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Full Name of Author — Nom complet de l'auteur

VICTOR M. OWEN

Date of Birth — Date de naissance

FEBRUARY 3, 1947

Country of Birth — Lieu de naissance

ENGLAND

Permanent Address — Résidence fixe

3 WILLARD ST.
OTTAWA, ONTARIO

Title of Thesis — Titre de la thèse

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Name of Supervisor — Nom du directeur de thèse

PROF. BRUCE McFARLANE

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SOME SOCIAL IMPLICATIONS OF
VIDEOTEX TECHNOLOGY IN CANADA:
THE CASE OF TELIDON

by

© Victor M. Owen, B.A.; B.A.(Hons.)

A Thesis submitted to the Faculty of
Graduate Studies in partial fulfilment
of the requirements for the degree of
Master of Arts

Institute of Canadian Studies

Carleton University

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of Graduate Studies acceptance of the thesis:

Some Social Implications of Videotex Technology
in Canada: The Case of Telidon

Submitted by Victor M. Owen, B.A.; B.A.(Hons.),
in partial fulfilment of the requirements
for the degree of Masters of Arts

.....
Thesis Supervisor

.....
Director, Institute of
Canadian Studies

Carleton University

ABSTRACT

On August 15, 1978, the Federal Department of Communications formally announced the development of a Canadian videotex system. The announcement committed the government and the public to the support of a new era in information technology investment, both as manufacturers and consumers.

For the public, however, the technology represents yet another step in the direction of informatic communication. In terms of social impacts, the speed with which the technology has been developed and implemented reduces the opportunity for society to adapt the technology and become accustomed to it. The inherent danger is that of using the innovation for functions better served by other methods.

This thesis provides an examination of the technological components and theoretical underpinnings of Telidon which lead the researcher to believe that the most significant social implication is the insight provided by re-ordering society's information, its methods of storage and means of retrieval. The resulting effect becomes a way of looking at the world and seeing ourselves.

The conclusions offer suggestions for future research on cognitive impacts, changing labour opportunities and the effects of information gatekeeping on society.

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CHAPTER ONE

INTRODUCTION

In this chapter we will pose the problem question which directly concerns the thesis argument. Other points which set the stage for the research are identified with the qualifier that the complexity of the issue requires some setting of limits if we are to provide a composite view of the implications rather than the impacts of videotex technology; since the latter can only be assessed after the fact, whereas the former lends itself to an interpretive study.

Statement of the Problem:

In the past decade Canada has experienced a surge in communication developments on a scale previously unknown in history. What has been heralded as the "communication revolution" has, indeed, been adopted as part of the North American lifestyle. Perhaps this is the result of the character of the technologies, that is, they are in most instances the products of former devices for social interaction.¹ Telephones and televisions were built on the earlier media of telegraph and radio. In each case the new technology serves the same purpose - that of social communication and entertainment - only with increased capacity and complexity.

Another explanation for mass acceptance is the availability of these new technologies. The influence such artifacts hold by sheer number is unavoidable. In a nation where 98% of the households have at least one television set, television viewing must be considered a normal activity (Stats. Can., 1980/81). What began as a curiosity and a symbol of wealth has now become a common household item in an affluent society.

There is a paradox of technology which lies in the import that man gives these inventions. Limited quantities ensure interest, curiosity and need for other men. It also separates those who "have" from those who "do not have", and, to a certain extent, provides the basis for class struggle. However, when the greater part of a population owns the technology, the pervasive influences of that technology ensure both its use and continuance to some degree (Innis, 1951:34). For example, the publication of books contributes to the teaching of old and new ideas, and the need to read, just as much as it supports the forestry, publication and marketing industries. The supplier-consumer relationship is interdependent and interchangeable, in the same way that reading follows the form of writing (most often left-to-right and top-to-bottom) each stage supports and complements - even replicates - the other process.²

The main problem which society faces now, however, is the lack of opportunity to put each new development to the test of time. For Daniel Bell this is the result of a lack of insulating space as the rate of technological advancement is rapidly outpacing the marketplace for real needs (Bell, 1981:60). Underlying this problem is the inability of men to see new innovations in their social perspective.

When man's artifacts become as much a part of his being as his language and means of expression, the relationship takes on a dimension and dynamics rarely defineable in the immediacy of their happening.³ Johannes Gutenberg could no more envision the off-set printing process or the new International Business Machines (IBM) laser-printer system for reproduction than we can foresee, based on existing technologies, the methods for information retrieval possible in the future. What can be determined with some confidence is that there will be significant changes in the way we think about these technologies. This idea is what Harold Innis called the "bias" of our modes of communication.⁴

Communications technologies provide a greater catalyst for change due to the nature of their hardware. The equipment of the media provides the structure for the process while hiding the essence of its function, that of facilitating communications. Media exist to transmit,

carry, store and deliver information. In this sense, communications technologies have been labelled an extension of the human organism (McLuhan, 1962:54). For example, the telephone replicates the senses of speech and hearing with its earpiece and mouthpiece. Yet its earpiece is active as a speaker and its mouthpiece is passive as a microphone, thereby presenting a contradiction of terms associated with these senses. The reason is simply that although the mechanism is perceived as a unit belonging to and extending the senses of the individual in a particular location, in reality only half of the device is a direct extension -the passive mouthpiece which connects to the active earpiece (or speaker mechanism) in some remote location. If the extension of the speech sense is not augmented with the feedback of hearing, the technology cannot function either as an interpersonal or intrapersonal communications tool.

The point of this argument is the hypothesis that communication technologies are more the "reflections" of human senses than their extensions. As with all reflections, there is a change of perspective, the right-side becomes the left-side and the left-side becomes the right-side to the observer. For the technology to work as a tool it must replicate the senses of the user in the same perspective, otherwise it is merely a poor facsimile of the human organism. The device, in fact,

becomes the second half of a communications dyad, rather than the link between two entities.

Society often sees each new innovation in the form of past inventions. Condemned to repeat the error of misapplication, the new technology falls short of its potential because too often we expect to create the ultimate multi-medium.⁵ Similarly, what we define as a tool is not always a tool but rather an imitation of the tool-maker. Contrary to the myth, television does not teach. It can work effectively as a teaching tool only if it facilitates learning; because as a passive device, it requires only a fundamental understanding of the language. In many cases the action behaviour of the programme is sufficient to hold the attention of the audience. Still, it is not the television programme that teaches but rather the facilitator (parent or teacher) who requires the viewer to reflect on the content.⁶ Books, on the other hand, are more effective tools because they require a knowledge of the oral and written language, as well as the activity of reading, if meaning is to be derived.

It would be wrong at this point to suggest that certain technologies have failed in their application. What can be asserted, however, is that man has failed to set appropriate goals and limits for his inventions.

Robert Davidson, a research associate with the Social Science Federation of Canada suggests that:

many negative social ramifications of technology have arisen because second and third order consequences of technological change have been insufficiently foreseen

(SSFC, 1982)

The 78rpm record and the Ford Edsel are no longer in production, not necessarily due to technological failure but rather as a result of the manufacturer's inability to assess competing technologies. The second and third order implications of design often require new industries such as field servicing, and result from the previous conditioning of the public which determines the role of the new technology.

We tend to speculate on technologies as a "win or lose" proposition rather than as part of the dynamic process of change, each element of a new innovation being intricately interdependent. Indeed, each sector of society sees the innovation at a different level of importance without realizing the significance until it is too late to respond in a orderly manner. The marketplace perspective looks at both the short-term and long-term economics related to research, manufacturing, distribution, sales and life expectancy of the technology. The consumer weighs the apparent need for the technology in light of the advantages or disadvantages of not having

it. What this means in economic terms is that new technologies are adopted more readily if they replace an older technology - by doing more for the same, or less, cost. Yet the decision making process for the buyer is not based on research or fundamental needs most often but rather impulse reaction, with the notion that if the device does not work or becomes obsolete, the process of purchasing can be repeated.

This process is called "consuming", and like eating, it is regarded today in a free enterprise society as a natural, everyday activity. Where we fail as a nation of consumers is not contemplating the consequences of our diet, both in direct personal ingestion and in the change brought about by others behaving the same way.⁷ The social implications, therefore, of any individual change depends on the relative influence of the event in its particular social context. It is not the behaviour or response to the technology which is inappropriate but rather the timing of its occurrence that poses conflict. The consequences of fads are excess production and relatively short-lived usage. Once the novelty has gone there are seldom other applications for the product. Similarly, mass demand places the industry in the position of a costly start-up operation which in turn draws on other sectors of manufacture - sometimes without much warning.

The Telidon/videotex technology is but another of the many innovations to appear in recent years.⁸ The problem question, therefore, is what are some of the social implications of this technology in the context of Canada?

Setting the Limits of Analysis:

Both the analysis and limits of research need be defined to support a particular thesis. Whereas it is relatively easy to look back on history and document the changes and effects of a particular invention, the setting of limits becomes important in the case of videotex/Telidon technology. Clearly, the technology is changing rapidly, being officially only three years old, and therefore our observations are both limited to the available data and are naturally biased by the times and proximity for the study. With this in mind our comments hold for the time of writing of this work.

For this research a systemic approach⁹ has been used to determine some of the implications of videotex by drawing on the limited history of communication technologies in Canada. Rather than identifying seemingly "like" technologies to suggest the implications, the unexpected impacts of the component technologies which have occurred in the past have been linked. In this manner the conclusions are the result of second and third order summation (Davidson, 1982). The social implications we are suggesting result from a transference, not of what has happened in the past but rather what has not occurred; which in effect produces a marketplace for new ideas and inventions.

The methodology takes into consideration the hypothesis that each medium of communication has its own

bias.¹⁰ The influence of a new medium must occur where there is no previous structure, otherwise there will be a conflict with the existing technologies and those who support each camp (Godfrey et al, 1980:2). For this reason, Telidon, as a protocol, must be examined both as a language of expression and in the context of videotex technology, as it is applied specifically in Canada. The research has not been extended, therefore, to include videotex in other nations other than for historic reference, although such work would certainly prove interesting.

What the bias and effects of videotex will be is speculation. Greater influences such as war, changing economic relationships, changing demography and environment can redirect society's interest in a technology.¹¹ For the same reason that the pneumatic mail system works effectively in Paris and the telephone in Ottawa, we must recognize the complexity of the conditions and influences which surround the implementation of new inventions. The physical and cultural environment for each location is unique.

In Chapter Two a historic look at the social impacts of past technologies, as a measure of space and time biases, has been put forward to provide a perspective for the theoretical argument. Specific attention is given to the development of technologies in Canada during the past

hundred years, especially the role media has played in society. It is our contention that these industries, although not directly responsible for the development of new electronic technologies, nevertheless, have paved the way for their implementation. The role of newspapers, television, and the computer are of primary concern because they are the technologies most closely identified - rightly or wrongly - with videotex and Telidon. It is the relationship of these technologies to society which is important.

The conceptual framework of the thesis has its theoretical underpinnings in Communication and Cognitive theory. The models presented in Chapter Three by Laswell, Shannon-Weaver, Gerbner, Osgood, and others offer some explanation for the way we perceive these technologies in our own thinking. Theories on cognition are grounded in the discipline of psychology, in the work of Freud, Piaget, Skinner and Rogers. Specific theories put forward by Innis, McLuhan, Ellul and Mumford provide the direct perspectives, however, which support these arguments.

Chapter Four explains the evolution of the Telidon protocol and videotex services, in general terms. There is a tendency when examining technology to become a victim of the vernacular quicksands - technical jargon filled with scientific acronyms. For this reason we have chosen to spell out names and organizations (with the acronym in

parenthesis) even though this may appear cumbersome at times. In addition, a brief account of the international^{application} of videotex is intended to provide the reader with an understanding of the marketing strategy and the general role of the Canadian government in Telidon.

A critique of the academic evidence including a summary of the research projects conducted in the Telidon applications thus far, is provided. Some specific views are presented by several leading specialists in the field, including Douglas Parkhill, Gordon Thompson, Herb Bown and others. These commentaries represent a cross-section of the people directly involved in communications technologies in Canada.

Chapter Five outlines the arguments in support of the thesis that the social implications of videotex, and particularly the Telidon protocol, are most likely in the manner we order information and the importance we assign these models of communication. What becomes important is not the labour shift or modes of production, but rather the juxtaposition of traditional culture with new systems for thinking.¹² These ideas are further expanded in the final chapter with some conclusions as to the influence that the individual and public can exercise with respect to Telidon specifically, and technological changes in general. The concluding chapter also provides suggestions for further academic investigation.

Central Theme of Study:

It is the researcher's contention that there is a dynamic relationship between man and his artifacts in which they not only reflect his thinking but shape it by their referent existence.

The new electronic technologies, particularly those defined by informatics and telematics, have affected a shift from cyclical to linear thinking, thereby producing cognitive dissonance in society. This concept builds on Innis' notion that what we think about and the way we think is determined, in part, by the tools or symbols with which we think. The "bias" of the medium, in this case Telidon/videotex, presents a potentially strong influence on how we order our concept of the world around us.

Moreover, the development of telematics is not evidence of a communications revolution but rather evolution based on the form and development of previous technologies. What may be occurring, however, is a cognitive revolution suggested by the changing social norms, search for new values and definitions in society.

A second hypothesis is that as a result of our precepts and mislabelling of technologies as "extensions of the human senses" we frequently attempt to use communication technologies as tools, when in fact, they are reflections - indeed, facsimiles of the human being.

In this chapter we have suggested that only first order implications are considered when a new technology comes into being. First order implications are the intended uses for the technology. Second order implications are defined as the use that the public makes of the technology, which are often different from those originally stated by the first order intentions. The third order is then the symbolism the technology creates within the social context, that is, the meaning we give these new objects in our language and thoughts.

We have established an empirical framework of analysis for the implications in order to speculate on the hypotheses of cognitive revolution in man's thinking - a shift from cyclical to linear thought which has been brought about by the concept we have of our technological artifacts and the way we perceive some technologies as tools.

Based on modern communication theories and theories on cognition, the thesis will argue the macro significance of videotex and Telidon in Canadian society.

CHAPTER TWO

REVIEW OF THE LITERATURE

In the first part of this chapter we will examine the underlying developments which have lead to the present media technologies. A further study of the roles played by three specific media (newspapers, television and computers) combines with a review of forecasts predicted for the now-present and those anticipated developments yet to come, to give a technological overview of the social environment. How we perceive this new technology and the way we apply the innovation of Telidon/videotex system is more understandable with this history.

The Social Environment:

Videotex and Telidon have been described, perhaps simplistically, as the marriage between television technology and the computer. The technology involves much more, however, namely modes of transportation, language, writing, refinement of minerals, development of alloys and virtually every industry and discovery to man.

We have collected the literature under three categories of "Historic Developments", "Contemporary Technologies" and "Future Prospectus" for the purpose of

understanding the significance of each underlying technology in its social context. For example, Harold Innis and Lewis Mumford both relied heavily on the history of civilizations to develop theories on the influence or bias of communication technologies in the rise and fall of empires. Technologies have become, moreover, integral parts of culture, manifesting attitudes and affecting change in social patterns. It is for this reason we will review the literature in three perspectives so that Telidon too can be similarly visualized.

Historic Developments:

Historically, the concerns are with the specific innovations of writing - including language; measurement - as it applies to space and time; and metallurgy - including all modes of refinement and recombinations, as these developments are fundamental to the present "high-technology" advances.¹

From writings of the past come warnings which may once again fit the new generation of personal computers.

. . . this discovery of yours will create forgetfulness in the learner's souls, because they will not use their memories; they will trust to the external written characters and not remember of themselves. The specific you have discovered is an aid not to memory, but to reminiscence, and you will give your disciples not truth but only the semblance of truth; they will be hearers of many things and will have learned nothing; they will appear to be omniscient and will be tiresome company, having the show of wisdom without the reality . . .

(Innis, 1972:56)

The Reference was not an attack on computers and computer programmers but rather to the invention of writing as portrayed in the Phaedrus in which Socrates has the god Amon faulting the contribution of Thoth - the Egyptian god of letters. It was not the Egyptians who introduced writing, however, but the early Sumerians who adapted the pictographs of previous tribesmen into the phonograms of language (Carney & Zajac, 1975:17). As early as the middle of the fourth millenium B.C., according to Jewish legend, the pictographs of the temple archives of Sumerian Erech² later listed among the possessions of Nimrod (Genesis X,8) provide evidence of writing (Derry & Williams, 1961:215). These writings even though void of syntax and grammar greatly influenced their societies.

Early tribal culture was fixed in an oral tradition. The Bards were the storekeepers of information, retaining sagas of as many as 250,000 words in memory. The generations maintained a continuous link of past, present and future which was reflected in seasonal festivals, belief in reincarnation and ancestral worship (Carney, 1975:8). The spoken word had importance in these societies and the shaman was the mythmaker who was capable of translating and giving meaning to the world around them. Change and innovation were unlikely in such settings since the perspective was often singular and monopolistic. The relationship between the "preserver"

that is, the Bard or shaman, and the people, gave rise to the particular social structure and culture. Indeed, tribal man did not perceive of himself as singularly important but rather as part of a larger social order - an integral part of the world around him. At the same time he believed his failure to comply with the rituals and taboos would surely cause harm to himself or others. Consequently an ideology was produced based on responsibility without power, and yet somehow providing the individual with a sense of integral importance.³

What the Sumerians accomplished with their primary monosyllabic pictogram vocabulary was a common shared meaning for significant symbols. By 2900 B.C. some 2000 signs had been reduced to 500 or 600, of which 100 of these represented a syllable or a vowel without consonants. However, the Sumerians failed to distinguish the consonants sounds from the syllables in which they occur and consequently did not achieve an alphabet (Derry et al, 1962:214-9).

The use of a particular medium on the development of the materials used and the language is evident with the Sumerians. Originally stone and later aluvian clay in small 3"x4" tablets provided the medium for cuneiform writing. Whereas strokes would lift the wet clay, small impressions made with a wedge-shaped stylus produced a concise and deliberate style of writing. Writing on clay

requires consideration of the content which must be dried and like stone, later carried. Such formats do not lend themselves to the development of literature, and elaboration of the language. Instead we see the reduction of symbols and emphasis on record keeping for transactions. The purpose for the Sumerians was quite simple; what developed, however, was the important step from pictograms or iconic symbolism to the abstract signs of letters. The shift, represented by the cuneiform writing (from pictures to signs) was in fact the expression of symbols of sounds rather than things (Durant, 1955:131).

The Egyptian hieroglyphics possibly evolved from the same Sumerian origin. They were able to represent a consonant with a single sign, yet because the Egyptians were influenced by their cultural beliefs - centred on the rites for the dead - they retained the more complex pictogram. Another reason why the Egyptians did not resort to a cuneiform writing was because they had developed paper and ink (using papyrus reeds and lamp black) as early as the fifth dynasty between 2680 and 2540 B.C.⁴ Both these two forms co-existed in the Hittite civilization and the earliest Cretan script.

By 1400 B.C. linear signs were in use at Knossos in an early form of Greek. Somewhat earlier, circa 2000 B.C. an alphabet was in use in northern Syria which resembled

Arabic and contained eight letters not found in Hebrew or Phoenician. Its disappearance may have been due to its cuneiform format in clay. Although durable, the clay medium was difficult to store and disseminate.⁵ It was the linear Phoenician alphabet existing around the first millennium B.C. which survived to become the basis for the Arabic alphabet and was later brought to Greece as the Cadmean letters in the middle of the ninth century B.C. The Etruscans borrowed the alphabet from the Greeks and in the last century B.C., the Latin alphabet of 23 letters (modern English added v, w and j) was established (Derry et al, 1961:214-219).

In Mesopotamia both Sumerian and Akkadian were learned by scribes but because of their many kingdoms, invasions and disasters, writing was not restricted to one group. Also, the attention to symbols rather than pictograms produced abstract thinking which led to the development of Algebra (quadratic and linear equations).

In Innis' words:

The significance of a basic medium to its civilization is difficult to appraise since the means of appraisal are influenced by the media, and indeed the fact of appraisal appears to be peculiar to certain types of media.

(Innis 1972:9)

Moreover, Ernst Cassirer has argued that:

language transformed the indeterminate into the determinate idea and held it within the sphere of finite determinations. "The spoken word set the seal on and gave definite form" to what the mind created and culled away from the total sphere of consciousness. (ibid:8)

That the written word has killed much of the spirit of the spoken word is a notion that Innis supports (Innis, 1972:56). Without the written language, however, we would not know of the influence of the oral tradition in Greece or their perfection of rhetoric.

In the transference from one medium to another something is likely lost, yet it is most probable that the very best of a culture's product has been preserved from the former mode of communication. This generally occurs for two reasons. First, a society will convert that information which it deems most important, at least the things that are foremost in people's minds. Secondly, those who are involved in the new medium have often experienced the effects of the former and therefore are apt to either reflect or oppose the methods inherent to the former medium.⁶ Such is the case with Plato and Socrates - "the last great product and exponent of the oral tradition" (Innis, 1972:56). Ironically, Plato's works celebrate the oral tradition of his mentor whose criticism would not be recorded without the development of writing.

With writing, came a structure - even method - which ordered language more rigidly and allowed closer scrutiny. Whereas early forms of writing were organized from right-to-left, including the Sumerian cuneiform, later versions varied direction. The Babylonians were, in fact,

the first to write in a left-to-right mode and the early Greeks used a bi-directional system, as did the Hittites, which they referred to as Boustraphedon - "as the ox turns". This meant that the next word continued, immediately on the following line rather than returning to the far left (or right) to begin the next string of words. Perhaps this is an explanation for the reversed direction of some Greek letters in today's language.⁷

What this structuring, or script in general, allowed was for layer on layer of word meanings to pile up and produce specialized vocabularies (Carney, 1975:9). In its formation, the objective of writing was to maintain records of transactions and to tell a story of specific things such as eventful happenings and the reign of kings. However, writing contributed to the restructuring of language because it established a source of reference, a standard which became inculcated in the institution of schools and formalized learning methods.⁸ In doing so, writing provided the linkage between past and present, a means by which an information base does not die but rather grows with each passing generation.

A second influential development of the past was the application of measurement as it applies to space and time. In the spatial context measurement includes both size and quantity and therefore covers man's ideas on length, distance, area and all aspects of geometry

(including number systems and more complex mathematics). Time measurement relates in many ways to the more tangible spatial concerns, yet it has always remained in the realm of the abstract. Without these two concepts of measurement the present technologies, so dependent on microscopic precision and minute timing, would not have developed.

What measurement represents furthermore is the desire for standards - a point of common understanding and agreement for social interaction, both on an intercultural and intracultural basis. It is these fundamental concerns which must be addressed first.

The origins of size measurement stems from very early beginnings - most likely related to hunting tools, territorial claims and the description of the size of game, in which parts of the body such as the hand, foot and arm would be used to measure things. Number systems in this case would be fairly limited, indeed, most primitive cultures have a number count of one, two, and plenty or else one, two, two-one (3) and two-two (4) (Durant, 1935:79).

The agrarian cultures provided a greater need to expand a system of measurement simply because of quantity. Land area, crop yield and trade were all influences in establishing measures for distance and content. For example, land area in south-east Asia was measured in

"baskets", that is, the number of baskets of crop yield (Singer et al, 1954:111). Clearly, this method was crude since the volume would vary according to soil conditions, climate and pestilence. What such methods reveal, however, is the basis for these measures - the things which each culture and civilization deemed important.

In more complex societies where trade flourished, (such as the Sumerian, Babylonian, and Egyptian civilizations) complex number systems emerged and higher mathematics developed at the same time as writing and record-keeping. The need for greater accuracy, particularly when dealing with lengths and quantities arrived with the advancements in architecture which, coincidentally, relates to the specialization of labour. It would have been very difficult to build a pyramid involving many overseers whose body measurements varied. Such measurements as the Remen in ancient Egypt were defined as five palms but also by averaging the length of numerous cubit measuring-rods. The double remen was said to be the diagonal of a square royal cubit. The royal cubit was then 20.62 inches and, by geometry, 29.16 is given as the "correct" length of a double remen. The practical ratios used, however, were 5 palms = 1 remen, 7 palms = 1 royal cubit, 10 palms = 1 double remen. Angles and squares measured in this manner would have a negligible error of plus or minus $1^{\circ} 10'$ which enabled

construction of large structures and measurement of major tracts of land (Singer, *ibid*).

As with the Egyptians, the Greek, Roman and other Mediterranean empires, all adopted length measurements which only differed by little more than an inch for the "foot" measure. Each people built its machines and structures as units complete in themselves, even when such tasks required hundreds of years to complete, as was the case with the pyramids. The directives for construction were set by religion and tradition and therefore were followed diligently.⁹

Time, even as an abstraction, was treated in a very basic manner; and then - only as a tool to assist man in his tasks. In this sense, time is very much like distance or recurring cycles in which the cyclical time-distance scale of the Babylonian and Greek astronomers has been carried forth to the present day. For those ancients, the stars were the travellers of time just as the Chinese li reflected the time it took for a coolie's travel with a standard burden. Distance was measured not in miles but rather as 10 li - being the distance between resting points (each resting point was about one hour apart). Distances with this method would vary with terrain, naturally, yet emphasized the "task oriented" thinking with fixed modes of transportation - still common in many parts of the world (Singer et al, 1954:110-120).

The transition from celestial timekeeping to mechanical was difficult because man was accustomed to a temporal timeframe. Like writing, the transition from familiar symbols - that is, the seasons, monthly cycle of the moon and the daily rising and setting of the sun - to abstract and arbitrary signs, was a momentous leap. Acceptance of two more systems - and with time measurement we are dealing with temporal, equinoctial and number concepts - appears somewhat paradoxal. Yet it is this acceptance of a multi-perspective time measurement which permitted new innovations to challenge the older concepts. In spite of the Egyptian water clock of the mid second millenium B.C. and the sand clocks of Greece, shadow clocks - both lineal and circular, continued as the only practical method of time measurement until the 15th century (ibid:112-126).

Timekeeping was an art which was manifested in political time keeping (the year of the reign of a particular king or pharoah), and magical time for religious and cultural rites; but generally it was not considered a necessary part of every man's knowledge. Moreover, the making of mechanical clocks, using weights, did not appear until the 13th century A.D. Spring driven devices were not in use until the 16th century (1575 A.D.) although Galileo had first observed the principle of the isochronous swing of the pendulum which when applied to

timekeeping, provided greater accuracy (Derry, 1961:225-8).

The mechanization of time had its roots in the organization of 13th century monastic orders in central Europe¹⁰, as Lewis Mumford notes: "the clock is not merely a means of keeping track of hours, but of synchronizing the actions of men" (Mumford, 1934:14). He further argues that "the clock, not the steam engine, is the key machine of the modern industrial age" (ibid). Indeed, the steam engine spurred the development of powerful machines of work. However, it was the restructuring of tasks and an awareness of minutes and seconds passing which gave cause for faster methods of production, and the scheduling of lives. The production of timepieces focused man's attention on minute detail, precision instruments, and ultimately produces - standardization.

Each of these developments was dependent on the refinement of other technologies, especially metallurgy and the purifying of basic ores used in tool making and the construction of machines. Copper, being perhaps the oldest of these materials, dates back to circa 6000 B.C. in the Lake-Dwelling at Robenhausen, Switzerland, circa 4500 B.C. in prehistoric Mesopotamia and towards 4000 B.C. in the Badarian graves of Egypt (Durant, 1935:102). Without this metal, present-day electrical and electronic

circuitry would not have progressed, copper wire being the most common method for carrying electric currents.

In the Cretan remains of 3000 B.C. another important innovation was established - that of the production of alloys, specifically bronze and brass. It was the fusing of tin or zinc with copper which produced a hard alloy suitable for weaponry and resistant to corrosion (oxidation) by the elements. These products can be considered first order effects. The more important impact was the technique¹¹ used to combine metals and elements which resulted in the experimentation with other materials.

Like copper, iron was equally important, although a relative late-comer in Western Europe circa 900 B.C. A simple tool like iron tongs used to grip the hot metal being worked, was essential to the production of tools for mining, weapons, horse shoes for extended travel, and generally the perfection of steel items. The improvement of various hearth furnaces to the more effective smelting furnaces of the Romans in Populonia, Etruria and Wilderspool near Warrington in England, and the later blast furnaces, similarly enabled the refinement of ores (especially iron) for steel production. Another source during this period was a high quality crucible steel called seric iron which was imported from the Hyderabad

district of India, in the shape of 5 inch cakes, $\frac{1}{2}$ inch thick.¹²

These developments and experimentation with the various metals provided a practical and eventually, a theoretical basis for developing more sophisticated technologies in the 17th, and 18th centuries.

With the arrival of the industrial revolution and mass production, the pattern was set for the new communication industries of the 19th and 20th centuries with a new role to be played in the social environment.

In this section we reviewed the inventions of the past which provided some of the basic-tools for technological advancement. This material has been introduced so that we may see how the development of writing influenced civilizations to some degree, often determining their social structures. Similarly, the structure of a civilization often has passed to another as a result of its writings and forms of measurement.

We have noted how the expectations of these technologies differed from their eventual uses which have been applied and how seemingly insignificant innovations produced sometimes enormous advances for mankind while other times serious constraints.

Contemporary Technologies:

Having traced briefly the development of a few of the discoveries and innovations leading to modern communications technologies, we will now examine the more recent applications which appear to influence directly the videotex technology. The social environment, in light of these technologies, consists mainly of the mass media. This section, therefore, is concerned with the role of the newspapers, television, and computers in Canadian society and with some of their associated industries.¹³

The Role of the Newspapers:

The newspaper industry gained a minor foothold in pre-Confederation Canada in the mid 18th century in the form of privately owned tabloids; the most notable of these was the Montreal Gazette, founded in June 1778. By 1800 there were just nine active printing establishments across, what was then, British North America. The advent of stagecoaches, in the 1830's and then steamships in the 1840's and railways in the 1850's allowed for new immigration and the distribution of newspapers throughout the more populated regions. In the decade between 1820-30 the westmost province population grew in numbers from 213,000 to 430,000, and during the 1840's Canada's population increased by 677,000 (Kesterton, 1967:10). With the 1850's and 1860's gold rushes in British

Columbia, the population increased rapidly as a result of westward expansion - particularly from the completion of the Canadian Pacific Railway from Lake Superior to Vancouver in 1885.

Two other developments about the time of Confederation (1867) also contributed to the growth of the newspaper industry. These were the conversion from rags to wood pulp for paper manufacturing and the power-driven cylinder press (actually used since the 1840's). By 1873 there were forty-eight daily newspapers across the country - over half of these were in Ontario. What is interesting about the variety of publications is the surge of opinionated journalism which emerged. "Anyone was free to launch his own journal to express his distress or forward his panacea" (Rutherford, 1928:25). For example, the Toronto reader, depending on his bias, could choose from the Patriot, the Herald, the British Colonist, the Mirror, the Examiner, the Globe and the Star (Rutherford, 1978:7-9). Newspapers not only served the individual interests of communities, they helped foster a sense of regionalism which has continued to the present.

The Press echoed sentiments of freedom, the right to speak one's mind, and was generally viewed as an essential ingredient in society. Paul Rutherford quotes the Colonial Advocate, 26 January, 1832:

that the Press is the life, the safeguard, the very heart's blood of a free country; the test of its worth, its happiness, its civilization . . .
(Rutherford, 1978:26)

Indeed, the Press of the 19th century served Canada as its predominant mode of literary expression, being the "mouthpiece" for both politicians and government critics alike. Men like George Brown and Edward Whelan (Charlottetown Examiner) and the Annands (Halifax Chronicles) in the mid 19th century, and later Thompson in the British Colonist pressed their political views on the country as did the politicians of the day. John A. Macdonald used the Montreal Gazette and Luther Holton, a Quebec Liberal M.P. used the Montreal Herald as did Leonard Tilley, Liberal Premier of Nova Scotia, through the services of the St. John News (Rutherford, 1978:27):

The early journalists regarded themselves more as public educators than reporters (Rutherford, 1978:16). The concern, even the means, for news reporting really did not emerge until the steamship and railway provided shorter travel time. The significant impact of the telegraph companies in the 1840's and 1850's provided the change in what was to become the dawn of the era of "field" journalism. No longer were newspapers responding just to events of the past - now they could provide, the same day, news reports from across the country and sometimes the world. The demand for reporters grew and a shift in newspaper format went from the rather mundane identical column typeface to varied headline and attention-grabbing techniques common to yellow

journalism in the late 1800's and early 1900's.¹⁴

Rutherford remarks that:

the renaissance of the popular press destroyed the unity of form and style and appeal that had characterized the dailies of a generation earlier

(Rutherford, 1978:49)

Whereas the basis for content in newspapers had been the personal accounts of the editor and various literary works, the influence of the brief telegraph message set a new format of short item composition which proved less demanding of reading skills. This was the birth of mass media as we know it today.

The growth of the newspaper industry remained unchallenged until the 1920's with the introduction of radio and the impact of the depression. Until that time the Press had held the unique position of serving both the mass audience and the smaller select elites, often through different publications and ownership but nonetheless, as part of the leading businesses of Canada. The role played by the Press, however, was changing. Whereas newspapers were once the medium for conveying news events, political views, and general items of interest, by 1929 it has become a medium for advertising, generating \$50 million revenue from newspapers and periodicals in that year alone (Rutherford, 1978:38).

Businesses realized the potential of a medium which boasted an average of four different publications per household by 1931. In fact this amounted to one daily

newspaper for each household, although two-thirds of the circulation was concentrated in the urban centres (ibid p.48). Moreover, economic conditions meant that newspapers had to be viewed as business efforts first. The price of newsprint almost tripled between 1908 and 1921, and the cost of the recession (1913) and the First World War further took its toll of Canada's "Dailies", leaving slightly more than 100 by 1931 compared to 121 in 1900.¹⁵

The mood of the times became co-operation among the owners, at least in the form of economic mergers, such as was shared by the Ottawa Journal and the Citizen in 1919. For other newspapers, co-operation involved take-overs where both Hugh Grayham and the Southams purchased rival newspapers to prevent further competition. This practice has again become the cause of the recent (1981) Royal Commission on Newspapers enquiry into monopoly ownership.

However, a greater control mechanism for content was the establishment of the Canadian Press (CP) in 1917 (Irving ed, 1962:21). As a news co-operative of publishers, they could prevent new entrepreneurs from entering the publishing market. The CP wire service provided further "gatekeeping"¹⁶ controls over foreign news (Associated Press) and immediate access to domestic news. In short, the newspaper industry had become a major power base in Canada.

What is now evident with the Kent Commission's (Royal Commission on Newspapers - 1981) investigation into the concentration of newspaper ownership, is the new role which has been defined for the industry. Newspaper conglomerates in the 1980's are diversifying their financial interests to include the electronic media,¹⁷ again as in the early part of the century, because of competition and repressed economic conditions. The Commission's report indicates that 80 per cent of newspaper's revenue is derived from advertising which means that the subscription cost is barely covering the expense of the delivery. This fact makes readership, or at least the lesser concerns of the reader, a second priority. Content becomes even less important just so long as there is adequate information to be worth the average 25 cent charge. When the Ottawa Journal ceased publication on August 27, 1980, there was an immediate increase in subscriptions for The Citizen. Moreover, the present distribution for the paper is up 28 per cent since that date¹⁸. The public, it seems, is conditioned to having a newspaper service for a number of reasons. First, it is the only medium which provides a permanent record since consumer videocassette and audio cassette recorders are not generally used for newscasts but rather for entertainment programme recording. Secondly, the print world can be challenged more easily than the fading

memory of a radio or television newscast¹⁹. A third reason appears to be that the tangibility of the newspaper provides a sense of barter or exchange which gives the buyer the idea he is purchasing goods rather than information. This point is further argued in Chapter Five.

Even with the concentration of ownership issue aside, the Canadian Press wire service still provides the major news-feed for all newspapers in Canada and, in fact, for radio and television broadcasters. Michael Sifton, owner of two of Saskatchewan's principal newspapers, pointed out to the Kent Commission that the journalistic staff of his newspapers almost equals the total news and public affairs personnel for all of Canada's broadcast outlets (Canada, 1981:216).

The Role of Television:

Television is a relative newcomer to Canada, being only thirty years old. When the Canadian Broadcasting Corporation (CBC) was given approval to commence broadcasting in 1952, the role of television was structured on existing policies and regulations which were first expressed in the Aird Commission's (1928) concerns with Canadian content, and the Broadcasting Act (1932) establishing the CBC - formerly the Canadian Radio Broadcasting Commission.²⁰ Like the development of most public services in Canada, starting with the canal system in the early 1800's and the Canadian Pacific Railway, television began as a publicly funded service via the federal treasury.

In terms of technical progress, Canada became the world's second largest user of the technology by 1955 (Kesterton, 1967:214). This growth continued rapidly into the 1960's with the added innovation of videotape recording which had been introduced in the late 1950's. As a production tool, the videotape recorder enabled more effective use of studio space and rehearsal time, allowed programmes to be repeated and a temporary record for future reference.

A significant factor for Canada had been the network continuity across the varied time zones. With the repeat capability provided by videotaping, the Toronto based 6:00

p.m. news programme and other network content, the Calgary delay centre was now able to re-telecast the programmes supplied by terrestrial micro-wave link at 6:00 p.m. western time (Pacific and Mountain time). This procedure assisted the Frontier Coverage Package in the late 1960's and the Accelerated Coverage Plan, (ACP) of 1974 which now provides communities with more than 500 people with a network service. These two programmes provided broadcasting for the North as well as numerous communities which were previously outside the signal reception areas of the major urban centres.

Television broadcasting, however, has not been limited to the Crown Corporation (CBC) since the independent stations had formed the Canadian Television network (CTV) linking eight cities by 1961. The competition for advertising and the attention of the viewing public became intense between the private and government networks²¹. For the Canadian Broadcasting Corporation this meant having to structure programmes to suit a general public and the interest of sponsors. The Canadian Television network, being wholly dependent on advertising revenues, regarded the Federal sponsorship as an unfair advantage in the competition for private sponsors and that the Canadian Broadcasting Corporation could receive political favours, especially during election years. The two issues which influence later

technologies are the aspect of marketing the technology, often through sponsors or advertising and the relationship between government and private industry in research and development. These two issues, as will be explained in Chapter Four, directly affect videotex and Telidon.

Television advertising has always been expensive relative to other media. In 1952 television advertising was sold by the minute with an average of four minutes per hour of programme for a cost of \$16,000. Present rates are generally \$8,500 per 30 seconds with 20 per hour, the highest rate being \$11,400 for 30 seconds in the Stanley Cup play-offs.²² Moreover, the sponsors of television programmes have been most often large corporations. The first drama production series presented by the Canadian Broadcasting Corporation in 1952 was in fact "General Motors Theatre". This is significant to the role of television in Canadian society because the development of the media content was determined by the corporate linkages between Canada and the United States. This occurred because both countries are tied to the same power grid system, that is 110-117 volts alternating current (AC) at 60 cycle modulation.²³ Manufacturers in the United States have therefore produced equipment for the Canadian market as well as their own. Television was affected directly by this factor, which became evident in the adoption of the North American "National Television

Standards Committee" (NTSC) format. This format consists of a television scanning rate for the electron beam of 525 horizontal lines, 30 times per second based on the 60 cycle frequency system. This standard, however, is different from that used in Europe and other parts of the world.²⁴ What these common technical agreements do is translate into significant economic and cultural impacts when we consider that in 1953, one year after the introduction of a Canadian network, 373 thousand households had television sets, or approximately 10 per cent of the Canadian population. By 1958, 75 per cent of the 4.05 million households owned at least one television set. Within the next nine years (by 1967) the number had risen to 95 per cent of the estimated 5 million plus, households (or 4,759,000 sets). Since 1967ⁿ the percentage has increased only marginally to 98 per cent, however, the number of households in Canada is now estimated at more than 7,807,000 (Stats. Can., 1952-81).

The data provide an indication of the market potential for hardware, that is television sets, channel converters, peripheral furniture and an early vanguard of the fast-food industry - the TV dinner. Advertising was not limited to national boundaries since the consumer products reached anyone who had access to the media. Indeed the problems identified in the Aird Commission (1928), the Massey Commission (1951) and the Fowler

Commission (1955) and the Fowler Committee Report of 1965, included the threat of American programming on Canadian identity and culture.²⁵ Since all of Canada's major urban centres are within a few hundred miles of the Canada-United States border, there were no means for preventing Canadians from "tuning in" the American broadcasts. Moreover, the cost of Canadian produced programmes in comparison to the American syndicated shows was significant. American producers tend to spend more than the average \$40,000 per half hour in Canada (this figure varies according to the type of programme), however, the cost of American production is shared by a greater number of people. Consequently, the syndicated programmes can be sold to Canadian broadcasters at lower prices - their initial cost having been covered by the United States Market (Irving, 1962:126). The resulting glut of American "pop" culture in Canada was something which few sponsors or the viewing public were concerned about until the international image of the United States grew less favourable during the Vietnam War years.²⁶

For a while the advent of Cable television (Community Antenna Television) promised some control by containing channels to a closed-circuit coaxial cable service, somewhat like the telephone system. However, the introduction of satellite distribution of television signals in the 1970's again opened up the air waves to

whomever cared to invest in the necessary receiving equipment.²⁷ Regardless of this development the cable companies have laid the communications network for the future in most urban centres. Only the telephone companies (telcos) can boast a higher penetration rate than cable's existing 87 per cent of Canadian households (Stats. Can., 1980/81).

The objective of the cable companies has been to supply a carrier service for communications - primarily for the entertainment programmes.²⁸ What has developed, however, is the establishment of a communications infrastructure for a multitude of new services and technologies, one being the Telidon-videotex system.

The second issue of government versus private industry development of new technologies is one already stated in the growth of Canada's primary industries, that is the railway system and other transportation services. Government involvement in the research and development of communication industries became firmly established with television. The zenith development is exemplified by the broadcasting of Parliamentary proceedings which after passage of the motion on January 24, 1977, began in the following Fall Session 1977 (Special Committee 1977). This role has been equally supported by the postal system and satellite communication services represented by the 50

per cent ownership in Telesat Canada - the sole agency responsible for Canada's domestic satellites.

The policy which has been set by the Canadian government's interest in industrial developments is to take the responsibility for any high risk ventures or high investment enterprises which would have otherwise required longer developmental time or foreign capital. This policy has been protected by the regulatory guidelines which have ensured both standardization of equipment, format and to some degree, the content covered under the Canadian Radio-Television Telecommunications Commission Act.²⁹ Television broadcasting has established the precedents for many of the concerns which are being presented with the new videotex technology.

The role of television in Canada is, clearly, an intricate arrangement between private and public investment dependent on the maintenance of an elaborate network system for delivery. The technology has become the catalyst for Direct Broadcast Satellites and a number of service industries including cablevision, TV guide, and the Bureau of Broadcast Management. It is this structure which influences the present videotex technology.

The Role of the Computer:

When Stanley Kubrick brought to the screen the image of an artificial intelligence bent on the fulfilment of its programme through the personified "HAL" in 2001: A Space Odyssey, few people regarded the film as more than a science fiction writer's imaginary and stimulating entertainment. Barely more than a decade has passed and computerization has been responsible for complicated voyages into space, landings on the moon, analysis of data previously too distant or vast to decipher. From the far reaches of the universe to the deoxyribonucleic acid (DNA) molecule of the human organism, computer technology is enabling us to test the reality of our theories which could not otherwise be validated.³⁰ As Einstein wrote:

In our endeavor to understand reality we are somewhat like a man trying to understand the mechanism of a closed watch. He sees the face and the moving hands, even hears its ticking, but has no way of opening the case. If he is ingenious he may form some picture of a mechanism which could be responsible for all the things he observes, but he may never be quite sure his picture is the only one which could explain his observations.

(Einstein, 1938:31, quoted in Zukav, 1979:35)

Indeed the closed container has undergone a metamorphosis, counting with crystalline accuracy the technology which has replaced cyclical time with linear progression - in this analogy, the digital watch. For the digital watch provides a picture of accuracy, the reality of the

present, but fails to give us the perspective of the past or the anticipation of the future.

The role of the computer is complex because it involves both the arithmetic permutations, in the traditional sense of the computing machine, and the replacement of mechanization in a technological framework. The underpinning technology is solid state electronics³¹ which in the form of the integrated circuit "chips" - a complement of transistors and other electronic components - provides the basic logic that serves as the life blood for the industry. The electronic monad³² is the transistor - a simple gating mechanism which is either open or closed, that is, it either allows current to pass or it blocks it (and in some cases it can be used to retard the flow of electricity).

The silicon chip is a component, indeed a critical one, in the development of computer technology. However, it is the computer which provides the blueprint for process. The computer enables automation in industry, repeated tasks, information storage, and information retrieval. What the silicon chip does for the computer is shrink the size of the device, into a form which can penetrate every other technology. The concept is miniturization and it represents a shift in attitude from "bigger and better" to "small is beautiful and efficient". It is this miniturization development which Daniel Bell

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argues is the most significant change in Western society (Bell, 1980:34). Whereas the industrial revolution portrayed wealth and progress as the number of employees in a company, the size of the factory, and the quality of the products produced - the computer society has moved everything to centralized even personalized control. The computer medium is "space bias", that is if in the words of Harold Innis, the medium is better suited "to the dissemination of knowledge over space than over time, particularly if the medium is light and easily transported" which appears to be the case, then we can expect a society to emerge which, like the space bias empires of Rome and Summeria, has a centralized government and secret laws and rules controlled by technology's "priests" (Innis, 1951:33). This may have been the scenario in the 1960's when International Business Machines Corporation (IBM) and Burroughs were very much the main industrial manufacturers of electronic computers.³³ Moreover, most applications due to the cost of computer systems, as we have pointed out, involved large volume and complex analysis of data requiring rather large memory capability.

At the time George Orwell was writing Nineteen Eighty-Four, F.C. Williams and Tom Kilburn at Manchester University had successfully tested the Electronic Delayed Storage Automatic Computer (EDSAC) (Williams, 1978:1193).

Based on the early concept of a centralized data bank and access terminals, Orwell's fears of a controlled society were within the realm of possibility. However, the development which has counteracted this movement somewhat is the microcomputer or the "personal computer" as it is now called. The "stand-alone" system does not require the services of a large scale computer network because it is tailored to the minimum and specific needs of the individual. Again this development has been made possible by the miniturization innovation which now permits the storage of 32,000 Random Access Memory (RAM) or more in a terminal less than the size of a typewriter. Yet, at the same time the personal computer can access larger data bases providing the instruction languages are compatible or adaptable. This development is analogous to the diversity of languages which was experienced in the fringes of the Babylonian and Egyptian empires. There, the people learned to adapt the language for their own use, borrowing as it were, techniques, symbols and the technologies they required (Innis, 1951:38).

What we have happening today is the competition of computer technologies, languages or protocols, which in time will result in either a dominant language being formed or a method for converting (translating) one to another.³⁴

The de facto influence (like television and radio) of the home computer industry ensures that there will be a progression towards a cellular information society rather than the centralized monitoring and control portrayed in the Orwellian scenario. It seems reasonable to expect that people using computer systems to retrieve information will behave in much the same way as conventional library users. One does not attempt to cover all the publications housed in the library - only those pertinent to his/her immediate interest or needs. Moreover, only selected works (information) need be removed for closer scrutiny, copy, or home use. Logically, it is unnecessary and expensive to maintain the same immediacy of access to all computer data.

Each of the three technologies we have discussed have had at least one major influence on society or the development of the subsequent technologies. With respect to the impacts which concern this work in relation to videotex, the social effect of newspapers has been to create a market base - a readership which serves to present and disseminate ideas and products. The industry has also shifted control from the elite clerical scribes of the middle ages to the less skilled printer - a mechanization of human skills which reached a new height of standardization with the manufacture of the typewriter

in 1873 (Williams, 1978:1270). These two influences, that of creating a market audience and a mechanized writing system (the printing press and later the typewriter), have been adopted into videotex.

Television has had similar effects in terms of impact on marketing by further developing the mass audience. Like radio, television began as an entertainment medium and is still very much regarded in this way. However, it did serve to prepare the population to seek information on a cathode ray tube (CRT/television screen), as well as achieving the market penetration, 98% of the more than 7 million Canadian households necessary for videotex to build on (Stats. Can., 1980/81:139). A side note of interest is that the electronic image on the television screen is created by a scanning pattern which is basically the same movement as the eye makes when reading a book, that is, from left-to-right starting at the top left-hand corner and finishing in the bottom right. This action is traced for 525 lines, thirty times each second. It is unlikely this pattern has any direct bearing on the way we see the image although it does reflect how we tend to structure new technologies in the form of earlier inventions - in this case writing and printing.

Computers have affected a different social influence - that of immediacy. Canadians can expect to contact each others across the country in seconds not because of the

telephone but due to the innovations produced by computer technology. The same attitude prevails for banking, purchasing, and a multitude of transactions which formerly required the development of large bureaucracies and more time to accomplish.

In the three contemporary technologies we have identified, the roles each play in society was discussed in terms of process. We alluded to the possibility that due to each technology's inherent structure there is a distinct pattern of influence emerging which can be observed in the new videotex/Telidon medium. Before we look at this new technology, however, we will review the literature on the future prospectus.

Future Prospectus:

Technological forecasting has always been the mystical art of the seer and prophet. Too frequently man has ventured into the unknown anticipating a technological or environmental Utopia only to find relatively few aspects of the prediction materialize. It is nevertheless valuable to review some of the prediction scenarios if we are to compare the first, second and third order implications of videotex.

George Orwell, Arthur C. Clarke, Marshall McLuhan, Alvin Toffler and Buckminster Fuller are but a few of the technological prophets. Few of the long-range prophecies predicted by some of these men have occurred at least not on the scale which was originally anticipated. Some aspects of Orwell's "big brother" society depicted in Nineteen Eighty-Four have emerged such as the Internal Revenue Service (IRS) in the United States and the mass communication networks. However, they have not occurred on a scale or in the same vein as was expected. The same can be said of Aldous Huxley's Brave New World which depicts a genetically engineered society. With the present computer growth it is expected within the next couple of years that the entire deoxyribonucleic acid molecule, which contains the blueprint for the human organism, will be decoded.³⁵ Selective breeding, cloning and cellular replacement are all possibilities

emerging from this one development although not on the scale that Huxley suggested.

Technology, like the behavioural forecasting which presents its dicotomous image in H.G. Wells' The Time Machine or B.F. Skinner's Walden Two, tends to be magnified and distorted to distribute the negative elements as society's predominant characteristics. An argument which has been used to explain the failure of some of these predictions is that once the image of these extreme possibilities has been presented, society is sufficiently warned to avoid making, at least, some of the mistakes.

Among the more credible literature are the "near future" predictions, based on empirical grounds. One method which has been used is the Delphi Technique.³⁶ The process involves a consensus judgement brought about by iteration, controlled feedback and anonymity of the participants. In this experiment, leading authorities and specialists are asked to rate a number of potential developments in the future as a probability factor, each being given the same information. The results indicate a high and low chance and the time-frame for the development. If nothing else this method provides a good indication of the perspectives of various disciplines and an indication of the foremost objectives in research study. It is as Karl Pribram states:

not only do we construct our perceptions of the world, but we also go out and construct those perceptions in the world. We make tables and bicycles and musical instruments because we can think of them.

(Pribram, 1981:130)

The more adamant of the futurists include Jacques Ellul and Marshall McLuhan. Ellul's technological determinist view of our present world provides a scenario in which technology does more than enable a future filled with machines and robots; rather it makes machines out of men. "Le technique" as he calls the phenomenon, permeates our very social thinking causing us to look at everything we do in a systematized and pre-conceived order. The argument is not simply one faulting man's natural curiosity and insight but is one of opposition to the deliberate adaptation of every new discovery into the technological order. As Herbert Marcus suggests:

The trend may be related to a development in scientific method: operationalism in the physical, behaviorism in the social sciences. The common feature is a total empiricism in the treatment of concepts; their meaning is restricted to the representation of particular operations and behaviour.

(Teich, 1972:82)

The notion is not unlike Siegfried Giedon's "mechanization" or Thorstein Veblen's economic determinism, however, Ellul appears more concerned with the power of conformity than technology per se. In Propaganda he extends his original postulation to include social propaganda -

the group of manifestations by which any society seeks to integrate the maximum number of individuals into itself, to unify its members', behaviour according to a pattern, to spread its style of life abroad, and thus impose itself on other groups.

(Ellul, 1968:62)

At the other end of the continuum we find McLuhan, who celebrates the arrival of communication technologies. The "global village" he predicts will arise from the new media technologies and "wired-city" advocates suggests that societies will be closer together because there will be an instant means of communication. McLuhan uses the technology, however, more as a metaphor for change - to probe our social awareness, than simple advocacy.³⁷

In the same era, Buckminster Fuller presented a number of environmental alternatives beginning with the "geodesic dome" and ending with tetrahedronal floating cities (in both water and air) as a means to respond to population growth estimates and a depleting world supply of food and energy. By the late 1970's and early 1980's the emphasis has changed partly because of pressure from the ecology activities for conservation, but also as a result of improved methods for operating machinery and technology. The so-called "me" generation concerned with personal acquisition matured to recognize the practical limits of the former ideology.

The implications of new environments produced by new technologies and communication networks will undoubtedly

have a profound effect on society. Alvin Toffler argues that much of the social unrest in recent years is the product of rapidly advancing technologies. What he describes as "the dizzying disorientation brought on by the premature arrival of the future" has been termed "future shock" (Toffler, 1970:11). This is basically the same as culture shock in one's own society; where the familiar symbols, ways of living and concepts are no longer present.

The ability for office-home communication, in terms of computer access to information for certain types of employment, may allow for community changes in which the family can operate on a cellular component basis with the rest of society (Toffler, 1980:388). If nothing else, we can expect to see a change in the roles played by individuals in the new labour market, where employment need not be tied to the office or learning to schools.

Closer to Canada, the prospects for distance relationships is emphasized by the existing telecommunications structure. In 1972, the Royal Society of Canada held a symposium on "Communications into the Home". Based on the developments in the 1960's including colour television, larger computer systems, and space travel, the predictions for the 1980's were most optimistic. Leon Katz argued that Canadians would be prepared to spend substantial sums of money on home

computer facilities which offered a variety of entertainment (Katz, 1972:49). Considering the market which had developed for television and the music industry this was a reasonable assumption. What had not been anticipated was the change in economic stability in the country or the influence of competing standards for the consumer dollar, that is, the home video-cassette recorders and video-disc systems.

Similarly, Donald Chisholm, of Bell Northern Research, anticipated greater use of television retrieval systems such as the IRTV system in Ottawa, through, which teachers could request specific programmes at specific times³⁸. The demand and introduction of low cost videotape players, however, led T.V. Ontario to approach the problem from a different avenue - that of scheduled broadcasts and a videotape loan service.³⁹

It was further speculated that "by 1985, video-phone will be a reality at a cost attainable by the average Canadian home owner" (Grafstein, 1972:142). Ten years later, it is doubtful we will see the device for another decade - if it is even necessary by then. Other predictions included that by 1980 voice usage would decrease relative to computer use of lines. Whereas there has been a marked increase in the use of data lines, voice telephone calls have continued to increase with the addition of direct

dialing to many places in the world and "packet switching", which permits more calls to be placed on the available circuits.⁴⁰

David Godfrey, in his book Gutenberg Two, suggests that the predictions made in a study by Bell Canada for social impacts of communication technologies, particularly in education, are typically ten years premature

partly because of the teaching establishment's relatively firm control of both Content and Carrier aspects of education... and partly because those who became involved in the technology early were quickly absorbed by the fascinating techniques available.

(Godfrey, 1980:151)

He cites The Film Industry in Canada: Report (1977) in stating that

it is quite likely that significant numbers of post secondary students will spend more time working at home or in small groups by 1980. Secondary students could follow by 1983 and primary students by the year 2000 A.D.

(ibid)

This scenario, however, fails to recognize other requirements of social control, and peer-group support, which are part of the educational system.

It is apparent that the computer is at the heart of most of our recent predictions, as we approach the fifth generation of computer evolution which uses bubble memories and the Josephson junction switches. As Brian Josephson, a Nobel Prize physicist, states:

A computer based on Josephson junction switches could be as powerful as an IBM model 370/168 - a very powerful machine - yet fit into a cube six inches on a side.

(Josephson, 1982:88)

Computer power has been developing exponentially since 1946. If the present technology which includes software programmes that are capable of "reading" and improving existing programmes⁴¹ "the compactness and reasoning power of an intelligence built out of silicon will begin to match that of the human brain" sometime in the 1990's (Jastow, 1978:47).

The predictions for Telidon/videotex technology are less dramatic, however. Services such as teleshopping - an electronic Sears catalogue, tele-banking - accounting at home, and message boards - for public and private use are not difficult to develop. It is because social acceptance of this kind of service already exists and the technology can provide the means.

Greater emphasis in recent symposia (Canadian Association for Information Science, Learned Societies, and Videotex '82) has been drawn to employment opportunities (in the "office of the future", information creation services, and manufacturing of equipment for this industry. In the office of the future "there will be a longer-term trend towards the reshaping of jobs and job structures, particularly as these relate to information-handling tasks" (Licker, CAIS '82).

Whereas we can observe the similarities between the various component technologies of videotex/Telidon it is still necessary to apply some theoretical models which we identify in Chapter Three.

CHAPTER THREE

Having reviewed the literature concerned with the social environment of the past, present and future we now need to define some tools to examine the Telidon/videotex technology discussed in the next chapter. The tools we have chosen for this task are concepts drawn from communication and cognitive theory.

Communication Theory:

Modern communication theory is not easily defined since there are two principal schools of thought, one which has grown out of the communication technologies of North America and the other which has its roots in earlier linguistic and semiotic studies in Europe. John Fiske has labelled these the "process" school, as most American theories relates to the process of communication, and the "semiotic" school which places greater emphasis on the meaning in communication activities (Fiske, 1982:2).

We should note, however, that this line of distinction is sometimes obscure and that there is a growing movement towards the merger of the two,¹ particularly in the area of cultural studies which requires a framework to explain both intercultural and intracultural communication (Sarbaugh, 1979:5). Since we are examining the language and the technology of Telidon both these perspectives can be applied.

Beginning with Harold Lasswell's model in 1948, we have mass communications defined as a process expressed by a linear series of questions; who says what, in which channel, to whom, with what effect? The better known mathematical theory of communication, however, as suggested by Claude Shannon and Warren Weaver (1949), presents the communication process in a linear sender-message-receiver structure. In this model the source of the message encodes the information and the receiver decodes the information. From their basic technical view of communications, a number of similar models have been proposed.

Theodore Newcomb's article, An Approach to the Study of Communication Acts (1953), offers a slightly different explanation in which two entities, either individuals or organizations, have an interdependent relationship with a third component. The third component can be the environment, or thing, or another person(s). The purpose of this triad configuration is to demonstrate how a change in any one component affects the others.²

G. Gerbner (1956) uses a similar triangular structure to define the process taking place within the individual. That is, each agent in the communication process perceives an event and expresses the meaning of the event based on his/her own abilities and values. We therefore have an event, a perception of the event, and a statement about

the event which is then conveyed to another individual or groups. Gerbner's model is not unlike that of Shannon-Weaver insofar as there is an implicit linear transfer of information. However, in attempting to provide a theory for mass communication he clearly identifies the need to recognize internal and-external influences on the creation of the message to be conveyed (Fiske, 1981:31).³

A somewhat different theory is suggested by Charles Osgood who provides a two-way feedback model in which the originator of the message can also become the receiver (Osgood, 1957:228). As such, the person or "interpreter", as he prefers to label the person, can perform both the encoding and decoding of the message. This model reflects Osgood's notion of the process, which he defines:

In the most general sense we have communication whenever one system, a source, influences another, the destination, by manipulation of alternative signals which can be transmitted over the channel connecting them.

quoted in Schramm, 1973:298)

A more complex, and perhaps more complete view of the communication process is suggested by B. Westley and M. MacLean in which they include a fourth element - the "gatekeeper", a term originally coined by Kurt Lewin (1958).⁴ Their model includes three perspectives of the

process, which are advocacy roles - those involved in the deliberate selection and distribution of information, behavioral system roles - which include the users of the information and "channel roles" - which are played by the gatekeepers (Schramm, 1973:299). Consequently, the Westley-MacLean model is particularly suited for the study of mass media and its numerous channels of communication.

Still another model evolving from the process school is presented by R. Jakobson (1958). As a linguist, however, he tends to bridge the gap between the process and semiotic schools (Fiske, 1981:36). His model is a basic linear structure involving the addresser, the message and the addressee. Where it differs from the earlier Shannon-Weaver and the Osgood models is in the addition of the contact - or physical and psychological channel and the code or language used by the participants. Jakobson further argues that each of the factors (content, message, contact, code) determines a different language function which, like the constitutive model, can be described in a similar format. The emotive then describes the relationship of the message to the addresser - one's emotions, attitudes, et cetera. At the receiving end of the functional model is the conative or effect on the receiver of the message. The message itself has four functions. The referential is concerned with the accuracy, the phatic deals with the confirmation of the

message by its redundant elements or variation to maintain the contact, the metalingual with identifying the particular code being used and, finally, the poetic function which, in McLuhan-like fashion, provides a metaphor (Fiske, 1981:38).

All of these models can be considered when examining communications technologies since they serve to define the process within the practical structure of the technology. Where the process analogy is less convincing is in the analysis of the content. For this purpose the European based theories offer a different approach, which is likely the product of an older history of language and cultural differences among its societies. The basis for these models is semiotics - the study of signs and the role they play in society. Within the discipline are three areas of concern - the types of signs which are used to communicate, the codes or ways the signs are arranged for meaning and the cultural context within which they are used.

The American logician and philosopher, Charles Peirce is regarded as the founder of American semiotics. He explains his theory of meaning by a three-way relationship involving the sign, which stands for something - usually the object, the object to which the reference is made and the "interpretant" - being the person. In this sense, Peirce's model of the elements of meaning are not unlike

those expressed by the British linguists C. Ogden and I. Richards in which a similar triangular model is presented (Ogden & Richards, 1923). Their concept of meaning links the referent (the person) directly with the reference (the thought), just as the symbol is also tied to the thought due to a causal relationship. The variable in the triangle is the imputed relationship which exists between the symbol and the referent, a relationship which in their view is not the foremost concern. In this respect Ogden and Richard's element of meaning are similar to those of Ferdinand de Saussure.

Ferdinand de Saussure, the Swiss linguist, has also been credited with the founding of semiology (semiotics) in the early part of this century (1915). His primary interest was in language and more specifically in the importance of the sign, which includes words, for communications. For de Saussure, the sign is composed of the signifier - the image, that is, the marks or letters of a word, the audible sounds in the air, and the images we hold in common - and the signified which is the mental concept to which the sign refers. He then argues that with the combining of the signifier with the signified (the physical sign with the mental concept) we give significance or meaning to something in the external reality. However, de Saussure retained focus on a theory

and left the problem of effect to his followers concerned with semiology (Fiske, 1981:49).

Among these semiotic/linguistic models there is the mention of signs and symbols as main actors, Peirce attempts to clarify the distinction by writing:

every sign is determined by its object, either first, by partaking in the character of the object, when I call the sign an "Icon"; secondly, by being really and in its individual existence connected with the individual object, when I call the sign an "Index"; thirdly, by more or less approximately certainty that it will be interpreted as denoting the object in consequence of a habit... when I call the sign a "Symbol".

(Zeman, 1977 in Fiske, 1981:51)

In other words, a photograph or graphic drawing of a house is an icon. Whereas a house or a car is an index for man's domain, mode of transportation or wealth. The symbol, however, only relates to the object by convention or agreement. Such is the case with words, the Arabic numbers system and roadway signs using the colour red or a hexagon for stop, and the colour yellow or a triangle for yield.

Most of the American "process" models place the communication emphasis on the interaction, that is, the channels which are available for both interpersonal and mass communication. Shannon-Weaver's mathematical model considers the effect of noise or interference on the communication. Noise in this case can be technical interference, such as static, or interruptions from other

people including verbal and non-verbal information. The intent is clearly to identify the participants and plot the flow of information. Only Gerbner appears sufficiently concerned about the interpretive aspect to include the concept of two alternating dimensions - being the perceptual and the communicating.

The strengths of the process school which concern this thesis are those of identifying how the Telidon information can reach the public, the roles previously identified by the various media, and the actors involved with the technology, that is the creators of the messages, the gatekeepers, and the users.

It is, however, the semiotic school models which promise to be more useful in our analysis, simply because we have identified the importance of the images presented by technologies in the past. Moreover, if we are to understand how meaning is derived in this process it becomes essential to link these theories with those on cognition.

Semiotics is an inductive study of the world, and consequently we require some empirical tools to support this perspective. These tools are content analysis, which provides measurable responses to media like television, radio, and publications⁵; the other is a systematic taxonomy such as that presented by L.E. Sarbaugh for the analysis of intercultural communications. His approach

concerns the homogeneity-heterogeneity of the participants in transactions. This propensity view is not uncommon to either school of thought where mass communication is involved. Sarbaugh argues that:

Communications efficiency will be at the highest end of the continuum when direct channels are used by dyads of participants who perceive the relationship with the other as symmetrical, encompassing mutually positive feelings towards the other, and involving mutually shared and compatible goals; and the intent of the other is perceived as one of helping; having similar views of the nature of life, purpose of life and the relation of man to the cosmos; who know and accept the other's normative patterns of beliefs and over behaviours; and who share a common code system.

(Sarbaugh, 1979:47)

Very simply, this structure evaluates the quality of the communication and to some extent, the probability of its effectiveness.

These communication models can provide some insight into how videotex, as a technology, assists information and communication flow. The structuring of the information, that is the encoding, is explained more by the "semiotic" models. To further understand the motives and influences which occur we turn to the theories on cognition.

Cognitive Theory:

Kurt Lewin is regarded as the founder of the American cognitive theory school having pioneered concepts of field theory and life space (Schramm, 1973:203), although the field theory concept was first presented by K. Buhler (1908), as the interdependence between new information and existing information - the field. Lewin's work provides us with new insights in consistency theory widened by Newcomb's communication model which was described in the previous chapter, and in fact spurred a following in cognitive theory.

The process of thinking has been described by Dorwin Cartwright, a social psychologist in this field, as beginning with a message in the environment (acceptance or rejection based on sense organs), which may then be accepted as part of a person's cognitive structure (based on general categories to which it appears to belong). If the information which is presented, however, is inconsistent with the person's cognitive structure one of three things may happen; the information can be rejected, it can be distorted to fit the cognitive structure, or it can produce changes in the structure. It is the last two possibilities which will be used, in part, to support the researcher's thesis.

Cartwright presents these concepts to explain crowd behaviour and mass persuasion using four variables:

- (a) A given action will be accepted as a path towards a goal only if the connections "fit" the person's larger cognitive structure.
- (b) The more goals that are seen as attainable by a single path, the more likely it is that a person will take that path.
- (c) If an action is seen as not leading to a desired goal or as leading to an undesired end, it will not be chosen.
- (d) If an action is seen as leading to a desired goal, it will tend not to be chosen to the extent that easier, cheaper, or otherwise more desirable actions are also seen as leading to the same goal.

He further suggests that to produce a set reaction, an appropriate cognitive and motivational system must gain control of a person's behaviour at a particular time.⁶ Moreover, the more specifically defined the path of action in a motivational structure the more likely we can expect the pattern to influence behaviour, and similarly, - the more precise the timing and situation created, the greater the control of the given motivational structure. These concepts attempt to explain the why's of human responses rather than the how's covered by stimulus-conditioning theory of Edward Thorndike (1932), operant-conditioning theory advanced by Fred Skinner (1957) and similar drive-cue-response reinforcement theory of Clark Hull (1934) and E.R. Guthrie's contiguity-response theory.

It was Fritz Heider, another scholar from the cognitive school, who advanced the concept of a natural propensity towards cognitive balance or inner consistency in human thought (Schramm, 1973:203). Both Cartwright and F. Harary provided an elaboration of Heider's theory to include any number of relationships, not just between two people. The converse to this notion is cognitive dissonance as developed by Leon Festinger, which attempts to explain why some information may be rejected by our senses or why individuals will often continue to seek information to support their decisions.⁷ The theory also explains, to some degree, behavioural changes or attitudinal changes of the participants.

In light of these theories Wilbur Schramm suggests that the process of learning must involve the introduction of some new element to the cognitive structure. The processing for this information, as Cartwright informs us, determines its suitability for the existing structure - basically, whether the information is accepted or rejected. Clearly, the lesser the difference in the nature of the concept from one's existing beliefs the more likely the new information will be accepted into the structure. When the situation does not permit other

choices or the new information cannot be refuted it becomes necessary to re-structure one's views (Schramm, 1973:205-8).

More specific theories which concern this study are centered around semantic memory and visual imagery. Of those which attempt to explain semantic memory, three have been selected for this work; they are space models, network models and set-theoretic models.

Componential analysis, that is the grouping of things according to some category or relationship is used for the space model. In this structure there is a tendency to group information, particularly objects in the environment, in various mental clusters. For example, colours are grouped according to hue (violet-purple, orange-red-crimson, yellow-tan-bronze) rather than by brightness or saturation (Fillenbaume et al, 1971). Similarly, such clustering of objects tends to enable us to discern whether a bench is more like a table than like a stool. Other groupings use sex, age, size or any number of commonality criteria on which to base the selection. Whereas the space model proves suitable for colours and relationships, it is weak where meanings for words tends to confound the issue, or where the phrasing of the question leads the individual to a particular association (Osgood et al, 1957).

Empirical research on the space model has been limited to storing and retrieving information by linear ordering, that is, by testing the time interval required to associate pairs either as adjacent or remote pairs such as A/B, B/C and A/C (Potts, 1975). The findings indicate that remote pairs are stored in memory as well as adjacent pairs and therefore the process is not simply that of repeated deduction (Restle et al, 1975:249). This hypothesis is further supported by experiments which test the recall interval of semantic associations such as "A collie is a dog" versus "A collie is an animal" (Collins and Quillan, 1969) which if deduced from linear ordering would require different response times. Again, the results show that the most common association, being the first statement, is more quickly recalled (ibid:263).

Network models are represented most frequently by an hierarchical tree structure of sets and super-sets of Bird and Mammal. The set of Bird can then be broken-down into associated concepts such as "birds can fly" and sub-sets of that set which identify types of birds - each differentiated by a semantic concept like "Robin - has a red breast", and "Canary - is yellow" (Collins, 1969). However, as the previous space storage concepts argue, this ordering is useful only in a systematic ordering of information. The semantic distance represented by "A dog is a mammal" has proven less valid than the frequency

principle which holds that the more often the word association is made the faster the recall will be for that particular concept (Rips et al, 1973).

The third model is the set-theoretic model of semantic representation. This concept differs from the mapping storage concerns of the space model in that the set-theoretic model explains the linkages from cluster groupings to sub-sets and elements arranged in the Collins and Quillian hierarchical model. D.E. Mayuer and B. Schaeffer and E. Wallace argue that concepts which share elements of descriptive features and properties, and names of super-sets and sub-sets form intersecting sets. Whereas, robins are a sub-set of birds such that "all robins are birds" a different relationship exists with the categorizing of women and lawyers (Cohen, 1977:18).

Visual imagery in thought is another concept which offers a tool for examining recent visual media. The debate as to whether a symbolic system can mediate thought or not is still ongoing. J.R. Anderson and G.H. Bower (1973) suggest that:

the pictorial images which we subjectively experience do not function in thinking, but are only a kind of mental embroidery, or epiphenomenon which illustrates, but does not mediate, the thought

(Cohen, 1977:26)

This view sees visual information as being stored in an abstract coded form which is not accessible to the consciousness.

Some words provide associated mental images such as flag, cake, dog whereas, abstract concepts often do not have clear images (ibid:28). The Naive-Realist or Radical Image school of thought argues that the images of a flag et cetera are stored as mental pictures. The popular belief, however, is that these things are stored as impressions and abstract concepts and therefore must be created as mental structures with a conceptual symbolic description rather than sensory images (Anderson and Bower, 1973).

The classic example of distinct visual memory is the situation involving patients with "left" or "right" hemisphere brain damage. In the case involving left-brain damage patients have difficulty recognizing words (and often will have speech impairment) although they are able to recognize symbols and pictures. The same phenomenon holds true for right-brain damage such that pictures are difficult to recognize and words are not (Corsic cited by Milner, 1971:22). Further evidence supporting this visual memory hypothesis is provided by a case study in which a Japanese patient in California with left-brain damage lost the ability to read Kana, the phonetic characters, but was

still able to read Kanji, the ideographic characters (Sasanuma, 1974 cited by Cohen, 1975:39).

Karl Lashley, a physiological psychologist, put forward the notion that memory is somehow distributed throughout the brain. More recently, Karl Pribram, following in Lashley's footsteps, has advanced the concept to provide the holographic model of memory storage based on the concept of interference wave fronts produced by the graded potential changes in neurons.⁸ As with a holographic film plate, the information can be reconstructed from a mere fragment of the original storage medium (Pribram, 1982).

Cognition appears to vary, however, and development goes through several stages in our lives from childhood to adulthood. The "schemas" or mental structures are different for each stage and are representative of the perspectives that children, teenagers and adults have about the world. Information is therefore processed and stored differently at different ages depending on the "memory traces" which have already been established (Piaget, 1973:12-23).

It is the author's contention that the theoretical underpinnings of Telidon/videotex technology can be founded in communication and cognitive theory since the technology employs a method for communication and the

means for ordering and storing information for later use.

We have identified a number of models which attempt to explain, from the process school perspective, how information is distributed. The relationship and meaning of message for communicators is supported by the semiotic school. Together these perspectives offer a framework to look at Telidon and other communication technologies.

Cognitive theory provides some insight into the potential effects of the technology in terms of how we perceive information which is to be encoded and that information which is presented, via the medium, to us. We have presented models which describe the criteria for communication to be acceptable in cognition centered on theories for semantic memory and visual imagery.

CHAPTER FOUR

VIDEOTEX AND TELIDON

In this chapter we will examine the technology in its basic form, look at the Field Trials being conducted, and present some of the criticisms of the technology.

Introduction:

We previously noted that videotex or Telidon has been used to denote a new technology which integrates the power of television with the computer. The two names, however, are not interchangeable and require further definition.

The term videotex is the generic name for "public-accessed interactive information retrieval services" and has been adopted internationally to include all services which provide the two-way/interactive capability, independent of the medium carrying the information, that is, telephone wires, coaxial video cable, fibre-optic cable or micro-wave/laser beam (Bown et al, 1978:1). The name has evolved from the fact that the predominant display medium is the television screen (cathode ray tube) and the common content is alpha-numeric text - hence video tex. All videotex formats, including Prestel (Britain), Antiope (France), Captains (Japan), and Telidon (Canada), provide the interactive ability which

means that members of the public should be able to request information via a terminal or key-pad, as required, and when required.

The term teletext refers to a similar service although it should not be confused with videotex since it is the broadcast version of the technology. Teletext, like television broadcasting, is uni-directional. In this mode a person is selecting information from a limited schedule the same as if each television station were to continually broadcast the same programme. By changing stations it would be possible to select different information, however, the schedule is fixed and the selection considerably more limited than the two-way videotex mode.

The third term to be defined is Telidon, and although it is used to refer to the Canadian videotex standard, it is actually the protocol or graphics language of the Canadian system. The name has been coined from the Greek tele and idon and means "viewed from a distance". Although the term has become synonymous with the technology, we will segregate videotex and Telidon so that the implications can be more easily identified.

Telidon as Protocol:

Telidon is a particular computer language, as we have already established. More specifically it is a way of seeing things for the computer, and as was suggested earlier, it is what Watanabe terms the "recognition of information".¹ The Telidon protocol is structured on a graphics paradigm using what are called "Picture Description Instructions" (PDI's). Picture information in this format is presented on the basis of geometric shapes or alpha-geometric coding - that is, a point, line, arc (circle), rectangle, polygon et cetera.²

The television screen (cathode ray tube) creates the visual image by a scanning process which projects a light beam of varying intensity on the back of a phosphor screen. The spot size of a cathode ray tube beam typically varies from 0.015-0.02 inches in diameter (Godfrey/Chang, 1981:105). In the case of monochrome (black and white) sets this picture is created by the tone or intensity of the beam alone - hence the creation of shades of grey (black to white). Colour television is created by the beams of three primary colours - red, green and blue and/or the combination of their hues. A total of 525 horizontal lines are traced out on the phosphor screen beginning at the top left-hand corner and finishing at the bottom right as we look at the image. In order to create graphics in this medium either each point on the screen

must be identified and located as raster points³ so that a mosaic of light dots is created to form the picture (as is the case with the Synchronous⁴ method in Britain) or, the horizontal scanning lines are built up to form the image in a layered manner; this is in effect what the television system accomplishes. However, if we imagine a round ball as a series of horizontal lines, beginning with a point and increasing in length, each centred below the previous line until the maximum length of the diameter is obtained and subsequently followed by decreasing lengths until the lower single point is reached, it becomes evident that the process is complex. The total number of points becomes quite cumbersome and the number of dots and lines varies according to the resolution of the television standard and the particular set. This resolution moreover varies from 256-1024 horizontal lines depending on the format (NTSC, PAL, SECAM).⁵

The "Picture Description Instructions" of Telidon, define the same object as a circle (actually as a series of arcs) with a set radius whose centre is located at a particular point on the screen. This is clearly a faster and simpler method than the mosaic or layered approach, although each geometric shape or combination of shapes must be described and constructed separately until a complete graphic is created.

The advantage of this picture recognition format is that the computation required to create and transmit the information between two points (terminals) is greatly reduced. The technique resulted from computer graphics research in the late 1960's and early 1970's conducted by the Federal Department of Communications' personnel of the Communications Research Centre Division at Shirley's Bay, near Ottawa.⁶ The areas of investigation concerned the use of telephone lines for data transmission and the limitations of the existing visual displays, that is, the cathode ray tube.

Both of these media represented severe limitations for computer graphics. In the case of telephone lines the rate of data transmission is limited to the capacity of the copper wires or the rate at which impulses at given frequencies can travel through the medium. Noise interference on telephone lines will disrupt the transmitted data thereby affecting signal quality and reliability. This factor severely impedes the transfer of picture graphics which typically requires a thousand times the capacity of voice signals. For example, if there is interference or distortion on the telephone lines when each point of the ball analogy is being constructed on the screen, the missing information can be critical to the completion of the image. Whereas, the Picture Description

Instructions only require a few key messages to be transferred - namely the geometric shape and location.

This is a relative argument, however, based on the comparison of two distinct methods. The key messages of the Picture Description Instructions can still be considered complex for the untrained operator as Fig. 1 exemplifies. The typical sequence of instructions required for simple two dimensional line drawing of a house and scene must be entered on the Information Provider (IP) terminal or the picture creation console, in the specific sequence the operator wants the picture to take shape when someone requests the image later.⁷

A term which is becoming common place in the computer industry in recent years is "user friendly", which means the computer language of instruction is simple to learn and use.⁸ This point is addressed more specifically in the following section from the standpoint of the naive user and general public. Still, we should note that from the perspective of the computer programmer or the information provider who constructs the computer image, the instructions required in the house example are not complicated but do require a sense of ordering of the spatial components.

The parameters set for the construction of these computer graphics include a set format of what has been called Telidon "pages". The page is the full frame of

Fig. 1

Example: House Unit;
DISPLAY

```

EG( SET WINDOW(0,0,1.2,1.0),SET FILL(2),SET_COLOUR(240),
    MOVE(0,0),RPOLY(0,1.2,0),(.45,-.45)),
    MOVE(0,.45),SET_COLOUR(300),RPOLY(0,1.2,0),(.55,0,-.55),
    SET_COLOUR(180),CIRCLE(1.0,.85,.1),
    TREE(.92,.35),TREE(-.05,.2),
    SET_FILL(2),SET_COLOUR(0),MOVE(.25,.6)RPOLY(.3,.3),(.15,-.15),
    SET_FILL(2),MOVE(.3,.35),RPOLY(0,.5,0),(.25,0,-.25)),
    SET_COLOUR(120),MOVE(.3,.35),RPOLY(0,.5,0),(.25,0,-.25)),
    MOVE(.62,.68),RPOLY(0,.07,0),(.07,0,-.09)
    SET_COLOUR(0,100),MOVE(.36,.45),RPOLY(0,.1,0),(.1,0,-.1),SET_COLOUR(0,0),
    MOVE(.36,.45),RLINE(0,.1,0,-.1,0,-.05),(.1,0,-.1,0,-.05,0,1)),
    MOVE(.6,.35),SET_COLOUR(0),RPOLY(0,.1,0),.15,0,-.15)),
    SET_FILL(0),SET_COLOUR(180),CIRCLE(.63,.42,.01),SET_FILL(2),
    MOVE(.2,.02),RPOLY(.3,.1,1,-.09,-.2),(.2,.13,0,-.2)),MOVE(.5,.5)
) &
END:

```

(Godfrey/Chang, 1981:159)

the television screen or the cathode ray tube display. More exactly, it is composed of the 525 scanning lines in North America (NTSC) with 8% to 10% loss due to technical adjustments of the particular television set and signal loss due to the broadcast mode.⁹ Moreover, the boundaries set by the Telidon page are consistent, that is, the information content will always be proportional to the screen area, regardless of the size of the cathode ray tube (5", 12", 19" television screens or as 3'x4' or larger video projections).

What has been established by extensive experimentation is that the maximum number of characters (text) which can be presented in this manner is approximately 40 per line including punctuation and spaces, and 16 to 20 vertical lines. Some sources, however, indicate as many as 20-24 lines are possible (Bown et al, 1979); this field offers about a 120-word display. Whereas these limits clearly prevent the direct adoption of the book and newspaper page, they do demand a closer look at the information and the methods for maximizing the information to be presented. Since as Cartier suggests:

Alphanumeric layout design treats the page as a mental space and as a recording surface that has to be organized on the basis of three levels: space, time and colour.

(Cartier in Godfrey, 1981:139)

Indeed, the Picture Description Instructions appear to offer some solution to the limitations of the textual format by identifying the content with images such as the weather map, industrial logo, or a picture of the commodity being described. In addition, the definition of the graphics is not written into the programme but is dependent on the quality (resolution) of the display medium, just as the same television programme appears differently on low-cost television sets and expensive studio monitors.¹⁰ The design approach used in Telidon has ensured a bridge for the changing industry by anticipating the higher display quality predicted to be available in the future.

However, the Telidon protocol is a language, which can be learned and used. The entrapment of this language which is not immediately apparent, is the fixing of the database which might otherwise be encoded.¹¹ Once information has been described by Picture Description Instructions it becomes difficult to analyze specific areas of the graphic. Moreover, there can be details which are available in the original database but are deemed inappropriate for the Information Provider to encode. The style of the graphics becomes standardized by the geometric primitives. This results in a forward progressive method like television, which allows a colour signal and a monochrome signal to be displayed on colour

television sets. The backward decoding, however, is simply not possible, that is, presenting the colour picture on a black and white set. The necessary components are not there to explain the colour signal.

The approach taken presumes that the primary concern is the technical quality of the picture - the intensity of the colours and the clarity of the picture since little attention has been given to the fluidity of the images. Telidon graphics, in spite of occasional sequential component change such as blinking arrows or step-frame motion, are not sophisticated animations like those used in recent science fiction films. The latest Walt Disney Productions animated film is Tron which contains about 1,100 computer generated special effects. This represents only 20 to 30 per cent of what can be expected in the next five years (McLeans Magazine July 1981, p.42).

First, the transmission rate limits motion on the Telidon page. As with film and television, the animated motion is created by presenting 24-30 frames (pages) per second. The Telidon-page creator sees this requirement as an extravagant use of pages of information for the sake of one second of motion, or in more noticeable figures 1440-1800 pages per minute of animation.

Secondly, the Telidon-pages are not created with the notion of continuity, at least not as we have come to expect in cinema and the television media. The linkages

need be obvious only to the user who decides to select a sub-category or even totally separate subject areas, connected by his/her personal interests or incites. Each page stands alone with the limited information that can be packed into the frame area, unless the subject matter such as alphanumeric text demands a sequence, or due to the "tree structure" or "key word" index format. The focus of page creation is on content and form and not process.

In terms of practical applications, this approach reveals a bias towards the visual sense and more particularly to the alpha-numeric text which often accompanies the computer graphics. As Ryan points out, "acquiring information from the alpha-geometric display on the Telidon terminal requires a certain set of visual perceptual behaviors" (Ryan, 1981:319).

To further understand the language of Telidon we should examine briefly the organization or indexing method used to locate specific pages. In the tree structure method, most commonly used, main categories are identified much the same way as an encyclopaedia is set up. For example, a city's entertainment schedule might indicate five specific categories of Movies/Cinemas, Dancing/Dining, Concerts, Exhibits, Sports Facilities. Each category would then have a follow-up page indicating more detailed information, in the first case - the names and locations of the theatres or the title of the films

followed by the location and times of showings. A fourth page might include a brief review of the film (this could be extended for each film). Depending on the subject or category, the branches could become extremely numerous and detailed with as many as 10 to the power of 11 address possibilities (Phillips, 1979).¹² Similarly the cross references for other sub-categories in this method require a form of notation or call number.

The format requires a shared understanding of the written language, both in syntax and vocabulary if everyone is to locate the same information. The approach is decidedly systematic and requires some training in how information can be categorized and linked together in the system.

The key word method for information indexing identifies critical words in the text such as subject headings or concepts which can be located in the pages. An example would be the word Telidon which when searched in the file would produce all the articles or passages in which the word appears. Usually this method involves a second or more level of key words which when combined with the primary word provides a precise retrieval of the information requested. The additional words serve to discriminate the more general references from the detailed material on the topic. Such words as social, implications, and Canadian would help in identifying

the particular reference to Telidon. The problem identified with this approach is that not everyone uses the same key words and the search may still not produce the required information. Unlike the "tree structure" method, it is not possible to backtrack one step to search another branch of information, since each search is a computer scan of the entire data base. This method, however, has its use, particularly for the naive user who needs only to have a general idea of the subject material and is prepared to survey more information than may be required.

A third method, which has not been fully tested at this point, is the pattern recognition of icons or predesignated graphics. Basically, symbols and logos would be included in the page creation stage which in some manner would identify the subject material. The Maple Leaf Canadian flag - identifying government publications, corporate logos of the Bay, Simpsons and Air Canada, can all be located in this way.¹³

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Videotex as Technology:

Videotex, as we previously stated, is a generic name for two-way interactive information systems which use monitors and/or television receivers to display computer stored information. To some degree it is what one person has referred to as a "carriageless horse" or the engine capable of pulling a yet incomplete and undesignated array of commodities (TV Ontario, 1980). More precisely, videotex is the means and vehicle for transporting a new format of information, in Canada's case it is Telidon.

The idea for videotex originated in Britain with the introduction of "viewdata" (now Prestel). As the name implies, the purpose of the technology was to observe information in an alpha-numeric format - that is print. Although the service did not differ greatly from "Telex" - the trade name for Canadian National and Canadian Pacific Railways (CNCP) Telecommunications service or similar formats which enable messages or data to be sent from one place to another for business transactions using a typewriter system, viewdata was designed for public use via home television sets. Both the British Broadcasting Corporation (BBC) and the Independent Television Corporation (ITV) developed systems - Ceefax (1972) and Oracle (1973), both broadcast teletext systems, which paved the way for the British Post Office's "Prestel"

protocol videotex format. Britain was the first country to establish a commercial videotex service in the world, with an estimated 100,000 television sets equipped to receive "teletext" by the end of 1980 (Canada, 1981:188).

France entered the videotex race for somewhat different reasons. The French government recognized the cost of publishing revised telephone directories during the 1970's when the French telephone system was undergoing a complete overhaul and rapid update of telephone listings. Both the interactive Teletel electronic telephone directory service and the teletext broadcast services use a protocol called Antiope which, like the British Prestel format, is based on an alpha-mosaic description for computer graphics.

Most of Europe's industrial countries have announced similar efforts in the past few years based on one of the three protocols (Prestel, Antiope, Telidon), however, Japan although technically ahead of most competition in this field has been forced to cope with the complications of the Japanese written language which involves some 3,500 characters or symbols. The writing speed or response time is therefore considerably slower for the Captain format than its western competitors.

When the Canadian videotex format was formally announced in August 1978, it was not simply a band wagon reaction to the international information market. The

Department of Communications personnel had observed the methods being used by the European developers and recognized that the vast distances and climatic conditions of Canada demanded other safeguards for information transmission. The Canadian government was persuaded to establish its own standard using the Telidon protocol, based on the facts that the superior graphics format and the country's communications infrastructure would support this new technology.¹⁴

A second argument for developing a Canadian videotex service related to the "National identity" issue - as a further indication of Canada's technological competence in the world market place and a protection against simply importing another foreign industry.¹⁵ The question of responsibility for development was underwritten again by the Federal Government because of its direct research commitments with ^{the} Communications Research Centre and the precedents identified in Chapter Two.

Four years later, the decision to support its development appears to have been a sound decision. The American Telephone and Telegraph (AT&T) Corporation formally committed the United States market to a standard based on Telidon in May 1981. Given the history of the development of North American television the choice would appear a simple follow-up step; however, as has been demonstrated by International Business Machine's (IBM)

interest in developing combined protocols (Prestel and Telidon) for its European markets¹⁶, the race is far from over.

If videotex is the vehicle for transporting graphics and textual information we should first examine the roadways of the Canadian communications infrastructure for they will determine to some extent how and where the technology is employed. There are three primary methods for delivering electronic communications to the home - the telephone cable network, the video coaxial cable system and the broadcasting of frequencies through the air. From the engineer's perspective these amount to closed-circuit systems (telephone and cablevision) and open-circuit systems (radio and television). All other methods such as microwave, fibre optic cable and direct-broadcast satellite constitute variations of these methods.

The telephone cable system consists mainly of a pair of copper wires which provide the two-directional flow for information - for the most part voice communications. Canadian made 1,020 calls per capita in 1978 using over 15 million telephones. In comparison there were 46,100 subscribers to telex and TWX systems¹⁷ (Canada Year Book, 1980/81:599,616). The frequencies which can be carried by these wires are limited; however, it is the rate at which information can travel through the medium

which concerns videotex applications the most. In other words the response time for the retrieval of information and the formation of graphics is slower than by other carrier methods (coaxial cable, optical fibre et cetera). The advantage of the Canadian telephone system is that 98% of the country's households have telephone service. There are an estimated 64.3 telephones per 100 population which translates into multiple locations within a residence or office building that can be used as videotex terminal locations (Stats. Can., 1980/81:616).

Another industry relevant to videotex system's development is the cablevision service. In little more than a decade, cablevision has a 52% of the population's households subscription rate. Moreover, 87% of the population can be reached by cable using secondary linkage services such as microwave and satellite distribution.

The initial purpose of the cablevision network was to provide a means of supplying a large number of television stations in highly populated areas where interference from competing transmissions or poor atmospheric and environmental surroundings limited antennae reception. The industry began in the 1960's with Master Antennae Television (MATV) facilities which were capable of distance reception from American and other Canadian metropolises however, the first cablevision services dates from 1952 in Canada. By processing and amplifying the

signals, the cable company could redistribute a number of stations on a single coaxial cable thereby providing a new consumer service for television entertainment.

The secondary linkage technologies of microwave and satellite communications have now replaced the need for large receiving antennae (and subsequent high-powered transmitters). Both of these innovations use a focused beam of energy directed at a parabolic receiving dish to provide the interconnection formerly served by cables. Satellite communications is really just an outgrowth of the terrestrial microwave relay station. Instead of providing a number of relay points to catch and forward the information signal because of the curvature of the earth, the geo-stationary satellite provides a point which can be accessed directly and clearly from all parts of Canada, and many other places in the Western Hemisphere for that matter.

We should clarify at this point that although microwave and LASER¹⁸ beam communications are generally sent through the air, these are still considered closed-circuit systems since they involve a point-to-point linkage.

The rapidly developing technology of fibre optics is similarly impacting on both telephone and cablevision networks. Instead of copper wires and multistrand wire/foil coaxial cable, the hair-thin strand of very pure

glass fibre uses light (LASER beam) instead of electricity, to carry the communication frequencies through the cable. So efficient is the technology that one strand of glass fibre carries up to "4,000 voice conversations, hundreds of millions of 'bits' of computer data, and up to six TV channels at the same time" (Kent, 1981:194).

The fact that communication satellites can relay a signal which may be received by a number of earth station receiving dishes is due to the diffusion pattern of the return signal from space the same way a search light illuminates a large area the further the distance is from the light source. By the same laws of physics, the intensity or strength of the signal decreases with the distance so that southern portions of Canada receive a stronger signal than the Northern regions.¹⁹

The alternative method for signal distribution has been broadcasting, as established by the radio and television industries. The broadcast mode of videotex is called teletext, and like the radio and television transmissions it is a one-way process.

Each of the 30 television frames transmitted per second contains what is called a Vertical Blanking Interval (VBI) which appears as the solid black line which sometimes rolls the picture if the vertical hold control is adjusted. Within the Vertical Blanking Interval consist lines 1-21 of the 525 scanning lines.

Most of the lines are used for control information for the television broadcast. However a few of these lines (line 15, 16 and possibly 21) can be used to transmit the Telidon information. Teletext is limited in this fashion to between 200 or 300 pages of information which are continually broadcast as a cycle, during regular television programming. Any more pages than this number requires too great a delay time for the user in fact 12-15 seconds has been established as the acceptable wait time for most people using the system (DOC experiments 1981). The Telidon decoder then enables the selection of these pages as the package is repeated.

The third aspect of the technology is the method used to display Telidon information in the home. Three elements are required: the display cathode ray tube (television/monitor/), the Telidon decoder which converts the teletext or videotex data into a conventional television radio frequency (RF) signal or as a component Red Green and Blue signal); and the command control mechanism - usually a calculator type keypad with numbers and a few function symbols, or by a typewriter-styled keyboard for more complicated text creation. By pressing a sequence of numbers, specific pages of information can be displayed on the screen. In turn, these pages provide the additional information and call numbers to locate other data.

Field Trials:

Commencing in March 1979, with T.V. Ontario, the first of some 20 operational field trials and commercial videotex services began in Canada. The purpose of these trials is twofold. The primary objective has been to test the delivery methods for videotex under various climate and technical conditions. The second objective has been to evaluate the potential market for the technology and the public response to the medium.

From Table III in the appendix, we can determine that the majority of these field trials involve the telephone companies (telcos) of Canada in some capacity; 16 different companies to be specific. The next major interest group is the cable companies. Finally, the third interest group is the often obscure "third party" newspaper syndicates. We will discuss briefly the concerns of each of these groups in respect to the "carrier" technology, that is, the mode of communication used to convey the information.

Perhaps as a result of the telephone companies' existing network structure, the most common method for videotex delivery is by telephone wire and "packet switching" techniques.²⁰ Project IDA (Manitoba Telephone) (Alberta Government Telephones), Project Vista (Bell Canada) to name just a few, involve over 96% of the 3,000 terminals. The telephone companies are interested

in demonstrating a new technology using their existing and recently developed carrier systems. Under CRTC regulations they are not licensed to provide the content of videotex other than through subsidiary organizations which offer a data base service, or like the French teletel interest, an electronic telephone directory including yellow page advertising. Project INET is the closest Canadian version of this concept.

Regardless of the content, the telephone lines can be used and therefore revenue can be generated for these companies.²¹ Bell Canada and other telecommunication enterprises also realize that unless they establish ways to serve the visual medium in some way, eventually the cable companies could be in a position to offer the same or better communication services. This thought may be the reason why Project Elie (Manitoba Telephone) using optical fibres and Project IDA (Manitoba Telephone) using coaxial cable are also being tested.

What should be pointed out here is the corporate influence held by the telephone companies; an influence which has international implications. When the American Telephone and Telegraph Corporation (AT&T) announced their support for the Telidon protocol it was with qualification.²² What was accepted as the American standard was actually a slight improvement on the basic Telidon format. Their videotex Presentation Level

Protocol (PLP) an enhanced version of Telidon, was then adopted by Canada and become known as DOC Technical Note 709 in a joint North American Videotex standard.²³

The cable companies, on the other hand, have approached the videotex service as a supplement to their existing entertainment package, much the same way as some companies now offer a surveillance, home-protection alarm service via the coaxial cable system. Since more than half of Canada's households have cable service, it is not surprising to find four trials in this operating mode.

Another format is presented in the City of Calgary Field Trial, Project Infocable and Premier Cablesystems as an open channel service, very similar to the coloured text bulletin board system which has been displayed for several years now. The open channel concept, however, allows for a designated channel of Telidon information. Even teletext can provide over 4,000 frames of information in this manner.

The third interest group is composed of the newspaper publishing syndicates. As publishers of information their interest in new forms of publication, and videotex falls in the category of electronic publishing, is not surprising. Indeed, Infomart (and Telidon Videotex Systems, the United States subsidiary of the company) - the principle marketing agency for Telidon, is jointly owned by Torstar Corporation (the parent company of the

Toronto Star) and Southam Inc., Canada's newspaper giants. Similarly, Thompson is the owner of Info Globe which is a division of the Globe and Mail (Kent, 1981:199). Moreover, Infomart and the Manitoba Telephone System introduced Grassroots, the first commercial videotex service in North America. This commercial venture which began in May, 1981, provides a variety of stockmarket prices, weather information and livestock reports for Manitoba's farmers.

This pattern, that of the newspaper industries' move to include electronic publishing via videotex and other text display means, is even more prevalent in the United States. There, the Times-Mirror corporation and Infomart in California and the Times Inc. Teletext trial which is taking place in Florida and California.

The Department of Communications has recently let five research contracts to evaluate the Field Trials across the country. One contract is a synthesis to evaluate all aspects of the trials, whereas the other four are to cover each of social, economic, technical and content aspects. When these reports are completed, sometime in March 1983, we can expect to see some of the findings of the trials, at least on a limited scale.

Claims and Limitations of the Technology:

The main argument which presents Telidon as the most advanced videotex protocol in the world is founded in the alpha-geometric encoding process discussed earlier in this chapter. Indeed, the picture quality presented by the Picture Description Instructions does enable more detail to be displayed with less effort than the European Antiope (France) and Prestel (Britain) alpha-mosaic method. Both government and private industry representatives promoting the Canadian videotex hardware, and the Telidon format in particular, are convinced that the superior graphics format and consequent page creation methods provide broader application possibilities than could otherwise be expected.²⁴

There are a number of marketing myths, however, which should be examined. The first of these is the claim that the Canadian Telidon system is an interactive graphics system which permits Canadians to retrieve page information on their home television set with the addition of a Telidon (Norpak) decoder or, with additional equipment, exchange information with other users. What is not explained most often are the trade-offs that is, the cost factors or the ifs which facilitate this scenario.

In order that conventional television sets can be used for Telidon page display the videotex/teletext signal must be further encoded into the National Television

Standards Committee (NTSC) standard radio frequency (RF) common to the broadcast transmissions. This conversion limits the resolution capability to less than 3 Mega Hertz (MHz) or approximately 240 horizontal lines - considerably less than the monitor/direct Red-Green-Blue drive which is commonly used for the Telidon Trials and demonstrations.

Converting standard receivers to a monitor unit is possible and could even instigate a new service industry, however, the average cost has been estimated at \$300. Electrohome Corporation, the foremost supplier of the Telidon Trial monitors, estimates they can provide both the Telidon decoder and the monitor/receiver for a few hundred dollars more than the conventional television receiver,²⁵

As with most manufactured products the price is expected to decrease with quantity. Similarly, based on production figures of 100,000 or more, Norpack, the original supplier of Telidon decoder hardware, expects before long to be able to sell the decoder for \$300 whereas 1982 prices are over \$1,000.²⁶

The second aspect of the technology which is somewhat misleading is the concept of interactiveness. Telidon and videotex permit an operator with control of an Information Provider terminal (IP) to create pages which can then be stored in a main computer. Both the operator and anyone else with a standard user system connected to

the same facility can then retrieve the information. What is established is a common viewing space like the television programmes which are broadcast; everyone can see the identical information (providing they are tuned to the same programme). Moreover, messages or electronic mail can be sent in this manner, by each participant depositing his/her page into the main storage computer. What is to be developed still is the facility for a common visual space thereby enabling the participants to create page information at the same time, on the same page while viewing the other's contribution as well as his/her own.²⁷ Research in this area is under way at the Communications Research Centre. However, like the marketing war being waged by the manufacturers of videodisc and consumer videotape recorders, the issue becomes a question of what constitutes control of the information. Selecting programmes is equally flexible using a videodisc player if there are sufficient numbers of recorded discs available, otherwise the recording capability has the advantage over the play only systems since it allows selection, storage (recording) and retrieval.

The marketing strategy, it appears, has followed the same lines of development as television broadcasting, the music record industry and videodisc players. Each of these technologies depends on a highly specialized group

to package the information and then disseminate the content to the public by simultaneous broadcasting or by facsimile distribution.

More important is the fact that promoters of Telidon/videotex are using the technology as an ultimate technological medium to do everything and anything we wish to do with information. Telebanking, that is banking via a home terminal, teleshopping, electronic mail, video games, Computer Assisted Learning (CAL) are possibilities which the industry's officials claim to be only a few of the many services slated for videotex.²⁸ This amalgamation of technologies is what Lewis Mumford pondered when he wrote of the communications media:

What is needed is a technology so varied, so many-sided so flexible, so responsive to human need, that it can serve every valid human purpose. The only true multimediuim remains the human organism itself.

(Mumford, 1970:298)

Clearly, Telidon and videotex are not providing any new services, only a repackaging of former methods for handling information. Where this repackaging will become significant is in the competition between the on-line videotex and the one-way teletext.

The service provided in the closed-circuit videotex mode is much like any other on-line computer system where there is a link between a terminal(s) and the host computer facility. The database in most computer systems

is accessed and used in a somewhat different manner than the Telidon database. In fact the Telidon file looks more like an audio-visual library, with its overhead transparencies, photographic slides and graphic drawings than the alpha-numerical or textual display and storage in computers and book libraries.

The question which arises is - to what extent can we expect to see encoding/decoding terminals in the public's homes? Not everyone uses typewriters or requires them to conduct their lives and business. Similarly, the total interconnection or wired city which videotex propogates presents numerous technical problems involving the carrier modes we have discussed, storage capacity of the Telidon data, and the maintenance of such an enormous system. In addition there are the questions involving privacy safeguards for personal information, whether there should be standards and censorship of the information, and the economics of information packaging and distribution.²⁹

With the telephone system the service simply replicates and extends the human communications. Short of the electromagnetic conversion of sound waves into electrical and electronic impulses, the system remains relatively free from interpretation. The Telidon medium requires the addition of another stage of information conversion. This involves both human interpretation and the selection of which information is to be presented. In

the videotex mode, or more precisely in a system consisting of numerous page creation³⁰ terminals, there is the question of whose information is best to use.

Teletext, or "broadcast videotex" as it is sometimes called, on the other hand has been sorely ignored in comparison because of its one-way transmission limitation. When the Ontario Educational Communications Authority's T.V. Ontario network began broadcasting Telidon "pages" in January 1980, the purpose was to test the technical limitations.³¹ The results indicated that the format would work effectively, yet was at a disadvantage for capacity, that is, the 200-300 pages would not provide a great selection. Similarly, work began in early October, 1982, with the Canadian Broadcasting Corporation's (CBC) Project Iris, which involves transmitting the Telidon signal in the Vertical Blanking Interval of their regular television broadcasts.

In both cases the network's personnel may have overlooked the second order effect of the technology, comparing instead, the characteristics of teletext with closed-circuit videotex rather than with broadcast television. What should be considered is the relative usefulness of a limited number of people having access to thousands of pages of information versus thousands of people having access to a few hundred carefully selected

pages. This argument can be extended further if we consider the fact that in both modes, that is videotex and teletext, a decoder and keypad or terminal is required. Within each terminal, (possibly a home computer) is an ever-increasing memory capability which continues to improve each year as the cost inversely changes with the capacity.

The possibility which can now be addressed is that of the broadcaster's potential to transmit, via terrestrial high frequency transmitters or even Direct Broadcast Satellites (DBS), a continuous stream of teletext encoded information. In this manner, scheduled packages of information can be grabbed by the individual's terminal in the same way we would now select a television programme. This down-loading approach for the storage of data in a personal computer is essentially the same technique used in video-recording or audio-recording programmes from regular telecasts.

The concept of Telidon delivery by Canada's proven mass distribution networks appears sound, however, the Royal Commission on Newspapers (1981) Report points out that:

By the end of 1980, with fewer than one out of every 10 Prestel sets in homes, BPO authorities abandoned the home market in practice, if not officially

Where an estimated 100,000 television sets in Britain were

capable of receiving the Prestel teletext signal, the question which must be asked is why has there been so little interest from the public, and what, then, does this behaviour indicate? (Kent, 1981:188)

In comparison, Canada can expect to have between 10,000 and 50,000 small computers and several thousand Telidon terminals in Canadian homes within the next three years (ibid:194). Clearly, the volume is very low in comparison to Britain's and France's effort, and compared to the use of other electronic media in Canada. For example, from 1953 to 1958 the percentage of Canadian households with television sets increased from 10 to 75 per cent, representing more than 3 million television sets sold (Stats. Can., 1953, 1959).

In this chapter we have examined the development of the Telidon protocol and the more general videotex delivery system as a two-way interactive format and in the broadcast teletext mode.

The subtleties of page creation were examined in the format of a language for the reproduction of picture graphics. The protocol was compared to other world formats so as to present the advantages argued for the Canadian format. However, the limitations of this computer language appear to be veiled.

The videotex technology section further elaborates the purpose and methods for delivery, particularly those

involving the telephone companies, and cable companies. Specific Field Trials have been reviewed with attention to the business interests behind these applications.

What remains to be considered are the influences made in terms of specific claims for the technology, which are not completely accurate when applied to the larger context of general or common use in Canada.

CHAPTER FIVE

In Chapter Two we identified a number of technologies and innovations which have enabled the development of Telidon/Videotex. In this chapter we present the implications which result from the past and present technologies in order to draw perspective on the arguments put forward by several leading experts in this area of communications technology. In conclusion the researcher, drawing on specific communication and cognitive models puts forward his own ideas and notions on this area of technology.

Synthesis of the Literature:

Throughout this work we have evidence of the impact of writing on civilization. Whereas, the intended use was that of record keeping for quantifying commodities and items of barter, the innovation soon became a tool of social control in which the scribes were to serve as an elite oligarchy. These early gatekeepers of information were the medium whereby history was both interpreted and written in the vein of the ruling head of state or spiritual leader.

For the masses, writing became an intellectual constraint rather than a means of education. Indeed, for the common man, writing served to segregate and maintain a social order based on others interpretation of laws

and messages.¹

The possibility of thousands or millions of people having the capability of reading and writing a language, let alone owning their own books and libraries, could not have been imaginable. Writing, for early literate man, was a medium for communication in the present and entertainment - using events of the past.

The third order implication, that of the structure of the written word in forming the way history would be recorded and ideas expanded, is an effect which has maintained its influence for nearly 5,000 years. The linguistic structures of different languages attest to the concepts and things deemed important to that particular culture. The written word has served to provide the mechanism for comparative translation and recognizing the culturally bound significance which only becomes evident when many translators read the same work and arrive at a consensus of meaning.

Systems of measurement similarly have affected man's development. Early methods of time and space measurement were practical tools for survival. Both of these aspects of measurement provided a method for planning the near future - how much time remained to achieve a goal and how much work would be required.

The practical result once again became a means for comparison and segregating men; only in this case the

effect was one of standardization - of both the work and people. In many instances, especially the earlier civilization, the measurement of time was a form of social control. Astrologers, high priests, pharaohs and kings all used measurement in some form to bring order to the masses.

The symbols and roles established were far reaching, however, monolithic structures, pyramids, and aqueducts remained to evoke awe long after their builders were gone. In effect, measurement, like writing for the author, created a type of immortality in the minds of future generations - the inescapable, thought inspiring, message of greatness. Mechanization of time, indeed, brought about a standard way of looking at work, at least in the western world where the industrial age first took hold. Not until Einstein's theory of relativity were we to once again accept, like earlier men², the notion of multiple times depending on perspective. For the most part, measurement had caused man to become more aware of minute details and the methodology of scientific study.

Precise timing and proportionate measurement followed similarly, through the processing of minerals and purifying of the base metals. Even after the discovery of writing the exact formula for combining many elements was held secret within the apprenticeship of the craft, unwritten and veiled in allegory and ritual, particularly where metallurgy involved manufacturing steel for weapons.

Indeed, metallurgy was a practical science which provided gold, along with other precious metals, and the harder metals for tools and weapons.

For nearly 3,000 years the second order impact was simply for tool-making and small machines. With the industrial revolution came the mass production of wire, and structural components made of iron and steel, for use as building materials. The concepts involving the process of refinement and use of these metals, however, has remained much the same; there is merely a larger production yield and number of combinations available with modern technology.

The unforeseen influence has been the re-combination process and attention to impurities within compounds. Without scientific study of the effect impurities have in compounds, transistors would never have been produced since it is the dopant or impurity which changes the electrical characteristic of semiconductor devices. The same influence has resulted in the development of plastics, insulators, and glass products ranging in application from cookware to fibre-optics.

Being more recent history, the development of mass communication media is somewhat easier to appreciate, though we encounter the "emic" versus "etic" standpoints articulated by Kenneth Pike³ - that of attempting to study behaviour and effects from within the cultural

phenomenon rather than from outside (Pike, 1959:37).

Newspapers were originally introduced in Canada as tabloids, privately owned and reflecting the particular views and topic preference of the owner. The purpose was to provide a select audience with general interest items from local gossip to literary works. For the most part, the early tabloids served to provide one of the many linkage mechanisms in society that of a "web of cross-membership", in this case - party supporters represented by the readership (Porter, 1979:24). As we iterated previously, newspapers formed a basis for public education.

With the evolution of the transportation systems across Canada and low cost newsprint from wood pulp, the general purpose changed to an information consensus which was abetted by the common source Canadian Press wire service. The second order impact was one of making and marketing news information for the public. Whereas, the third order effect has become the routine scheduling of information as a daily event, in a given predictable format. What is perhaps most significant about newspaper distribution is its wholesale effect on the way we treat information. As was suggested earlier in Chapter Two, the concept of barter exchange has been with us for some time, indeed Innis' staples theory supports the notion that we have a nation of exporters and importers.⁴ The

newspaper industry has bridged the gap between the valuation of books - the storehouse of knowledge, and everyday public information which has traditionally been verbal. The who, what, when, where and why journalist formula for news investigation, provided the first commercial means for using information as a commodity.

Television's influence has been quite different, although, superficially, both media appear to provide news information. Canadian television began as a spill-over from American entertainment programming. Variety shows, dramas and the "situation comedies" of the 1960's provided the backbone for the networks. The news and weather programmes were, for the most part, little more than verbal announcements of the printed newspaper reports.⁵ The pattern had been established by radio announcements in the two previous decades; television, therefore, merely allowed the public to see who was announcing.

The second order effect of television has become the routine established by the scheduling of popular programmes and the formula used in the structure of news and public affairs programmes. Television viewing is, moreover, an integral part of many Canadian and American lives clearly widened by the fact that the majority of highschool-aged children have spent more time in front of a television set than in school.⁶ The third order symbolism established with the medium is the cognitive

association made of the television screen as a source of information and entertainment. This effect can be labelled a type of behavioural conditioning in which the public comes to expect news in a set pattern of presentation and at a given time or times. Moreover, the credibility of the information presented often relates to the icons presented. Ratings for the viewing audience will vary according to the credibility of the station's anchorman even when the news source is identical.⁷

When computers were first introduced they were viewed as large and expensive calculating machines. The engineers of the 1940's could not imagine the same power of a computer that filled a room with racks of equipment condensed into a terminal that can be carried in a suitcase. Computers were originally built to automatically handle mathematics permutations - giant number crunchers. Businesses, industry and a public who continues to want new and better machines, however, has brought about a market place for the new computer technology.⁸ In Canada and western societies there is some form of computer technology involved in every aspect of our lives even if it only involves the census or Departments of National Revenue and Health and Welfare. These are the realities of the second order.

The implications, which our modern-day seers suggest for the future, focus more on the potential impact -

as positive or negative scenarios for the social environment. The more subtle influence on how we come to perceive information technologies is far less studied. Computers and computer terminology are continuing to occupy more of our work and consequently our thoughts. Except for the information scientists and the programmers involved with the inner workings of the technology, the image which is visible is the compact machine - the terminal or display medium.

The Telidon machine is all of these - it is mankind's language, his written expression, the product of his points of reference - the size, magnitude and form produced by standardization and the by-product of his chemical alchemy. Yet the uses may be as varied as the people who use the technology. The experts in our society who can provide some clarification of the issues are the Telidon engineers, the policy makers, the research scientists, the systems specialists and the broadcasters.

The Experts' Views:

The technical perspective for Telidon and videotex is linked to both the economic realities and the technology policies of Canada. When Douglas Parkhill, Assistant Deputy Minister for the Department of Communications, responsible for the Telidon Programme Office argues the need for Canada to aggressively market "the best videotex system in the world", he is reflecting the policy objectives set out in the Industrial Policies Committee of the Science Council of Canada (1979),⁹ and the concerns expressed by the Consultative Committee on the Implications of Telecommunications for Canadian Sovereignty (The Clyne Committee). Parkhill identifies the need for a structure in which the electronic highways, one being the Telidon/videotex network linked by telecommunication systems, do not favour one particular organization (Godfrey, 1980:73). Moreover, the structures which currently exist will have to undergo some changes,

... the current CRTC policy which treats cable companies as broadcasters is nothing more than a temporary aberration that soon will be consigned to the garbage dump of history. When this happens, at least for interactive TELIDON services, cable TV companies will become carriers subject to the same regulatory rules as the telephone carriers.

(ibid:83)

Parkhill's view stresses the need to place the new technologies in a stable regulatory framework which still

permits flexibility while maintaining some guidelines for operation. In terms of the Government's role in the new videotex technology he states:

To date what we've been concerned with the Telidon programme in Canada is creating a basic industrial infrastructure that would make it possible for us to play any role at all in this new field.

(Parkhill, July 6, 1982)

In essence, he adds that we potentially have with the Telidon technology is an "intelligence amplifier" which serves to access a multitude of information formats; it can provide the convenience for making transactions via the telecommunications network, access to educational pedagogs and even other computer programmes. None of these roles can be carried out, however, unless private industry is convinced there is a marketplace for the technology. The particular relationship which has emerged can be summed up by his comment:

considering the miniscule amounts of money that Canada has put into this /Telidon/ in comparison to other countries we could have got nowhere if we hadn't had the closest collaboration between government and industry.

(ibid)

One of the foremost persons who has helped develop this infrastructure and rapport with industry is Herbert Bown, sometimes referred to as the "Father of Telidon". Bown suggests that Telidon has succeeded in achieving public attention compared to the videophone because it offers a

"common visual space".¹⁰ Like the telephone network the Telidon-videotex medium provides the interactive element for information flow, which will eventually permit the possibility for the barter of services between individuals - "I'll teach you Spanish if you'll provide a sketch of my new living room" (Bown, 1982:171). Just how government agencies and private carrier corporations will tax the users of the technology has yet to be determined. Clearly, if the public is to enter a new era of cashless interaction some new source of revenue will have to be established for governments to survive.

Although Bown admits to the reality that what we have presently is a "common viewing space" with Telidon, somewhat like television, on-going work at the Communication Research Centre and other research in private industry will afford the total interactiveness of a common visual-working space in the future.¹¹ The third revolution presented by Toffler will see Telidon, Bown suggests, as -

a total integration of all media and all systems: two-way communication; full exchange of information in alphanumeric and high-resolution graphics; common visual space networks; Telidon that talks to all computers; overall communications systems for voice, data, video, text; the user as information source. And all available in one device that will fit in my hand.

(Bown, 1982:171)

Gordon Thompson addresses the question of information economics more directly. For Thompson, the realities of the videotex/Telidon structure mean that the teletext

broadcast will be difficult to provide billing beyond a flat rate, just as the television broadcast operates.

Whereas, with videotex service, via coaxial or fibre optic cable and telephone lines and packet switching, charges can be levied on a unit basis or monthly rate, in the same manner as the telephone and cablevision companies presently bill their customers (Thompson, 1979:viii).

There are, however, two fundamental problems facing the videotex/Telidon technology. The first is that "information technology is inherently different from industrial technology". The concept of a centralized machine serving a whole country or even an entire city presents too many logistic problems - even the telephone system is incapable of handling all calls during peak holiday periods of the year.¹²

For this very reason, Thompson argues that the limitation of the industrial development of technologies such as videotex is the inability for individuals to convert labour into capital directly, other than by creating a better "mousetrap" (ibid:7). His primary contention, therefore, is that it is both necessary and possible to redirect the commercial underpinnings of our society from the "staples tradition" of the past to the information marketplace of the future. There is a requirement, moreover, for society to place its faith in knowledge (Thompson uses the term - information), as a

marketable commodity he calls the "ethereal good".¹³ An ethereal good then is defined by Thompson as:

one that is not tangible, is not expropriable and can be copied for less than the cost of the bona fide version

(Thompson, 1981:1)

Information, music, books and many other things can be replicated at a surprisingly low cost. Indeed, the consumer has already adjusted to the advantages of off-air pirating of music and televised movies as well as photocopying segments of books and articles which, theoretically, are protected by copyright law. However, Thompson identifies that this interaction between information technology and our socio-economic system is only a first order impact. The higher order impact involving the "transformative class of interactions"¹⁴ is somehow ignored when we consider electronic mail, pay television and electronic transfer of monies - basically "just new ways of doing old things rather than new ways of doing new things!" (Thompson, 1979:20).

Telidon can therefore provide an opportunity "... to discover links in this society that we would otherwise never find".¹⁵ In this case, Thompson is referring to human friendships established by linking people with common interests via the Telidon terminal. The further implication is that "this technology allows a society to reconsider the basic ways in which it stores its

information" (TV Ontario, 1980).

Graham Spry, who for many is considered the "Father of Canadian Broadcasting", has continued through his career to act as social conscience for the past fifty years of communications development in Canada. From the pioneer days of the Canadian Radio League, later to become the Canadian Broadcasting League, to the present he has maintained a vigil on the implications of both foreign and domestic influences on the quality of Canadian broadcasting.¹⁶ The Telidon/videotex technology represents more than the reality of television - "people being entertained to sell a product", since "broadcasters are very much in the business of selling audiences" otherwise they could not afford to continue operation. Spry suggests that if Telidon is to develop in the same manner "this will result in the most massive centralization in human history" - centralized by market services and/or in state power (Spry, 1982).

Perhaps these views are all too extreme, however, either in a negative or positive perspective. Whereas, the possibilities exist for an "all encompassing" medium which serves as a gateway interface for other media, Telidon has its practical limitations as Marcell Wein of the National Research Council's Computer Graphics Division points out: "Telidon coding is a communications channel which happens to be linear", in other words the information

in the database is encoded for practical purposes in the protocol language. There are and should be other languages to serve other needs. What we are witnessing currently is the struggle among competing technologies and formats - "new standards only develop after the dust has settled" (Wein, 1982). Telidon, in this sense, has emerged from the test tube a little prematurely.

Application of the Theoretic Models:

☛ In chapter three we identified some theory models which have been used to explain the human communication process and the process of cognition. Similarly, in Chapter Four, we segregated the Telidon videotex technology into two parts which identify Telidon as a specific protocol language which can be tested in terms of its "message characteristics" as a communications format and in terms of its cognitive role. The videotex system, likewise, can be studied for its content carrying efficiency in the communication process and for its "referent importance" in society.

Telidon, as a language, requires a syntax composed of the Picture Description Instructions which must be learned in order for the individual to create his/her own graphic content. The structure is set by the sequence presented in the block-building approach to the construction of the graphic. The effect, therefore, is somewhat like a cross-word puzzle which requires the viewer to guess at the missing elements in the iconic sentence. This process can be considered stimulating if, and only if, the user of the technology has a complete understanding of the visual language. It can be further argued that the protocol is therefore "culture bound" since symbols and predominant forms will be those deemed most easily identifiable to the information provider.¹⁷

At present, Telidon is a language which involves the masses, that is, it operates in the same way as a news programme, television show or music release - by mass appeal. The graphics composition must be easily identifiable, attractive to look at (pretty colours), and reflect the existing media structure.¹⁸ The second element of the protocol is really an add-on. It is the printed text which is the written language itself, and follows the form established by newspaper and magazine advertising. Where the two are combined to provide a complete message in which the visual images are identified in a specific context and the missing explanation is augmented by the visual message, we have information which can be distributed to most of the population as mass media.

Both Gerbner's and Shannon-Weaver's models of communication accommodate this linear transfer of information in which the information provider creates (encodes) the concept in an appropriate medium which can be understood (decoded) by the mass audience.¹⁹ The Westley-MacLean model is an even better process model for studying Telidon, because it clearly identifies the gatekeeper role of the information provider who determines what information is to be presented in which colours and for whom.²⁰ This is the case with teletext especially but is also true of videotex until there are sufficient information provider terminals to permit an interactive

feed-back function.²¹ The individual using a Telidon terminal is provided with a "look but don't touch" philosophy.²² The feed-back message, as was suggested earlier, is limited to a consumer-response interaction which is much less direct than the telephone as a communication medium. Even the written text falls short on effectiveness because the television screen is not the best medium for displaying large quantities of the written language.

If we attempt to find suitable semiotic models to support the technology the problem becomes even fuzzier, since North Americans have tended to accept the images presented on television as representative of society. This after all is a logical assumption if we hold to the notion that consumerism, that is the response to advertising, controls the content of the media.²² The Telidon protocol is, after all, a visual medium; it does not include oral messages. However, our limited understanding of the role of the visual media is exemplified by the lack of consistency when dealing with the colour coding of Telidon pages. Vista experiments and those conducted by the Department of Communications indicate there is still controversy over colour combinations and the assignment of colours for meaning.²³ Such issues appear trivial and yet provide some evidence that the icons already established in the composition of

the graphic information for Telidon pages and other media are understood and accepted by the majority.

How the protocol reflects or influences our thinking is still another question. Cartwright's model strikes at the most important long-term issue - that of the effect the images presented have on human cognition. Clearly, if the Telidon pages provide information which is consistent with existing formats there is a greater likelihood of the message being accepted.²⁴ The same can be said of the sequence used in selecting the available information. If items of information are not located where they are expected to be, the user can expect to have difficulties accepting the situation.²⁵ Heider's original concept of inner consistency suggests a model which demands greater control of the access of computer stored information if it is to offer new cognitive patterns. The display medium will have to offer a wider scope of images if it is to provide the function of a mental "one-armed bandit" capable of presenting randomly linked concepts and images.²⁶

The cognitive influence which appears more realistic, however, is the pattern established by behaviourism. Our willingness to adapt and use the technology will depend most likely on the perceived benefits of using the medium. If the content proves redundant, difficult to read, and costly compared to other methods then there is little

reason, to subscribe to this format.²⁷

The preoccupation modern society has with the re-ordering and conversion of information from one format to another suggests that we are concerned more with the form and medium than the message or content.²⁸ It is not surprising therefore, that Telidon attempts to offer a multi-medium which replicates, to some extent, the capabilities of television, overhead projections, and books and newspapers.

Videotex as a communication system presents fewer difficulties with respect to these models because it complies with other information carrier systems, indeed, utilizes all the formats currently used for data, voice and picture distribution. If we test the effectiveness of Telidon/videotex in terms of Shannon-Weaver's model it can be considered fairly efficient. There are visibly three components at work encoding-transmitting-decoding with a means to protect against noise or external interference.²⁹ The difficulties arise, however, if we attempt to consider all people since only a small percentage of the population can at present provide the encoding or sender function relative to the receive capability. As with the application to protocol, the Westley-MacLean model establishes that there is a gatekeeping control element presented by restricting the information providers to specific institutions. At this

Stage of development in the industry the fundamental reason in economics rather than politics, the cost of information provider terminals is at least five times or more that of the decoder/monitor facility.³⁰

Perhaps the most important model to look at with respect to videotex is Jakobson's. The "contact" element he suggests is a physical and psychological channel which is established between information providers and even between the man and machine. This notion is supported, in part, by Wisenbaum's experience at the Massachusetts Institute of Technology (M.I.T.) where he found that after a short period of time individuals established an almost personal conversation with the computer which they regarded as private (Suzuki, 1982).

The particular role to be played by Telidon/videotex or any personal computer utility, moreover, has still to be determined. The union may develop in a similar manner to the automobile which has had far reaching consequences in terms of support industries, lifestyle, and significant symbols. Ogden-Richards' model not only identified the relationships among man, his artifacts and his thoughts but can be used to explain how, in this case, the object (Telidon terminal) can become another referent (the person). The second half of the communication dyad - the intelligent terminal - can be both a channel of communication, if someone else is involved, or merely

a mirror. As a reflection of one's thinking, there must be some change in cognition. "Self-consciousness, introspection, mirror conversation developed with the new object itself" became evident with the advent of mirrors (Mumford, 1962:129). In the case of Telidon/ videotex and more precisely the personal computer we are looking at a potential medium that not only "mirrors" our thoughts but can link them - perhaps in new and different ways.

If and when Telidon facilities are sufficiently numerous to become a common place object we can expect to find much of our mental time to be absorbed, in one way or another, with the medium. A pessimist might argue, as did Socrates, that society may become mentally dependent on the technology using it as it were to do our thinking. The optimist will argue that, if nothing else, the technology offers variety and a means to do old things differently.

Third Order Implication:

Under different circumstances Telidon/videotex may not have developed until the latter part of this century or even the beginning of the 21st century. However, since the component technologies were readily available Telidon has arrived - perhaps a little prematurely. Nevertheless, the fact that there has been as much attention given to the technology as there has indicates a need to find some solutions especially for the "information explosion" in Western society.

The greater part of North American culture is literate, and Canada in particular is among the better educated societies of the world.³¹ With the ever increasing number of publications, including professional journals and books, each year we are reaching the stage where it is no longer possible to maintain information on what has been published without the aid of computers. Neither can we physically reproduce and disseminate all the published material to everyone's satisfaction. The available natural resources, manpower and economics of the matter prevent this occurring. Nor is it possible for one person to read all that is written as was once the case.³²

In 1947 Innis gave the Presidential Address to the Royal Society of Canada. In quoting Hegel, he states: "Minerva's owl begins its flight only in the gathering

dusk . . ." that is, a new civilization and culture only emerges as an older one decays (Innis, 1951:3). Perhaps we are now at that point where literacy, at least the medium used for writing, is curtailing the development of society in other directions.

The advent of the telephone, radio and television again shifted Western society back to an oral tradition, at least in part. For a few decades considerable attention was given to the format of the media until it too has become an accepted and predictable part of our lives.

What has not developed is a suitable means for linking the various communications media or converting an aural medium into a visual medium, a visual medium into a tactile medium and so forth. Neither has our technological society been very successful in adapting new media to the varied applications, usually because the economics of converting the system for small numbers applications is not profitable for the developers. It is fair to say that man has continued to be sufficiently flexible to adapt to these inconveniences. The limited psychological research conducted with Telidon/videotex to date has concentrated on the adaptability of the individual, especially the naive user, in an attempt to establish the best design interface for operation of the equipment.³³ Other studies by academic and research institutions have focussed on the human limitations, that is the minimum acceptable conditions

permitted by the users of the technology, given the technology as a fixed constant.³⁴

At present, Telidon is competing not only with other media for public attention but also with other videotex formats. It is unlikely a contest of this type will be successful for all interests in communications technologies. What appears to have been ignored by the promoters is the "gateway" function which can be served by videotex/Telidon, provided there is some international co-operation in which the policy makers agree to open some of the legal barriers involving the various videotex formats and television standards.³⁵ Such co-operation is, however, somewhat doubtful considering the high financial investment, and the history of competing technologies, and manufacturers.³⁶

The more likely implications therefore, is that the Telidon protocol will cause society to consider from the public's perspective, rather than the computer specialists', how we select information, what information is really necessary and when to use it. This simply means that Telidon or some future product of Telidon will again set the stage for the new social order. The mere existence of Telidon/videotex provides the symbols for thought, it has after all inspired this thesis.

CHAPTER SIX

CONCLUSION

At the onset of this work we stated that the Telidon/videotex technology could be grounded in a historical and social context. We established that the basis for the technology had, in fact, evolved from the fundamentals of writing, measurement and the discovery and refinement of minerals. Each of these innovations produced ideas and methods which have carried through to the present day. Moreover, the bias of each period prevented societies from perceiving the long-term impact of their discovery.

What became important for societies was form and technique which could be applied in new settings using new tools. The paradox which developed, however, is that the dissemination of communication technologies soon exceeded the ability of society to respond to the innovation. This has resulted in the misapplication and mislabelling of some of these discoveries.¹ What have been termed communications tools are sometimes only the product of the process, yet have remained locked into the rôle and form set by the parent technologies.

The relative importance each technology holds is based on its usefulness and ability to provide control - of the environment and society or other men. The knowledge gained from these innovations has been carefully guarded in the

language of the technology, the people's culture and the artifacts produced. Telidon is not just hardware or technology but a way of seeing and defining information. As a protocol, a language, it has its limitations, in fact it is space binding - not because of the potential network made possible by videotex but as a result of the new communication order which it could bring about; the new linkages created by organizing various formatted information. McLuhan may have been correct in predicting a "global village" but not for the same reasons. Rather than everyone being able to contact anyone, we may simply find that society will again become restructured into small communities of common interest groups - spread throughout the world.

We stated in the beginning of Chapter Two that Telidon/Videotex can be described as a marriage between two major technologies, that is television and computers. It would be more accurate to describe it as the off-spring of such a marriage since the technology possesses some of the characteristics of both parent technologies; yet it represents a totally new technology which has a long development ahead. As Toffler has stated: "technology feeds on itself. Technology makes more technology possible" Furthermore, he argues, "Technological innovation consists of three stages, linked together into a self-reinforcing cycle. First there is the creative idea. Second, its

practical application. Third, its diffusion through society." (Toffler, 1970: 26-7).

The practical applications today involve the creation of a network and marketplace. In this respect the technology is dependent on the financial market and will undoubtedly experience the problems of growing up in the media family. As Bell suggested, the concern with social impacts is to predict how society will and is changing. The elimination of "insulating space", that is the time to digest these innovations and contemplate society's direction, is to prevent room for growth.²

Throughout this work we have alluded to the notion that the new generation of information technologies does more than create new ways of doing things, "they alter man's total intellectual environment - the way he thinks and looks at the world."³ The question which still remains is when we look at a Telidon image display do we see the reflection of ourselves - the projected image of our thinking, an image which is held up for imitation and criticism or do we see only the unintrusive darkened window of a television set. The "Metamorphoses" told by Ovid seems equally appropriate here -

What you see is but the shadow cast by your
reflection; in itself it is nothing. It
comes with you, and lasts while you are
there; it will go when you do, if go you
can.⁴

Technology's conceit suggests we will find all the answers

to our needs in front of us. The folly of this thinking is clearly the danger of ignoring the important lessons behind.

In Chapter Three we examined some of the theoretical underpinnings which support the notion that communication technologies have been mislabelled as "extensions of our senses" and frequently fail to provide us with suitable tools for social interaction, other than by providing society with a common knowledge base about particular subjects. The reality, however, is that human behaviour ensures that if other means and technologies appear to require more effort to reach the same goal they are less likely to be selected.⁵

Our examination of the Telidon/videotex technology in Chapter Four reveals the complexity of the issues which range from technical concerns over standards to application and marketing limitations. The question of Telidon becoming a significant symbol for thought in the very near future is problematic as is the likelihood of a massive labour shift.⁶ As John Madden has pointed out -

Videotex itself is unlikely to cause a significant change in the total number of jobs available . . . there could be some shift of jobs from "hard copy" journalism to "soft copy" [videotex] journalism.
(Madden, 1979:16)

Electronic publishing is only one of the directions videotex may travel, although the evidence to date indicates that a growing proportion of the page creation inventory consists of textual information. Indeed, Telidon/videotex may be the

Phoenix rising from the ashes of the print empires.⁷

Until we have had time to consider the impact of the technology it is little merit to consider more than the implications we have suggested. The technology affords us the opportunity to reconsider the way we structure our repository of knowledge. Nevertheless, we recognize the cognitive change which must take place if we are to channel our information through a medium that can hide the complexity and power within.

If Leslie Armour's argument holds that:

the process of the creation of standard men for standard tasks and the resultant competition did more than anything else to orient time from a dominating (but not wholly) cyclical notion to a linear notion which has plagued us ever since.

(Armour, 1981: 35)

then the shift in thinking has been the result of the changing symbols in our society. The new information technologies bear little resemblance to the artifacts of the past even when they are modeled on earlier forms.

We have not attempted to explain the organizational linkages and economic structure of Telidon since this presents a valuable study in itself, as does the changing labour opportunities represented by the new information order. Similar research in the relationship established between man and his personal Telidon terminal will also prove interesting if we are to understand cognition better, as it affects the individual, the knowledge he/she has access to, and relationships in society.

APPENDIX

I Chronology of Developments

- 1969 -Basic research and development of interactive visual communication system, Communications Research Centre, Department of Communications.
- 1973 -Technology transfer agreement with Norpak Limited for the commercial development and sales of graphic terminals.
- 1976 -Herb Bown, research unit manager, was asked to create a simulation of the Prestel system.
- 1978 -August 15, press conference for the unveiling of the Canadian Videotex prototype.
- 1979 -March, First of the Field Trials began with TV Ontario -The Ontario Educational Communications Authority.
 -April, the Canadian Government announces its \$ 9 million Telidon programme.
 -November, the Canadian Videotex Consultative Committee (CVCC) and its sub-committees were formed (including Videotex Information Providers Association of Canada -VISPAC).
- 1980 -June, International Telegraph and Telephone Consultative Committee (CCITT) recommend equal status for PRESTAL, ANTIOPE, and TELIDON.
 -Second generation Information Provider terminals.
- 1981 -February, announcement of \$ 27.7 million additional Government investment.
 -May, First Commercial Telidon service GRASSROOTS.
 -May, AT&T announce its Presentation Level Protocol" (PLP) in support of TELIDON.
- 1982 -February, announcement of the new Telidon standard "Technical Note No. 709-E".

TELIDON FIELD TRIALS
and COMMERCIAL SERVICES

TABLE I-1

PROJECT NAME	ORGANIZATION	OPERATION DATE	LOCATION	NO. OF TERMINALS	MEDIUM
1. Ontario Telidon Network	TV Ontario	March 1979 Jan. 1980	Ontario	55	Telephone Wire
2. IDA	Manitoba Tel.	June 1980 Dec. 1981	Manitoba	33	Coaxial Cable
3. MERCURY	New Brunswick Telephone	April 1981	New Brunswick	45	Telephone Wire
4. CANTEL	Task Force on Services to the Public	April 1981	Across Canada	100	Telephone Wire
5. VISTA	Bell Canada	May 1981	Quebec	491	Telephone Wire
6. GRASSROOTS	Infomart and MTS	May 1981	Manitoba	150	Telephone Wire
7. AGT/TELIDON	Alberta Govt. Telephones	Aug. 1981	Alberta	30	Telephone Wire
8. ELIE	Manitoba Tel.	Sept. 1981	Manitoba	150	Optical Fiber

TABLE I-2

144									
9.	Marketfax	Cableshare	Nov. 1981	Canada	12	Telephone Wire			
10.	Videopress	Cableshare	Nov. 1981	Ontario	12	Telephone Wire			
11.	ELECTRONIC MESSAGE SERVICE	British Columbia Telephone	Dec. 1981	British Columbia	200	Telephone Wire			
12.	Premier Cablesystems	Premier Cablesystems	Dec. 1981	British Columbia	Open Channel	Coaxial Cable			
13.	Maritime Telephone and Telegraph Trial	Maritime T&T	March 1982	Nova Scotia	15	Telephone Wire			
14.	AGORA	Université du Québec	April 1982	Quebec	100	Coaxial Cable			
15.	INFOCABLE	Cable Telecom. Research Institute	June 1982	Ontario	Open Channel	Coaxial Cable			
16.	City of Calgary Telidon Field Trial	City of Calgary	June 1982	Alberta	Open Channel	Coaxial Cable			
17.	Teleguide to Ontario	Infomart	June 1982	Ontario	1200	Telephone Wire			
18.	INET	Computer Communications Group/Trans-Canada Telephone System	July 1982	Canada	275	Telephone Wire			

TABLE I-3

145							Telephone Wire
19.	CABOT	Memorial University	July 1982	Newfoundland	3		
20.	PATHFINDER	Saskatchewan Telecom.	July 1982	Saskatchewan	125		Telephone Wire
<u>Future Trials:</u>							
21.	IRIS	Canadian Broadcasting Corporation	Sept. 1982	Ontario Quebec Alberta	500		Broadcast
22.	Ontario Telidon Network	TV Ontario	Oct. 1982	Ontario	100		Telephone & Broadcast
23.	Telidon 2	Télécâble- Videotron	Fall 1982 Fall 1983	Montreal Quebec	250 250		Teletext- Coax Videotex- Coax
24.	PALAIS DES CONGRES DE MONTREAL	Société du Palais des Congrès de Montréal	June 1983	Quebec	Unknown		Telephone & Coaxial Cable
25.	INFOCABLE	Cable Telecom. Research Institute	Fall 1983	Ontario	Unknown		Coaxial Cable

NOTES

ENDNOTES

CHAPTER ONE:

¹ Bell points out that "the earliest modes of mechanization simply copied the earlier shapes they displaced" (Bell, 1980:46).

² Bell argues that as the first railway car tracks were modeled on the same width as carriage wheels so it happened that "function followed existing form" (ibid).

³ McLuhan uses the example of the African audience whose relationship to media differs totally from North Americans who see the content and its role in a totally different manner (McLuhan, 1962:51).

⁴ As Innis suggests "we can perhaps assume that the use of a medium of communication over a long period will to some extent determine the character of knowledge to be communicated" (Innis, 1951:34).

⁵ Lewis Mumford, The Myth of the Machine: The Pentagon of Power, 1970, p. 298.

⁶ The role of "facilitator" was the main theme advocated at "Technology and Its Future in Education" a symposium sponsored by the Ontario Educational Communication Authority, Toronto, October 1980.

⁷ Kant argued that there is one categorical imperative, namely that one should act or behave in the same manner as suitable for all others. Christian and Eastern doctrines offer similar moral codes.

⁸ Since the development of radio in the 1920's the advent of new communication technologies have been developing at an increased rate, first with the component technology such as television, computers et cetera then followed by varied means of distribution.

⁹ A biological analogy is presented with the study of videotex/Telidon to attempt to show the total effect produced by the interaction of man and his machines.

¹⁰ As Innis suggests - "the impact of writing and printing on modern civilization increases the difficulty of understanding a civilization based on the oral tradition" (Innis, 1951:41). The same can be said of cultures who utilize different communication methods.

11 The rapid industrial and ideological change which emerged in Japan and Germany following the Second World War is evidence of how a society can redirect its development from previous structures.

12 Thompson suggests that "with this Telidon increased graphics ability we really have the opportunity to rethink the fundamental way we write, that we could add an iconic language to our repertoire with time varying icons (TV Ontario, November 13, 1980).

CHAPTER TWO:

¹ There are a number of other developments which also relate to videotex technology including the refinement of glass making, chemistry, transportation, and numerous other adaptations of techniques which directly or indirectly have produced the advances necessary to produce Telidon-videotex. We have, however, selected these particular innovations to relate the critical elements which have had noticeable impacts in history.

² Erech is also known as Uruk or Warka in other works (Durant, 1963:118).

³ Durkheim writes: "religious representations are collective representations which express collective realities; the rites are a manner of acting which rise in the midst of the assembled groups and which are destined to excite, maintain or recreate certain mental states in these groups" (Bohannon, 1973:255).

⁴ also estimated between 2750 B. C. and 2625 B. C. (Innis, 1972:16).

⁵ Although more durable than paper the clay medium would tend to be centralized and subject to the perils of wars or nature.

⁶ There is a cultural bias, as Innis points out, which determines the way a particular people conduct their social affairs. This bias is carried forward with each generation until there is a reason to change, that is trade with others or as a result of political struggles. Social psychology theory argues that the natural development of the human being produces a stage of independence and rejection of values held by the parents (Gleitman: 1981:489).

⁷ The Greek letters eta, lamda, xi and mu are opposite in direction from the English letters, however, the Russian alphabet reflects this notion even further with its backward "R" or ya. (Durant, 1966:205).

⁸ Not until this point do we see a shift in power where the people are not dependent on a few literates to provide interpretations of past literature.

⁹ Ritual, both written and for the most part unwritten, has provided the framework for social behaviour. In its cultural form it is represented by traditions; in its religious form, by rites.

10 There were some 40,000 monasteries under the Benedictine rule at this time each linked to the other by the decree "that the bells of the monastery be rung seven times in twenty-four hours" (Mumford, 1962:13).

11 Formalized technique has been argued by Bell and Ellul as a negative impact because it is applied to everything and anything. Ellul condemns such systemization as an indication of social conformity and a preoccupation with methodology. Yet without this ordering, which eventually led to the "scientific method", most of our modern-day knowledge would not exist.

12 Charles Singer, et al., A History of Technology, Vol. I, N. Y., University of Oxford Press, 1954, p.223.

13 All of these media involve more than the direct function they serve, since there are support industries such as pulp and paper manufacturing, equipment manufacturing, transportation, buildings construction. "Associated industries" in this context, however, will mean those electronic/communication networks which provide the direct linkages.

14 "Yellow Journalism" is the name given to that period of history in which news was sensationalized to attract the readers attention. Newsmen deliberately sought after headline news events to sell copies.

15 It should be noted that although the number of daily newspapers decreased, the circulation rose tremendously between 1900 and the 1930's, mainly due to the outbreak of World War I and the arrival of the depression; each event provided mass interest.

16 The role of "gatekeeping" is a term first coined by Kurt Lewin and has been readily adopted in the mass media to identify the channeling role performed by the press and news broadcasters.

17 Thomson is the owner of Info-Globe, a computer data base made available to the public and business interests, (Also available on Bell Canada's Display Phone service). Torstar Corporation and Southam own the sole international marketing agency for Telidon-Infomart Ltd.

18 Distribution figures for weekday circulation at the end of the second quarter (June 30, 1980) were 125,970 and 162,660 including Saturday. By September circulation was up to 139,700 weekdays and 176,948 including Saturday.

19 The radio and television newscast depends on repetition and impact visuals (television) to create awareness of an event which is carefully selected to fit a particular time period and duration.

20 American television has already crept into Canadian livingrooms prior to 1952 just as the radio networks competed for listeners along the border metropolitan centres.

21 Rutherford points out that "National advertisers scrambled to use the airwaves to send their spiels to the unseen but huge television audience . . . the biggest stations earned a before-tax profit on equity of 98.5 percent in 1964". (Rutherford, 1978:85)

22 Figures provided by the Canadian Broadcasting Corporation, Head Office, Ottawa, September 1982.

23 Since European countries use mostly a 50 cycle system the effect has been that much of the technology (primarily television) developed there has had little marketing success in the United States and Canada unless they have produced an NTSC version.

24 The two rivaling formats in Europe are the Phase Alternating Line (PAL) and Séquential Couleur à Mémoire (SECAM).

25 Rutherford states: "the multimedia have at times slavishly fashioned their offerings according to a foreign blueprint. During the golden age of radio, CBC news was modelled upon the BBC version; in recent years, television news has followed the American lead." (Rutherford, 1978:100)

26 The "anti-war" protests of the mid to late 1960's by college students contributed considerable to the media coverage of the American foreign policies.

27 Earth-station receiving dishes range in prices from \$800. to \$8,000. depending on the quality installation site, however, until recently only Telesat Canada was authorized to provide earth-station units (at \$20,000/year rental rate).

28 Cable television operation began in Canada during the 1950's as a means to provide better reception in outlying areas of Ontario and British Columbia. Not until the late '60's did the growth of cablecasting start to include several channels.

29 The Canadian Statute of 1968 established the Canadian Radio-Television Commission (CRTC) and added the provision "that Canadian broadcasting should promote national unity". (Singer, 1975:196).

30 David Suzuki predicts that within ten years we will have deciphered the human genetic code.

31 Solid-state electronics uses the electronic properties of solids to replace mechanical switches for electricity/current flow.

32 Kant used the term "monad" to refer to the smallest common element in the universe from which everything is made.

33 Actually, several small computer companies rivaled International Business Machines (IBM) including Honeywell, Univac, et cetera.

34 The arrival of what have been called "gateway" programmes now offer, to some degree, conversion from one computer language to another. Trans Canada Telephone offers a programme called INet which links several systems.

35 All 64 letters of the deoxyribonucleic acid molecule have been identified with the help of computers, and it is only a question of time before the entire code will be charted.

36 Theodore J. Gordon and Robert H. Ament, "Forecasts of some Technological and Scientific Developments and Their Societal Consequences" in Technology and Man's Future, edited by Albert H. Teich, 1977, p. 7.

37 McLuhan's sometimes bizarre statements have been critized negatively by many traditional scholars yet those who knew him suggest his intent was always to provoke thought. (From discussions of the Canadian Communications Association assembly, Learned Societies, Ottawa, 1982)

38 The Bell Telephone IRTV represented some degree of control for the teacher since programmes could be requested for viewing without days prior notice. The limitation was set in the number of videotape players available at any one time.

39 The circulation of videotapes to Ontario schools has provided more direct control of the audio/visual media by the teachers but has added to the cost of duplication and distribution (that is shipping costs).

40 Packet switching technology or what is sometimes called TBX, provides a means of condensing the voice or data message into short segments which can then be transmitted efficiently. In this method there are no silent periods between information - if one person's information is not ready to be carried through the lines then someone else's will be.

41 These new computer programmes are sometimes referred to as "wrap-around" programmes because they build on the existing programme. Theoretically, artificial intelligence could increase exponentially if this process continues.

CHAPTER THREE:

¹ Canada has provided the environment for this merging since our cultural heritage can still be linked to the European schools while the technology is grounded in North American systems.

² The notion is a wholistic approach which considers the influence and change of any one element causes a change in the relationship.

³ Gerbner's model is more complex because it considers that there are two stages of encoding, one by the person and a second in the technology.

⁴ D. M. White has similarly analysed the communication role in "The Gatekeeper: A Case Study in the Selection of News". In People, Society and Mass Communications, Ed. L. A. Dexter and White Free Press, 1964.

⁵ Whereas content analysis can be applied very well to television, radio and the print media, it is premature to apply the technique to Telidon pages until there are sufficient numbers to be counted in working applications.

⁶ What Cartwright is suggesting is that timing is an important element in considering the influence of media. A predisposition to receiving information in a given manner ensures a greater propensity to acceptance of the information provided this way.

⁷ We earlier alluded to a social cognitive dissonance brought about by the outpacing of man by his technologies. The time to adjust to new concepts and information technologies is clearly not always available.

⁸ The holographic or wave-front reconstruction process was first detailed in a paper for the Proceedings of the Royal Society 1949 in "Microscopy by Reconstructed Wave-fronts".

CHAPTER FOUR:

¹ As cited by C. C. Gotlieb & A. Borodin, Social Issues in Computing, 1973, p.

² Herbert Bown, a General Description of Telidon: A Canadian Proposal for Videotex Systems, Department of Communications Technical Note No. 697-E, December 1978, p.2.

³ See glossary definition.

⁴ Also known as "alpha-mosaic".

⁵ Both PAL and SECAM formats utilize a 625 line scanning system with 50 cycle power. The NTSC format uses 525 line at 60 cycles per second. The resolution of the European systems are therefore somewhat higher.

⁶ The original work with computer graphics concerned strategic plans for National Defense, and methods for minimizing transmission errors losses on telephone lines.

⁷ Michel Mills identifies the problem in Telidon Behavioural Research 3, 1981, p. 3.

⁸ A "user friendly" computer also means that the language of instruction is spoken English.

⁹ R. J. Zavada, SMPTE Journal, Vol. 83, April 1974, p. 304-16.

¹⁰ This also ensures, to some extent, that the same Telidon page can be shown on a liquid-plasma display or other "flat screen" displays which may develop.

¹¹ This point is discussed further in Chapter Five. Since Telidon is one "way of seeing" data, there are other perspectives which could require direct access to the basic data base.

¹² The problem which has not been addressed here is how to access the pages other than by the "tree structure", when the topic sub-categories have been intentionally ordered in this pattern. The time required to move through the branches may prove discouraging.

13 This is the same technique used by the Japanese Captain protocol. Pictures which are reproduced use a "bit-plane" memory format, (see glossary for definition).

14 The Communication Research Centre's engineers responded to the information, that Canadian telephone and broadcasting companies were buying the British and French videotex systems for trials, by developing a "better" system (Kent, 1981:191).

15 The importation of foreign goods has plagued Canada since its colonial days, as Innis has pointed out with the "staples tradition" and Clement's examination of the corporate linkages between Canada and the U. S. Large scale manufacturing such as farm equipment, the automobile, and aircraft have failed to capture a Canadian developer, other than as subsidiary companies.

16 Jonathan Chevreau, "IBM videotex discounted as Telidon threat", Toronto Globe and Mail, Saturday June 19, 1982.

17 Teletypewriter Exchange Service (TWX) is operated by the Trans Canada Telephone system with 5,100 subscribers in Canada. Telex, introduced by CNCP Telecommunications in 1956 has more than 41,000 customers.

18 Laser technology is defined in the glossary, however, in this work we refer to laser beam as an open-circuit format like microwave telecommunications. Fibre optic cable also uses laser technology in a closed-circuit system.

19 The geostationary satellites are placed in a near circular orbit as close to the equator as possible. The signal pattern broadcast to earth produces a distorted ellipse "footprint" which broadens and weakens the further north it reaches.

20 By 1978, the telephone companies reported from the 260 separate systems over 158.38 million kilometers of wire are in use covering a route length of 642,207 km (Canada Year Book 1980-81:616).

21 The Consultative Committee on the Implications of Telecommunications for Canadian Sovereignty (Clyne Committee, March 1979), have pointed out in Telecommunications and Canada that "carriers" of information should be separate from the "producers" of information. Where the delineation becomes complicated is in the case

of Bell's Vista programme which provides both the creation of pages for a client (producing) and the means of routing (carrying) the information.

²² Bell System, "Videotex Standard: Presentation Level Protocol", American Telephone & Telegraph Company (AT&T) announcement, May 1981.

²³ C. D. O'Brien, H. G. Bown et al., Telidon-Videotex Presentation Level Protocol: Augmented Picture Description Instructions, Department of Communications, February 1982, p. 7-10.

²⁴ *ibid.* p. 2.

²⁵ It is unlikely that an economically viable conversion programme could be undertaken to adapt older television sets to the RGB direct drive input signal. The technical quality fluctuates considerably among sets. For this reason the most practical development and approach will be the gradual up-date of new equipment and the introduction of high quality processing devices to improve Telidon and regular programming on television.

²⁶ Richard Larratt, "Market Factors" in The Telidon Book, eds. David Godfrey and Ernest Chang, (Toronto, Press Porcépic Ltd, 1981) p. 64.

²⁷ This point is raised more specifically in Chapter Five in an interview comment by Herbert Bown.

²⁸ Many of the services which are being billed as Telidon technology are in fact computer services already in operation or covered by other programmes, particularly where the service involves alpha numeric text. This is the case with "telex", interbank computer services such as "instabank" and "cashstop", or on-line search programmes (Info Globe, ERIC, and Encyclopaedia Britannica).

²⁹ The Canadian Videotex Consultative Committee (CVCC) was formed November 1979. The committee is composed of members from the private and public sectors and government, concerned with videotex developments. Collectively, their function is to advise the Assistant Deputy Minister of Research, (DOC) Mr. Douglas Parkhill, of the needs and safeguards for the technology. A sub-committee structure, including the Videotex Information Service Providers Association of Canada (VISPA), addresses issues of privacy, control, and standards for the industry.

³⁰ The CVCC has representatives from the telephone companies, Ontario Educational Communications Authority, Canadian Cable Television Association, Southam publishers and Informart to mention only a few. The players are the same who have existing financial interests in information technology.

³¹ TV Ontario provided the ideal Trial programme for testing teletext because of its broadcast facilities and large Ontario coverage area. Phase three of the Trial is now providing the "Careers search" programme for students as text display only.

CHAPTER FIVE:

¹ With the development of writing came the written laws of Rome. Innis writes:

A written instruction called the formula was sent to the judex ordering him to condemn or dismiss the defendant according to the answer to the question raised. The exact question in dispute was therefore determined by trained lawyers and the actual facts by laymen (judex) who settled the dispute according to the formula decided by the praetor, a trained legal expert. The older spoken formulae were displaced by written formulae, but only after the technique of the jurist had been fixed to a degree that the innovation had little influence.

(Innis, 1972:88)

² Lewis Mumford, Technics and Civilization, (N. Y., Harcourt, Brace & World, Inc. 1963) pp. 14-17.

³ Pike has coined the words "etic" and "enic" from the words phonetic and phonemic following the conventional linguistic usage.

⁴ If we are to accept Thompson's notion of "ethereal good" that is information as a commodity, Innis's staples tradition theory can be applied to the present development and interest in videotex/Telidon where the information providers of tomorrow are buying and selling information as any other merchant group.

Use of the new information technology is important to the Canadian economy because this country is extremely dependent on the world economy. Foreign trade represents about one third of our GNP.

(Serafini, Andrien 1981:69)

⁵ The "talking head" image of the television news has changed in recent years with the advent of electronic news gathering using remote television cameras and micro-wave feeds for immediate coverage.

⁶ In his address to the Canadian Communications Association, the Honourable Francis Fox, Minister of Communications states:

"Today Canadians spend 500 million hours a week watching television ... about 23 hours per week per person. In the case of Canadian children, by the time they reach the age of twelve, they will have viewed some 12,000 hours of television ... about twice as much time as they will have spent on their formal education."

(Learners Society, June 5, 1982)

⁷ The relatively subtle differences between the Canadian Broadcasting Corporation's Journal news programme, and the Canadian Television Network's news or that of Global Television relate to personalities and much less content.

⁸ The Royal Commission on Newspapers report states "From 10,000 to 50,000 small computers will be in Canadian homes by 1985, it is estimated" (Kent, 1981:194).

⁹ Science Council of Canada, Forging the Links: A Technology Policy for Canada, February 1979.

¹⁰ W. Sawchuck, H. G. Bown et al., An Interactive Image Communication System Using Narrowband Lines, Department of Communications, April 1978, pp. 129-31.

¹¹ Herbert Bowh, interview, August 26, 1982.

¹² Bell telephone frequently requests Holiday season calls to be placed before the rush of Christmas to avoid disappointments. Part of the traffic can now be handled with packet switching technology and satellite communications, however, most local systems have built in transmission limitations which tie new technologies, including videotex, to antiquated equipment.

¹³ "Ethereal" is defined in the Concise Oxford Dictionary as: /1. Light, airy; heavenly: of unearthly delicacy of substance, character, or appearance. 2. Of or like ether, i.e. medium formerly assumed to permeate space and fill interstices between particles of matter; medium in which electromagnetic waves were formerly thought to be transmitted./ We will assume in this application Thompson is applying the second definition.

14 "Transformative class of interactions" in this sense relates to new forms of interaction both in terms of man with machine and relationships between people. The telephone brought about new methods of interrupt strategies for people engaged in conversation. Silence in a telephone conversation can mean more or less than intended.

15 TV Ontario Tenth Anniversary Special; From Books to Bytes, Laurier Lapierre, Gordon Thompson et al., November 13, 1980.

16 Spry's momentous speech in 1932 before the Parliamentary committee reviewing the Aird Royal Commission on Broadcasting stated to the Parliamentarians: "The question before this committee is . . . the state or the United States". (Media Forum Vol. 3, No. 2, February 1982, p. 5)

17 Michael Mills, Telidon Behavioural Research 3: A Study of the human response to pictorial representation on Telidon, Department of Communications, 1981, p. 37.

18 As Godfrey and Chang point out, the alphanumeric design in Telidon "treats the page as a mental space and as a recording surface that has to be organized on the basis of three reading levels: space, time and colour". (Godfrey, 1981:139)

19 See Chapter Three, p. 60.

20 Michael Mills, op. cit., p. 5.

21 As we pointed out previously the "interactive" element of videotex simply means that more than one terminal can share a common repository or data bank. Osgood's model requires that the individual (terminal user) is both an originator and receiver of information with some other.

22 It is perhaps naive to believe that the public determines, in an active way, the content of media. Economics, that is, the availability of money and the variety of products are major factors when competing for the consumer dollar. Sponsors depend on changing public opinion and novelties to gain support. (Berelson, 1966:473)

23 The use of colours for coding and for the particular assignment for classification of information has been suggested but is problematic in an international consensus for videotex.

24 See Chapter Three, p. 69.

25 Research conducted by Tombaugh and Dillon indicates the naive user becomes bored or frustated when the pages are not easily located or the pages take several seconds to complete. (Tombaugh, 1982)

26 The single screen, two dimensional format of Telidon does not allow for simultaneous presentation of different information to present new visual relationships or comparisons for the viewer.

27 We suggested in the onset of this work that for the technology to succeed it would have to serve a function which is a perceived need in society not already served by some other or better technology. Also see p. 69 (d).

28 The fact that form is of major importance to our language structure is evident by the development of "justified margins" in printed texts, word processing et cetera. This processing provides neat right-hand margins which are aligned yet change the spacing between words.

29 See Chapter Four, p.81.

30 Chang points out that the "lowest cost" approach to Information Provider terminals is by using a Telidon update module in an Apple personal computer. (Ernest Chang, Design Considerations for the Telidon - Apple Picture Creation System, working paper DSC-16-IR, University of Victoria, February 1982)

31 John Porter, The Vertical Mosaic, Toronto, University of Toronto Press, 1965, p.p. 173-182.

32 Gutenberg's Bible was produced in Mainz in 1455 A.D., by 1513 there were 90 new book titles; 944 by 1523 A.D. The number has increased exponentially with the speed of printing development, ever since. (Carney, 1975:74)

33 Richard F. Dillon & Jo W. Tombaugh, Session X Where the World is Heading: Psychological Research on Videotex, Behavior Research Methods & Instrumentation, Vol. 14 (2), 1982, p.p. 192-7.

34 Michael Mills, op. cit., p. 67.

35 The "gateway" function is that of an electronic translator which converts one computer language or protocol to another.

36 Only now are there negotiations taking place to arrive at an international standard in television to provide for digital interface with the North American and European formats, after thirty years of competition.

CHAPTER SIX:

¹ The problem with using new technologies for old needs is that the newer device not only is "out of phase" with the objectives but it creates additional problems. One example of this is the case when faster and larger jet airplanes replaced earlier versions. Longer airstrips, bigger terminals and longer wait periods for luggage resulted.

² Daniel Bell, The Winding Passage, Cambridge, Mass., ABT Books, 1980, p. 60.

³ Alvin Toffler, Future Shock, N. Y., Bantam Books, Inc., 1970, p. 29.

⁴ Ovid, The Metamorphoses, trans. Mary M. Innes, N. Y., Penguin Books Ltd., 1955, p. 85.

⁵ See Cartwright's fourth variable for crowd behaviour, Chapter Three, page 69.

⁶ It requires time or large numbers of such objects in society for new devices to become significant symbols. Telidon/videotex terminals at present meet neither criteria.

⁷ The Phoenix was a bird in Egyptian mythology which symbolized reincarnation. Only one Phoenix could exist at a time. When it was to die, after about 500 years, it would build a nest for itself which then became its funeral pyre, and from the ashes a new generation Phoenix was born.

GLOSSARY

GLOSSARY

- ALPHA-GEOMETRIC: alphabetic and geometric shapes used in the Picture Description Instructions of Telidon.
- ALPHA-MOSAIC: fixed raster system in which the screen is divided into a number of equal areas which are assigned a character position.
- ALPHANUMERIC or (ALPHAMERIC): Alphabetic and numeric characters.
- ANTIOPE: the name given to France's videotex protocol, based on alpha-mosaic coding.
- BIT: the physical representation, a magnetic spot in a computer memory which represents data.
- BIT PLANE MEMORY: process of storing bits of information for the mosaic composite of a picture.
- BYTE: a sequence of adjacent binary digits (8 bits).
- BUBBLE MEMORY: a memory system capable of retaining vast amounts of information in garnet crystals even when the power source is inactive.
- CALL NUMBER/ADDRESS: an identifying number used to describe a location in a library/computer memory.
- CAPTAIN: an acronym for Character And Pattern Telephone Access Information, the Japanese videotex format which includes a dot matrix character treatment of both Eastern Kanji (Chinese ideograph), Katakana (Japanese square form), Hiragana (Japanese cursive form) and the Western alphabet and number system.
- CATHODE-RAY TUBE: the standard television picture tube, television monitor, or test monitor display.
- CLONE: the process of cellular reproduction based on the genetic blueprint of the organism's DNA molecule.
- CLOSED-CIRCUIT: a system which is self contained and protected from external interference, usually an electrical system.

COAXIAL VIDEO CABLE: a two conductor cable usually composed of a centre wire insulated from the outer woven mesh or foil conductor.

COMPUTER ASSISTED LEARNING (CAL): an educational programme based on interactive computer systems.

DATA BANK: a collection of data organized for rapid search and retrieval.

DATA BASE: a collection of information in a form that can be manipulated by a computer.

DECODER: a converter which changes signals received in one format to another; a circuit which accepts only one format signal and converts it into a usable signal.

DEOXRIBONUCLEIC ACID (DNA): substance in chromosomes of higher organisms, storing genetic information.

DIDON: is the one-way French version of teletext.

DIGITAL: information that can be represented by a collection of bits. The digital computer can represent information only as separate, discontinuous numbers and works on data by mathematically adding binary numbers.

DIRECT BROADCAST SATELLITE: of the new generation communications satellites which contains a high powered transponder (transmitter) to relay a signal from earth back to one-to-three meter receiving dishes. The transponder is typically in the 12/14 GHZ frequency range.

DISH: a parabolic antenna with highly directive wave reflection.

DISPLAY PHONE: a recent development of Bell telephone which provides a display screen, for character display, a standard telephone receiver and a touch sensitive keyboard for typing messages or accessing the data base. (Not to be confused with video phone.)

DOPANT: impurities (commonly of boron and phosphorous) used in the composition of transistors to make the silicon wafers electrically conducting or non-conducting.

DOWN LOADING: a process of transferring data from a host computer to a smaller terminal memory.

EARTH STATION: the receiving facility for satellite communications systems, usually consisting of the parabolic antenna and processing electronics.

ETHEREAL: used in the context of intangible, electromagnetic medium.

FIBRE-OPTIC CABLE: hair-thin strand of extremely pure glass fibre which is insulated and used to carry light-encoded communications.

FIELD JOURNALISM: used in this context to mean remote investigation or coverage of news events.

FIELD SERVICING: used in this context to mean repair servicing, adjustments, modifications other than by the manufacturer.

FIXED RASTER: alpha-mosaic system which divides the screen into a fixed number of equal areas or approximately 960 positions (24 x 40) for home receivers or sub areas allowing for 72 x 80 raster points.

FRAME: the area displayed on a television set, typically two frames are interlaced lines as 1, 3, 5, 7... and 2, 4, 6 to make up the 525 line television picture.

GATEWAY: a computer programme for converting one set of instructions for another, basically an electronic translator.

GEODESIC DOME: a structure built of short struts along geodesic lines.

HOLOGRAPHIC: of or belonging to holography - the process of making a three dimensional picture produced by interference wave fronts on a photographic film/plate.

INFORMATICS: information science; that is the collection classification, storage, retrieval and dissemination of recorded knowledge treated both as a pure and applied science.

- JOSEPHSON JUNCTION: superconductor switching based on Brian Josephson's theory that an electrical current or flow of electrons can tunnel through barriers that would ordinarily restrain them, depending on the presence or absence of a small magnetic field much like a transistor only the amount of current required is infinitesimally small. A computer using Josephson junction switches might be twenty times faster than one using the best competing technology and a fraction of the size.
- KEYBOARD: a typewriter-type input control for a computer terminal which has lettered keys or touch sensitive letters.
- KEYPAD: a calculator-type control panel for limited programme command instructions.
- LASER: (Light Amplification by Stimulated Emission of Radiation) a device generating intense beam of coherent monochromatic radiation in one direction.
- LASER PRINTER: a photo-copy like system which prints hard copy directly from the terminal output.
- MICRO-WAVE: a very short electromagnetic wave.
- MODEM: (MODulator-DEModulator) a device which allows a computer to communicate over telephone lines.
- MONAD: what Immanuel Kant termed for the smallest particle of matter, a universal element.
- MONITOR: cathode-ray tube device used to display broadband video, that is, non-encoded television signals which typically displays higher resolution pictures.
- NTSC: (National Television Standards Committee) the North American television format based on 525 horizontal scanning lines at 60 cycles per second.
- OFF-AIR (recording): the process of using a receiver to pick up broadcast radio or television signals which can then be recorded.

- OFFSET PRINTING: a process whereby a design or page is photographically reproduced on a thin metal plate, which is curved to fit the revolving cylinders of the printing press.
- OPEN-CIRCUIT: a broadcast system which radiates a signal to any number of receivers in the area.
- PERSONAL COMPUTER: a stand-alone system which may include peripheral equipment but generally has a limited storage capacity.
- PAGES (Telidon): the data displayed at any given time on a television/monitor screen.
- PAL: (Phase Alternating Line) television signal format used in most European countrils consists of 625 horizontal scan lines at 50 cycles per second line frequency.
- PDI: (Picture Description Instructions) geometric primitives code used to describe graphics.
- PMI: (Picture Manipulation Instructions) a new generation coding system to offer interactive control of graphics between terminals.
- PRESTEL: the British videotex protocol based on an alpha-mosaic coding scheme.
- RADIO FREQUENCY: (RF) the television broadcast frequency used by television receivers.
- RAM: (Random Access Memory) the main memory of any computer.
- RASTER POINTS: the units defined by dividing the display screen into a matrix of 512 x 512 lines.
- SECAM: (Séquentiel Couleur à Mémoire) the French television format which provides 625 lines in an encoded signal.
- SILICON CHIP: an integrated circuit etched onto a small wafer of silicon, usually by photo-reduction.
- SOLID STATE (electronics): the use of semiconductors for electrical switching using potential differences.

- SYNCHRONOUS:** used in this text to refer to British Prestel system which requires the transmission and receiving times to be matched.
- TAXONOMY:** principles of classification, method of categorizing cognitive behaviour.
- TELEMATICS:** merger of information, information technology and communications.
- TELETEL:** one of the two French videotex formats.
- TELETEXT:** one-way broadcast mode of videotex signal, sometimes called broadcast videotex.
- TELIDON:** alpha-geometric protocol used in videotex/teletext modes, sometimes used to include both coding and system.
- TETRAHEDRONAL:** of the type which is a four-sided solid, triangular pyramid.
- TWX:** Teletypewriter Exchange Service owned and operated by TransCanada Telephone System.
- USER FRIENDLY:** a computer language which is written in simple English.
- VIDEO-CASSETTE RECORDER:** based on different formats ranging from half inch to two inch tape width, available in both consumer and industrial grades.
- VIDEO-DISC:** a method of storing large quantities of video information on plastic record-like discs using either a stylus or laser system.
- VIDEO PHONE:** a communications system which transmits both speech and pictorial information between two communicating entities.
- VERTICAL BLANKING INTERVAL (VBI):** the electronic synchronizing stage in the television picture scanning process.
- VIEWDATA:** British term for the domestic information system created by adding telephone transmission system to the home television set.

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