autres paliers de gouvernement peuvent promouvoir l'excellence du design de nombreuses façons. Ils peuvent:

1   Accorder à cette question l'attention de la publicité nécessaires pour sensibiliser le public et faire de l'excellence du design une priorité nationale.

2   Inclure la question de l'excellence du design dans une foule de politiques et de programmes, quelle que soit leur orientation particulière.

3   Atténuer les obstacles et les barrières à un bon design en révisant régulièrement les normes et en instituant, dans la mesure du possible, des standards fondés sur des critères de rendement.

4.   Instaurer des programmes et des politiques qui appuieront l'excellence du design (par ex. la mise au point de systemes de design).

5   Réviser méthodiquement le rôle du design dans la poursuite des objectifs économiques, sociaux, technologiques, culturels et écologiques et mettre sur pied une politique et des lignes directrices adéquates, là où il conviendra de le faire.

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6   Prendre au plus tôt une décision visant à appuyer la demande
    d'un projet visant l'excellence du design dans les collectiv-
    ités éloignées; le Canada apportera de la sorte, sa contribu-
    tion à la Conférence des Nations-Unies sur les établissements
    humains.

7   Les gouvernements étant de gros acheteurs de biens et de
    services, ils exploitent des organisations importantes et
    très évidentes; il y aurait certes avantage d'y utiliser un
    design de grande qualité, qui serait profitable autant du
    point de vue de leurs propres activités qu'à titre d'exemple
    pour les autres.

8   S'assurer que l'aspect "design" de tous les projets qu'ils
    réalisent directement ou qu'ils appuient indirectement tien-
    nent compte des facteurs tels que les frais à long terme
    assumés par la société, l'esthétique et le bien-être de l'être
    humain.

    Ce ne sont ici que quelques moyens qui permettront aux
    gouvernements de prouver leur désir d'être les chefs de
    file des efforts nationaux visant à établir l'excellence du
    design. On pourra évaluer le succès de l'Assemblée par les
    réponses tangibles qu'elle suscitera: l'appui du public, une
    sensibilisation accrue vis-à-vis du design, les mesures des-
    tinées à promouvoir l'excellence du design de même que le
    développement des systèmes et des compétences techniques
    nécessaires. Le fait que déjà quelques soixante-dix hommes
    d'affaires et hommes politiques importants aient manifesté
    leur intérêt et aient apporté leur appui aux objectifs de
    l'Assemblée prouve qu'il n'est pas utopique de s'attendre
    à ce que le public, à tous les niveaux, saisisse les points
    centraux des questions soulevées et apporte son appui à nos
    efforts pour convertir les idées en actes. L'Assemblée du
    Design n'est qu'une étape dans un effort continu. On ne peut
    en entrevoir la fin, mais les fondements de l'édifice sont,
    espérons-le, déjà bien établis.

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